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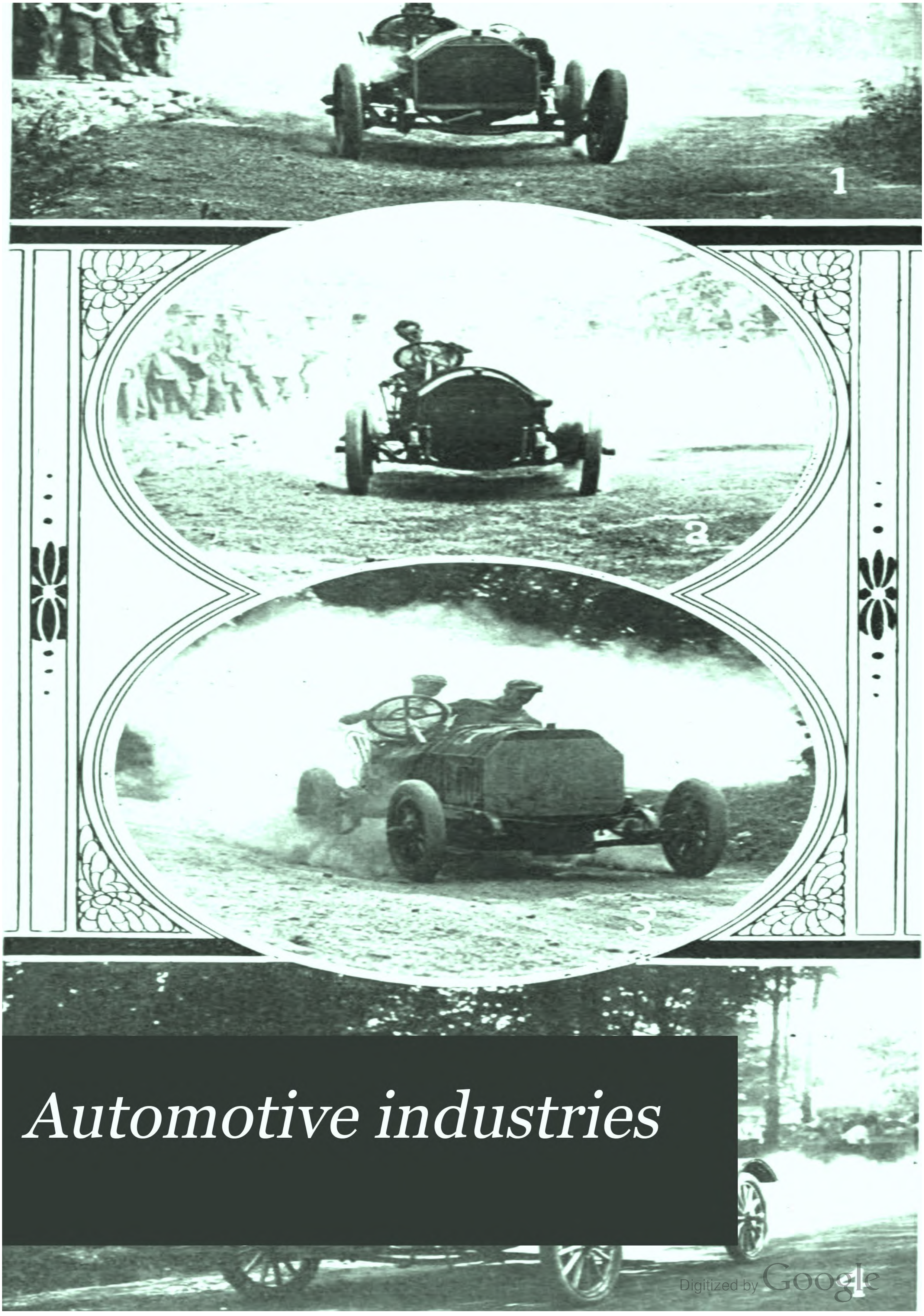

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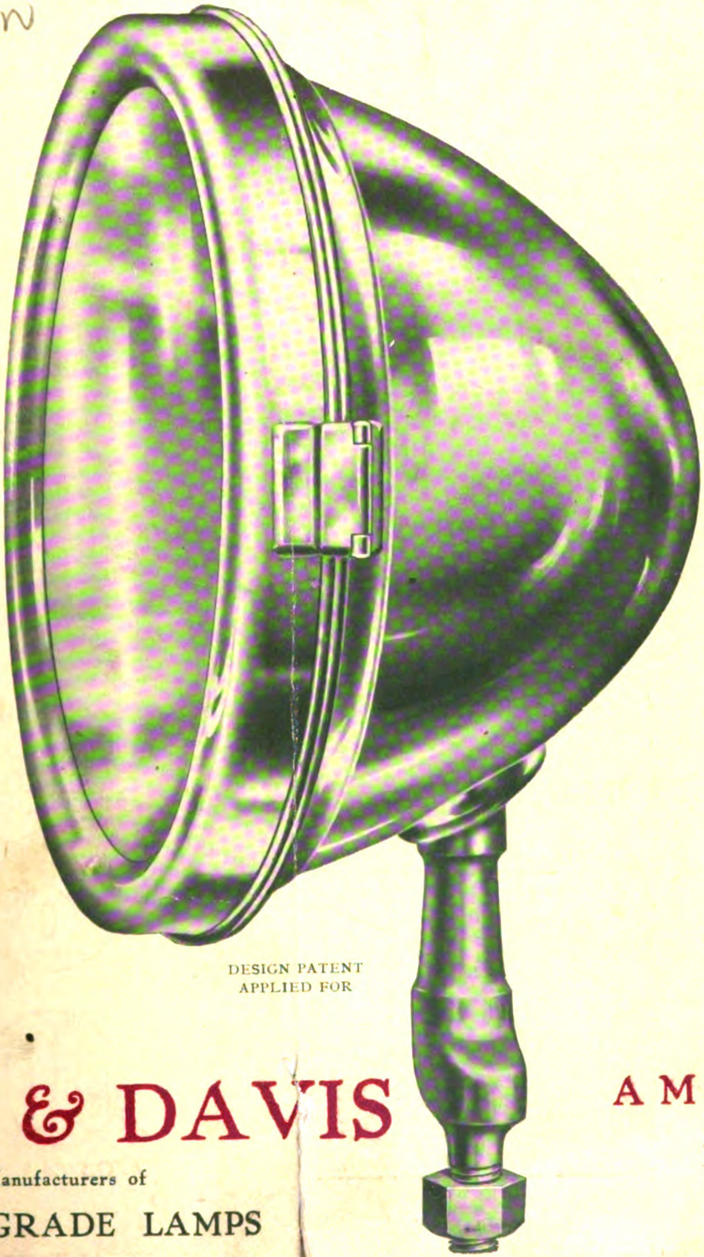

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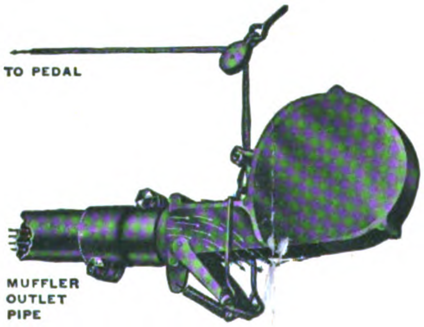

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aXiII NEW YORK—THURSDAY, JULY 7, 1910—CHICAGO No. 1

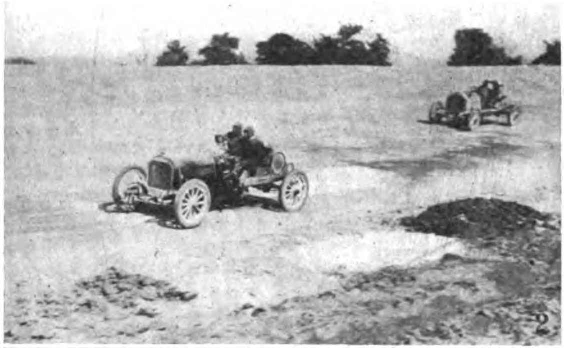
THE AUTOMOBILE

Cobe Trophy Feature of "Fourth" at Indianapolis

INDIANAPOLIS, July 1—For the second time this summer the Indianapolis Motor Speedway opened its gates this afternoon, and despite the excellent card provided a crowd of 6,000 people was lost in the grandstands. This July meet was of a more attractive nature than its predecessor in May, for the reason that it had a number of the trophies up for competition, including the Cobe Cup, the G & J Trophy, the Remy Brassard, and the Speedway Helmet. Two of these were down for decision this afternoon, one of them being the G & J Trophy, which was won by Bob Burman in a Marquette-Buick. The Speedway Helmet offered in the free-for-all at 10 miles, and which was won in May by Bob Burman, was captured this time by Eddie Hearne of Chicago, driving the 120-Benz.

It was a day of sensational record breaking, new marks being established in nearly every one of the stock car events. In the time trials Bob Burman, driving the Buick Special, set 1-4-mile mark at 08.5, an average of 105.87 miles an hour. In the 160-inch class, Herreshoff in a Herreshoff established a new mark of 5:30.61 for this division; Louis Chevrolet in a Buick reduced the 161-230 class 5-mile figures from 4:41.77 to 4:40.8, his own record; in the 231-300 class Burman in the Marquette-Buick smashed the 10, 20, 30, 40 and 50-mile records in the long-distance race for the G & J Trophy. His times were: 10 miles, 8:14.4, previous 8:16.8; 20, 16:21.5, previous 17:10.70; 30, 24:17.1, previous 26:06.11; 40, 32:06.5, previous 34:25.4; 50, 40:03.1, previous 42:03. In the 301-450 class Burman in the Marquette-Buick also cut the 10-mile record from 7:57.1 to 7:56.45, and established a record for 15 miles at 11:46.4. Another demonstration of pace was made by Hearne in the Benz in the Helmet race, in which his 10 miles in 7:13 average 83.14 miles per hour. The G & J Trophy race attracted a field of eleven cars which included Burman and Louis Chevrolet in Marquette - Buicks, Pearce and Heineman in Falcars, Fox in a Pope-Hartford, Harroun and Dawson in Marmons, Moore and Davis in Great Westerns, Miller in a Warren-Detroit, and Cook in a Black Crow. Chevrolet cut out the pace at the start and held the lead for 10 miles, when Burman, sore at being beaten for the Helmet by Hearne, zipped to the front, and set a merry clip for his team-mate. Chevrolet, however, was not beaten so easily, and at the 25-mile post

LINE-UP FOR COBE TROPHY



1—Just After the Start in the Cobe Trophy Race

2—Burman and A. Chevrolet Fighting it out on Turn

3—Aitken in the National "60" Cutting for the Front

4—L. Chevrolet, Last Year's Winner, Stops for Gasoline

his number lead the others on the score board. Shortly after this, however, Burman again gained command, and from that point on held his field in check. All the way, however, he was grimly pursued by Chevrolet. Burman, however, had plenty up his sleeve and nearing the finish he felt so safe that he stopped at the pits to take on a supply of gasoline and oil. Even with this he had enough left to beat out Chevrolet by 4 seconds. Pearce in a Falcar had stuck to his task like a veteran and as a result of his perseverance he brought his car home in third place, just ahead of Fox in a Pope-Hartford. In fifth place was Heineman in the other Falcar, while the other two cars that finished the race were the Great Westerns driven by Moore and Davis. Dawson in a Marmon stopped at 45 miles. Miller in the Warren-Detroit went 25, while Harroun in a Marmon and Cook in a Black Crow stopped in their third lap.

Striving for the Speedway Helmet were Zengel in the Chadwick, Hearne in the Benz, Ireland in a Stoddard, Harroun in a Marmon, Louis Chevrolet in a Buick Special, and Wilcox in the Simplex. Burman and Aitken, although entered, did not answer the call the first time, and got out on the track just as the field was breaking for the flying start. It was called no start, however, so Aitken and Burman lined up with the others on the next trial. The early stages of the battle proved a struggle between the National and the Benz, and these two led past the judges' stand on the second lap. Chevrolet's Buick and the Simplex had dropped while Harroun, Zengel, and Ireland were bringing up in the rear. Hearne after this assumed command, having taken the lead away from Aitken who had turned the 5 miles in 3:40.3. Harroun was runner up, but despite his best efforts he could not catch his fellow Chicagoan, who won the race handily with the Chadwick in third place and the Stoddard fourth.

In the minor events Chevrolet in the Buick was the star, winning twice, while his team-mate Burman, in the Marquette Buick, also captured first place honors. The Alco driven by Grant made its debut as a Speedway candidate and won handily while other firsts went to the Herreshoff in its class, and the Maytag in the handicap.

INDIANAPOLIS, July 2—More records were smashed on the second day of the meet, the feature of which was the 100-mile race for the Remy brassard, which was captured by Burman in the Marquette-Buick, with Dawson in a Marmon second, Harroun in Marmon third, and Arthur Chevrolet in a Marquette-Buick fourth. Burman made a remarkable drive of it, going the century without a stop in 20:35.6, as against the previous record of 1:23.43 made by Kincade in a National in the Prest-O-Lite race last May.

Thirteen cars started in this classic and it proved to be a battle between the Marmon and the Marquette-Buick. If points had been counted the Marmon would have captured the honors, but they weren't so the glory goes to Burman, who, however, had to drive his best in order to beat out the new start, Dawson, by a scant 5 seconds. The field that came to the tape included, besides these four, Kincade in a National, Pearce in a Falcar, Cook in a Black Crow, Moore in the Great Western, Louis Chevrolet in a Buick, Stinson in a Black Crow, Aitken and Wilcox in Nationals and Davis in a Great Western.

Kincade in the National made a bold bid for the race in the early stages, and for 30 miles he showed the speed of the party. Then Burman went to the front and flashed first past the tape at 40 and 50 miles. Sixty miles saw a new leader, when Dawson in the Marmon assumed command, holding the pace until past 70 miles. Then Burman came up again and, although grimly pursued by Dawson, the remainder of the distance he held his own and at the end had enough to gain the decision by only a narrow margin. Dawson made a plucky fight of it, but what hurt his chances was the stop he made at the end of the seventh lap for slight repairs which enabled Burman to go to the front. In the next to the last lap Dawson managed to pick up 8 seconds

(*Continued on Page* 30)

Glorious Fourth at Wildwood

WILDWOOD-BY-THE-SEA, July 2—Car No. 13, a large Franklin, driven by Miss Gallagher, belied its number to-day by winning the first sociability run of the North Wildwood Automobile Association from Camden to North Wildwood, N. J., about 121 1-2 miles, with a penalization of only 5 3-4 points.

The allotted time for the run was six hours twenty-three minutes, which included a stop at Alloway of fifteen minutes for luncheon.

In addition to Miss Gallagher, the only other winners of prizes announced this evening were the Chadwick, No. 26, driven by F. B. Wildman, of Norristown, Pa., which won second prize, with a penalization of six points, and third prize, won by Mrs. D. Walter Harper, in a Stanley Steamer, penalty 8 1-2 points.

The official cars of the run were the Franklin, pathfinder; Peerless, which carried the referees; Matheson, patrol No. 1; Peerless, patrol No. 2; Mitchell, press car. The officials were Clyde A. Woolson, referee; Clarence Cranmer, starter; H. N. Sharp, scorer; P. D. Folwell, A. A. A. representative, and J. L. Keir, contest chairman.

WILDWOOD-BY-THE-SEA, July 4—No records were broken at the meet here to-day, the mile track record of 41 2-5 seconds remaining unchanged. The honors of the day very easily belong to J. Fred Betz, 3rd, in his 90-horsepower Simplex, who, in the time trials, negotiated the mile in 45 seconds flat.

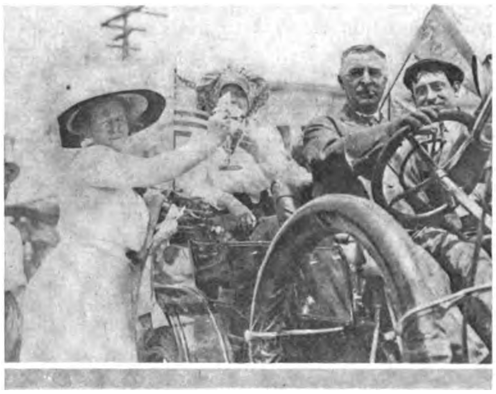
The main event of the day, the free-for-all, was captured by the Simplex in 51 1-5 seconds, the Houpt-Rockwell being a good second in 53 1-5. The Knox Giantess was third, Chalmers fourth.

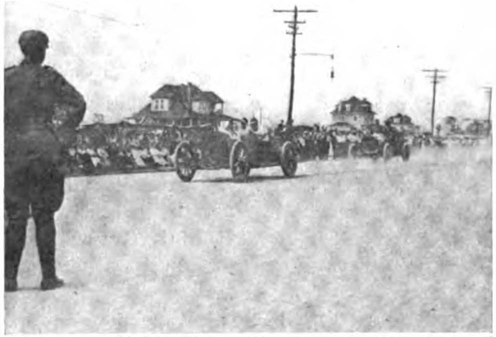
Those who conducted the races were: P. D. Folwell, Representative Contest Board A. A. A.; C. A. Woolson, referee; W. G. Rhodes, assistant referee; C. W. Cranmer, starter; G. Proud and J. Ackley, announcers; A. C. Maucher, chief timer; H. B. Lasher, clerk of course; judges, W. R. Walton, W. Lyman and H. L. Hornberger; umpires, D. W. Boyer, W. Middleton and J. H. Beck; marshals, H. H. Hoffman, L. Smith, A. S. Murphy, L. G. Spingler, Charles Kraus, C. V. Stahl, A. Klein, H. H. Carver and D. C. Bayless. The summaries:

No.	Car	Driver	Time
Runabouts, $1,200 and Under—			
1.	**Warren-Detroit**	G. G. Stranahan	1:06
2.	**Buick**	Tom Wilkie	1:14 1-5
Touring Cars, $1,201 to $2,000—			
1.	**Buick**	P. Hines	:59 3-5
2.	**Buick**	Tom Wilkie	1:09 3-5
3.	**E-M-F**	Frank Yerger	1:10
Touring Cars, $4,000 and Over—			
1.	**Houpt-Rockwell**	Harry Hartman	:59 4-5
2.	**Houpt-Rockwell**	Stanley Martin	1:10
Touring Cars, $2,001 to $3,000—			
1.	**Stoddard-Dayton**	C. A. Warren	1:05 1-5
2.	**Speedwell**	Ernest Stein	1:06 1-5
Touring Cars, $3,001 to $4,000—			
1.	**American**	R. Fertig	:58 2-5
2.	**Palmer-Singer**	George Parker	:59
Stripped Chassis, $1,200 and Under—			
1.	**Waren-Detroit**	Geo. F. Stranahan	1:01 1-5
2.	**Warren-Detroit**	J. L. Fritz	1:01 3-5
3.	**Warren-Detroit**	Tom Berger	1:06 1-5
Stripped Chassis, $2,001 to $3,000—			
1.	**Stoddard-Dayton**	C. A. Warren	1:03 2-5
2.	**Jackson**	Ira L. Brown	1:08 4-5
Stripped Chassis, $1,201 to $2,000—			
1.	**Pullman**	H. P. Hardesty	1:01 4-5
2.	**Speedwell**	Ernest Stein	1:04
Stripped Chassis, $4,000 and Over—			
1.	**Simplex**	J. Fred Betz, 3d	:48 3-5
2.	**Houpt-Rockwell**	Stanley Martin	:53
Free-for-all—			
1.	**Simplex**	J. Fred Betz, 3d	:51 1-5
2.	**Speedwell**	Ernest Stein	:53 1-5
3.	**Knox Giantess**	Louis Disbrow	:54 4-5

Time Trials—

Car	Driver	1st Trial	2d Trial
Simplex	J. Fred Betz	:45	:47
Knox Giantess	Louis Disbrow	:52	:51 1-5
Chalmers	C. J. Rogers	:55 3-5	:53 3-5
Houpt-Rockwell	S. Martin	:48 2-5	:51
Warren-Detroit	Tom Berger	:58 4-5	:61 1-5





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1—Handing Prize to Lucky Number Car in Parade

2—American Traveler, Winner of Event No. 5

3—Winning Franklin, Driven by Miss Gallagher

4—Tom Berger Sending Warren-Detroit Across in Front

Premier and Moline the

CHICAGO, July 2—By decision of the referee given here to-day No. 1 Premier, driven bŷ Ray MacNamara, was declared winner of the Glidden Trophy, with a total penalty of 93 points. Second honors went to the Chalmers 30, No. 5, with 116 points marked against it. Third place was captured by the Maxwell entry, No. 7, driven by H. E. Walls, with a final score of 208 points. No. 2 Premier was fourth, with 806 points; No. 10 Glide fifth, with 2,247 points, and No. 15 Cino sixth, with 2,414 points.

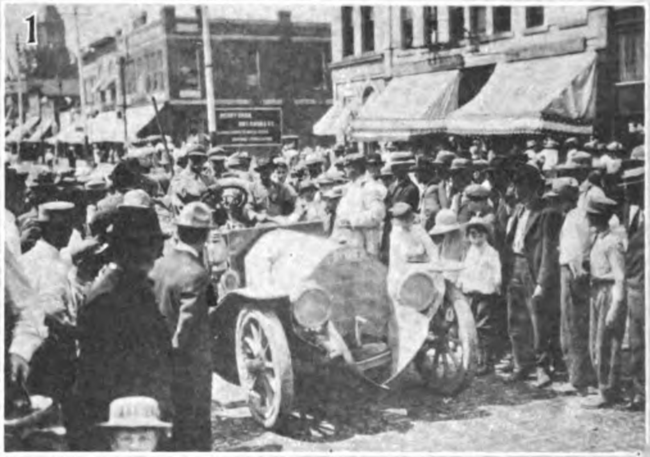
The winning honors in the Chicago Trophy event, which was under the same rules and over the same course as the Glidden, went to No. 100 Moline, driven by C. H. VanderVoort with the lowest score in the field—19 points—the performance of this car being one of the features of the contest, in that it made every checking station on time, took a perfect brake test and lost but 12 points for work on the road and only 7 points in the gruelling final examination at the end of the run in Chicago. This car, according to the rules, had to carry but two passengers, but made the entire 2,850 miles with four passengers, so that in this respect it competed under conditions identical with the Glidden cars. It performed under an 18-mile-an-hour schedule as compared with the 20-mile schedule of the Premier, which was due to its price classification. Second honors in the Chicago Trophy class went to Jesse Illingworth, in No. 107 Maxwell runabout, with 51 points against it. Another Moline, No. 102, driven by F. E. Salisbury, was third with 64 points, and the third Moline No. 101, was fourth, with 481 points. Fifth in this classification went to entry No. 103 Lexington, which it will be remembered broke a side member of its frame running into a sink hole in Arkansas and lost nearly 2,000 points thereby, its final score being 2,042.

Of the twenty-six cars which left Cincinnati three weeks ago on this long test only eleven came into Chicago contesting for either the Chicago or Glidden trophies. There were, however, five of the original entries which entered the city, either as non-contestants or otherwise. Of these five No. 3 Chalmers was disqualified at Oklahoma City for doing work on the car in the garage, but completed the run as a non-contestant, covering every foot of the course. No. 4 Chalmers withdrew at Lawton, Okla., in order to do confetti work, made imperative because of one of the confetti cars breaking down. This car covered the entire distance of the circuit. No. 12 Ohio also completed the entire circuit as a non-contestant, as did No. 106 Falcar, driven by Van Sicklen in the Chicago Trophy division. To this list must be added two four-cylinder Cartercars, that, owing to rear axle trouble, had to lose a day's time and cut the course 100 miles or so in order to catch up with the procession. One of these cars it is asserted actually traveled further than the route called for because of getting lost.

There were several cars which accompanied the tour from the start in a non-contesting capacity, and which covered every mile of the route, these being a Chalmers confetti car, a Columbia car carrying the referee and acting as pacemaker, two Cadillac gun cars carrying four people each, as well as a quick-firing gun, the Halladay press car and the Great Western press car.

As the complete tabulation shows there were but five cars in the whole tour that made perfect control performances—that is, were not late at one checking station on the entire tour—these five cars being: No. 1 Premier, No. 5 Chalmers, No. 7 Maxwell, No. 100 Moline and No. 107 Maxwell. In this respect the Maxwell entry made the best showing, in that it entered but two cars in the two contests and both of these made all controls on time from start to finish. There were two Premiers entered, but one lost out on controls, and of the three Molines, only one was clean on all the checking stations. Only one of the three Chalmers made all checking stations on time.

The final examination at the completion of the tour was a strenuous one in every sense of the term. The first phase of this contest was a brake test in which the cars crossed the braking line at their competing speed of 18 or 20 miles per hour, and their distance was taken for stopping with hand brake, and then with foot brake. Only three of the eleven cars made perfect brake performances—that is, stopped the car under 50 feet with each set of brakes, these three cars being No. 100 Moline, No. 101 Moline and No. 107 Maxwell. There were four other cars that stopped within the 50 feet with the foot brake, but failed with the hand or emergency, these being No. 5 Chalmers, No. 7 Maxwell, No. 102 Moline and No. 103 Lexington. The winning Premier No. 1 was assessed 16 points on its foot brakes, and 48 points on its hand brakes. No. 5 Chalmers, which finished second in the Glidden, was assessed 36 points on the hand brake. No. 7 Maxwell, which lost 33 points on the hand brake, lost these due to a wood shoe forming a part of the braking surface of one brake having been lost.



1—Premier at Marengo, Iowa, Noon Control

2—Chalmers "30" Checking in at Davenport, Iowa

The second phase of the final test was for clutches, the cars having to bring the front wheels to an 8-inch curb and either climb the curb, spin the rear wheels or stall the motor. Only one car was penalized on this score, that being the Lexington No. 103, which was penalized 5 points. After the clutch test the cars were garaged and completely washed so that the technical committee had an opportunity to look over every detail of them for bent, impaired or lost parts. In order to do this the spring wrappings were taken off and no precaution neglected to make the test as thorough as possible. This test revealed several broken fender irons, loose spring clips, and in four or five cases

Glidden Tour Winners

the front springs had slipped back or forward on the axle. Two or three cars showed loose spokes in the wheels and there were two cases of hub-flange bolts being loose. Because of having carried too much weight on the running boards there were two cases of fender and running board brackets having been broken. It was remarkable that after so long and gruelling a test there should have been little trouble as the examination revealed. The complete penalties assessed against each car appear in the tabulation herewith, as well as the points levied in each case.

In summing up the performance of the eleven cars it is most interesting to note that the three Moline entries and No. 107 Maxwell passed the cleanest examinations at the finish. No. 100 Moline had but 7 points, No. 101 had only 3 points and No. 102 set the record of the trip with only 2 points against it, one being for a muffler rod nut lost and the other for the brass sleeve outside of the steering column being loose. The No. 107 Maxwell received but 8 points.

3—Molines, 100 and 101, and Parry No. 105 at Guthrie Center, Ia.
4—Maxwell Checking In at Wichita, Kansas

In the Glidden end of the contest the No. 1 Premier passed the best examination with 15 points assessed against it; then came No. 2 Premier with 20 points and No. 5 Chalmers with 41.

There was not a solitary car that did not receive technical penalties for work done on the road. The car with the cleanest record in this respect was No. 1 Premier with 9 points for taking on water and repairing and replacing fan belts. No. 100 Moline was a close second with but 12 points. The No. 5 Chalmers made the most remarkable road record, in that it went for five days longer than any of the other contestants with its clean road score, and finally lost it on the run into Wichita, Kan., when a fender iron crystallized.

The announcement of the Glidden award was delayed until to-day because of a protest entered by the Chalmers Company against the Premier entry, this protest having been handed to the referee in Kansas City. The protest was on the grounds that the Premiers were not stock in that they carried 1 1-2 gallon oil tanks on the right side under the tonneau floor, and had a hand pump fitted for pumping the oil from these tanks to the crankcase of the motor. An investigation was made and the Premier company claimed to have 74 cars fitted with this form of oiler. The referee would not allow the protest on the ground that the protest, which took into consideration the validity of entry, should have been made before the start of the tour. It is understood that the Chalmers Company is discussing the question of appealing the matter to the Contest Board, which it has the privilege of doing.

The Chicago Motor Club arranged for a checking station in Garfield Park, on the outskirts of the city. At this point a procession was formed of all the contesting and non-contesting cars in the Chicago and Glidden trophies, led by a band.

In the final technical examination detailed penalties were inflicted as follows:

Glidden Trophy

Premier Car No. 1—10, front wheels, spindles, loose; 1, water connection, leaking; 2, engine hanger belt broken; 2, spring clips loose—total 15.

Premier No. 2—2, cylinder head plate, leaking; 5, spring leaf broken, right rear; 5, spring leaf broken, left rear; 1, ignition shaft jaw coupling, loose; 1, hub flange bolt, broken; 4, rear reach rods on foot brakes, bent; 2, rear reach rod lever on foot brakes, bent—total 20.

Chalmers, No. 5—6, fender iron broken; 2, steering gear loose on frame; 1, muffler cutout wire broken; 2, body bolt lost; 1, body bolt loose; 2, shackle bracket loose; 2, ignition terminal broken; 25, tie rod bent—total 41.

Maxwell, No. 7—2, bumper plate lost; 4, four spring clips loose; 5, spring leaf broken, right front; 2, grease cup lost; 5, front wheel loose; 5, steering yoke pin loose; 50, defective brake; 1, body bolt loose; 2, fender bracket loose; 5, front wheel bearing loose—total 81.

Glide, No. 10—5, spring leaf broken, right rear; 2, muffler loose; 150, rear axle housing parted; 2, fan belt lost; 25, fan pulley, broken flange; 1, radiator, leaky connection; 5, spring leaf broken, left front; 6, three spring straps lost; 5, front wheel, loose, left; 5, front wheel, spokes loose, left; 5, front wheel, loose, right; 5 front wheel, spokes loose, right; 5, fender broken; 6, step bracket, broken; 15, steering column crank loose—total 242.

Cino, No. 15—6, three grease cups lost; 15, rear spring bracket, bent; 1, pressure pipe on gasoline feed line, loose; 20, radiator leaky; 2, engine bolts, loose; 10, front wheels, both loose; 2, fender loose; 1, muffler, final exhaust pipe loose; 12, two fender irons broken; 5, spring leaf broken, right front; 5, spring leaf broken, right rear; 5, spring leaf broken, left rear—total 84.

Chicago Trophy

Moline, No. 100—5, front wheel bearing, loose; 2, fan blades, impaired—total 7.

Moline, No. 101—1, gasoline leak; 2, steering column, finishing plate on dash, lost—total 3.

Moline, No. 102—1, muffler nut, lost; 1. steering column sleeve loose—total 2.

Lexington, No. 103—5, ball and socket timer connection broken; 10, both steering yoke bearings loose; 5, wheel bearing loose; 2, grease cup lost; 500, frame side member broken—total 522.

Maxwell, No. 107—1,spring clip loose; 2, nut on step bracket bolt lost; 1, front union on muffler loose; 2, rear fender screw lost; 2, fan bolt lost—total 8.

FINAL STANDING OF GLIDDEN TOUR CONTESTANTS

Glidden Trophy

			Road Pen.			Final Penalties						
No.	Car	Driver	Control	Tech.	Sub Total	Foot Brakes	Hand Brakes	Spring Sag	Clutch	Axles	Tech.	Grand Total
1	Premier	Ray MacNamara	0	9	9	16	48	0	0	5	15	93
5	Chalmers	Wm. Bolger	0	39	39	0	36	0	0	0	41	116
7	Maxwell	H. E. Walls	0	59	59	0	33	0	0	35	81	208
2	Premier	Chas. Bollenger	220	500	720	15	41	0	0	10	20	806
10	Glide	Fred Cassel	785	1070	1855	73	37	0	0	40	242	2247
15	Cino	Walter Donnelly	977	1168	2145	38	142	5	0	0	84	2414

Chicago Trophy

100	Moline	C. H. Vandervoort	0	12	12	0	0	0	0	0	7	19
107	Maxwell	Jesse Illingworth	0	43	43	0	0	0	0	0	8	51
102	Moline	F. E. Salisbury	25	37	62	0	1	0	0	0	2	64
101	Moline	J. A. Wicke	90	388	478	0	0	0	0	0	3	481
103	Lexington	J. C. Moore	508	874	1382	0	113	0	5	0	522	2042

Owen Cars with Big Wheels and Left-Hand Drive

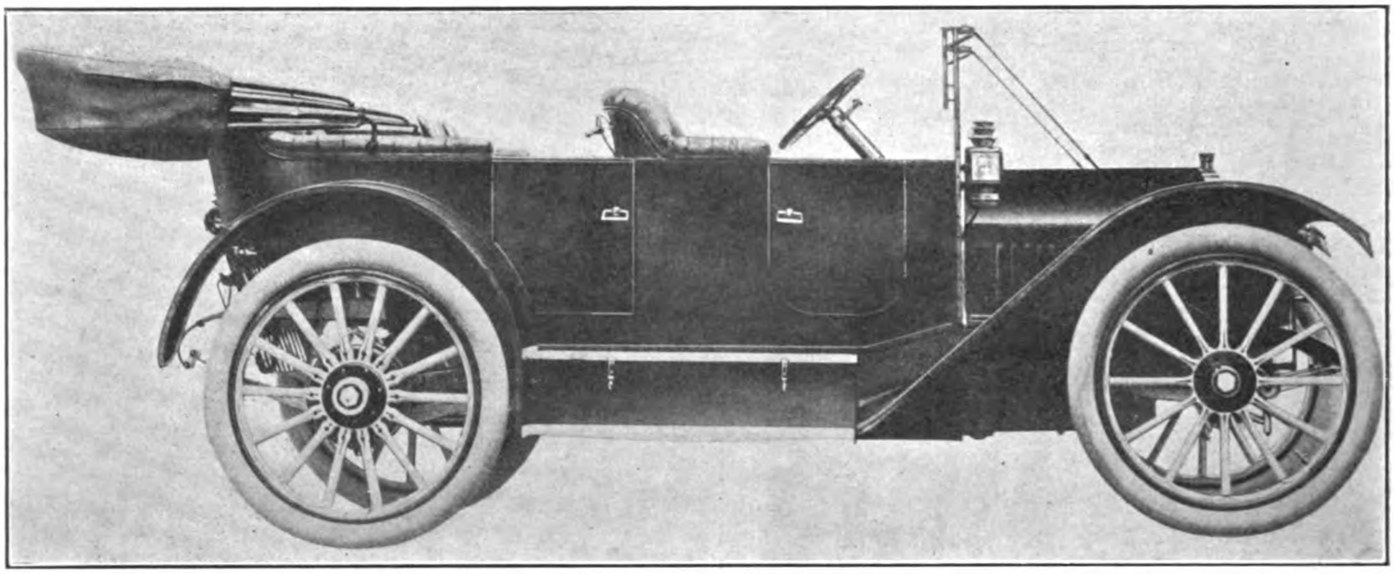


Fig. 1—The car complete with a gunboat type of body, left-hand steer, control amidships and large diameter wheels

COMBINING, as it does, the results of past years of experience as mechanics, designers and producers, unhampered by any questions of factory equipment, firm policy or executive prejudice, it follows that the 1911 product of the Owen Motor Car Company, of Indianapolis, Ind., should represent the last word in latter-day motor car construction.

The fundamental points upon which the Owen product has been built include, among others, these primary essentials: long-stroke engine, left-hand steer, right-hand control, low gravity, closed-front, straight-line body and high wheels.

While much has been said and written as to the relative merits of right and left-hand steer, it is the experience of many qualified drivers that a car can be handled much better from the left than from the right. With the traffic rules in force in this country it is more essential that a clear view of the road to the left be had than to the right; a left turn is fraught with more danger than one to the right; besides, it permits the occupant of the guest seat to alight directly on the curb and not in the mud of the street, at the imminent risk of being run down from the rear by an automobile traveling in the same direction.

Forty-two-inch wheels, the standard equipment of the Owen, make for ease in heavy going, increased traction area, comparative freedom from side-slips and high mileage—in the latter respect the builders claim an increase of from 200 to 300 per cent.

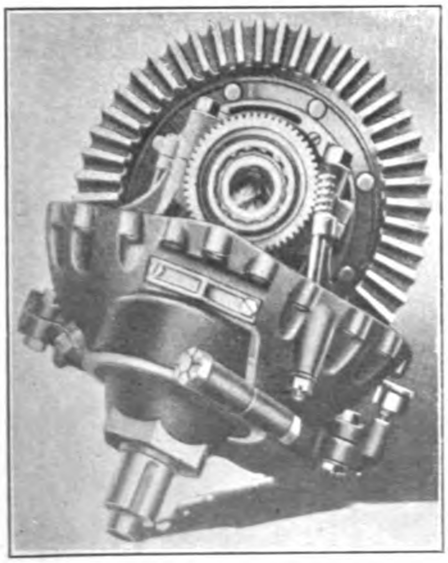


Fig. 2—Differential and bevel drive unit which are separately assembled

The double-dropped and offset frame members facilitate a greater turning angle and enable the production of a high-wheeled car with a lower gravity with respect to spring suspension than is possible by ordinary construction.

The closed-front, straight-line body, the standard Owen equipment, is a much-appreciated guard against wind and weather, and a preventive of trailing robes or garments. Besides, the straight lines set off the finish, all the mouldings being worked out of the solid wall of the sides. The absence of double mouldings and other embellishments conveys an idea of unadorned simplicity.

Notable Mechanical Refinements in the 1911 Car

Passing from the general appearance of the car as it is shown in Fig. 1 to the motor, the left side of which is presented in Fig. 5, opportunity will be taken to comment upon the excellence of the magneto installation. It rests upon a pedestal which blocks it up to the exact right height, so that the armature spindle is in correct alignment with the extension of the driving shaft, and a universal joint intervenes, the function of which is to compensate for such minute differences as may be inadvertently interposed. The magneto is so placed that the wiring of the high-tension system passes up through a conduit to the distributing box, which is parallel to the line of spark plugs, and by a special system of terminals the spark plugs are so joined that each of them may be disconnected with a minimum of effort for purposes of testing.

The upper half of the motor case carries a pair of arms which extend out to the chassis frame, but instead of a sod-pan the aluminum case is flanged out between the arms, serving as a perfect substitute for the sod-pan, and affording a platform on which to rest the auxiliaries, and to place tools which may be used in making ad-

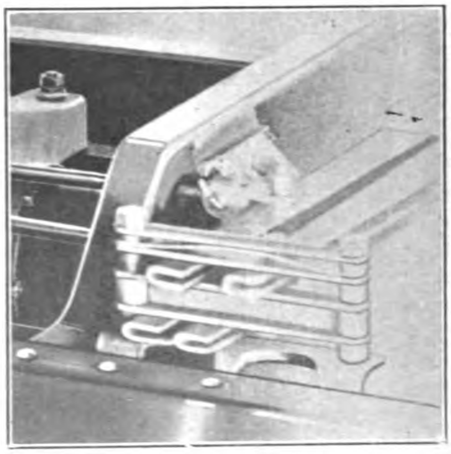


Fig. 3—Details of the equalizing bars for the brakes

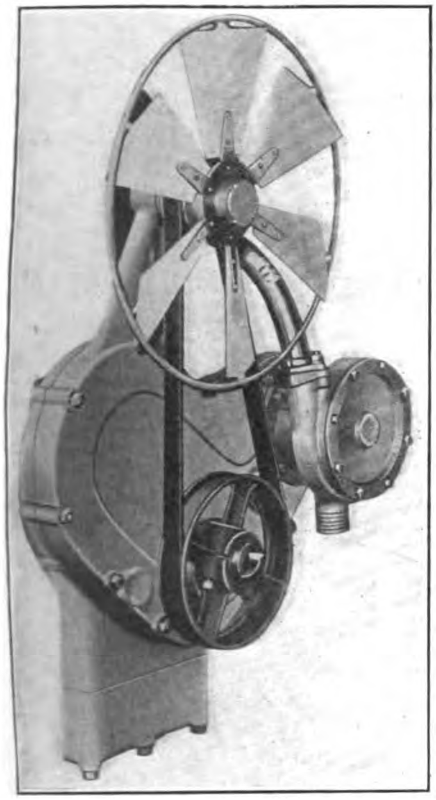


Fig. 4—Front end of the motor showing the fan, method of driving, and water pump

justments on the road. As a further incident of this construction, this integral flanging acts as a stiffener between the arms. The cylinders are cast in pairs, and are of the T-head type, there being two pairs for the 4-cylinder motor. Glancing at the illustration again, it will be observed that one of the tappet housings shows at the rear above the flywheel. The row of valve mechanisms comes on the right side of the motor, and the lifts are enclosed by a telescoping sleeve system, so that they are protected from the dust accumulations, are muffled, and may be gotten at readily. The many other nice mechanical refinements are so clearly shown in the illustration as not to demand further favorable comment.

In the cooling system, beyond stating that the radiator is of well-chosen capacity, additional refinement will be the better understood by referring to Fig. 4, which shows the front end of the motor, the fan bracket and fan, also the belt, and the driving pulley which is double-shrouded and extends out from the halftime gearcase, being pressed on the stub end of the crankshaft. The centrifugal pump is also shown at the right of the fan belt; it is of unusually large capacity and is driven by a pinion which meshes with the halftime gear system. Lubricating oil is carried in a commodious well in the bottom half of the crankcase, and the gear pump which circulates the oil is inserted in the case, and readily detached for purposes of cleaning or inspection. Fig. 7 shows the filler for the lubricating oil and offers an excellent idea of the nice eye to detail which the designer expended upon this car.

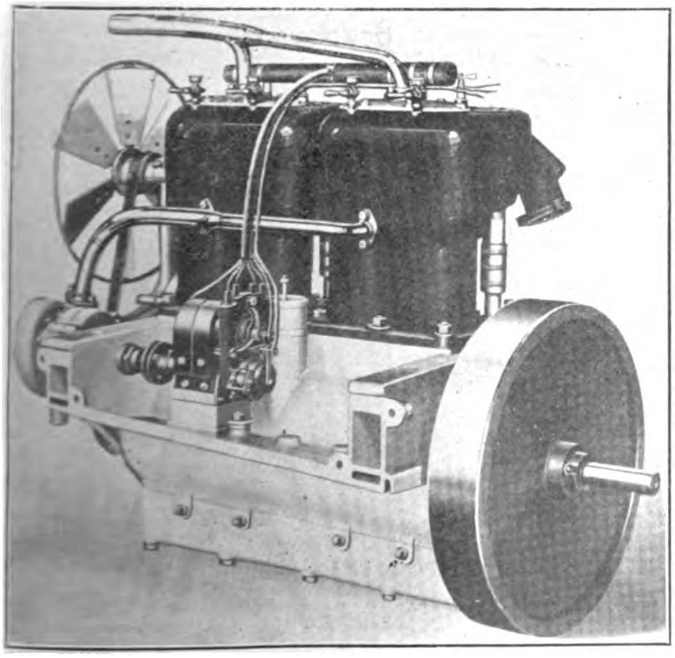


Fig. 5—Left side of the motor presenting details of the magneto mounting, method of wiring, and shape of the motor case

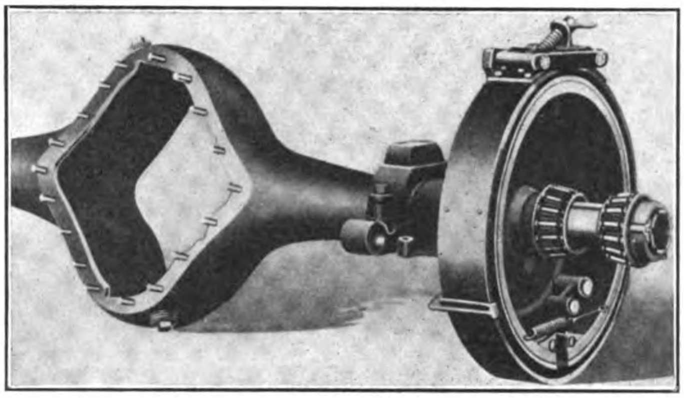


Fig. 6—Live rear axle housing presenting Timken roller bearing mounting, brakedrum, and two sets of brakes

A part of the rear axle is given in Fig. 6, and shows the Timken roller bearings, large diameter brakedrum, external constricting band and internal expanding band, also the spring perch, and the enlargement in the mid-position of the axle which takes the bevel-and-differential unit which is shown in detail in Fig. 2. The strength of the rear axle is adequately depicted in Fig. 6, but to do the subject justice it will be necessary to enlarge somewhat upon the advantages which are present in the unit method of assembling the bevel drive and differential gear sets. This set is mounted on annular-type ball bearings; the bevel pinion and its meshing gear are fixed in their relation by a definite machine method which offers no opportunity for a curious autoist to throw the pinion and gear out of their true relation, but this point ranks low in the series of advantages as compared with the opportunity which is afforded the men who work on the system; they are enabled to do a definite and accurate machine job, using suitable templets and gauges on a jigging basis. Noiseless performance, coupled with high efficiency and long life, are therefore normal expectations. Fig. 3 is just a detail in the chassis work. It shows the equalizer bars for the brakes, and their guides above the level of the chassis frame.

Goodrich, Diamond, Fisk or Firestone are tire options.

The Owen price propositions include: Six-passenger touring car, fully equipped, $4,000; two-passenger runabout, fully equipped, $4,000; Berlin (fore-door) limousine, $5,400; Berlin (fore-door) limousine, body, $1,800; chassis, $3,600.

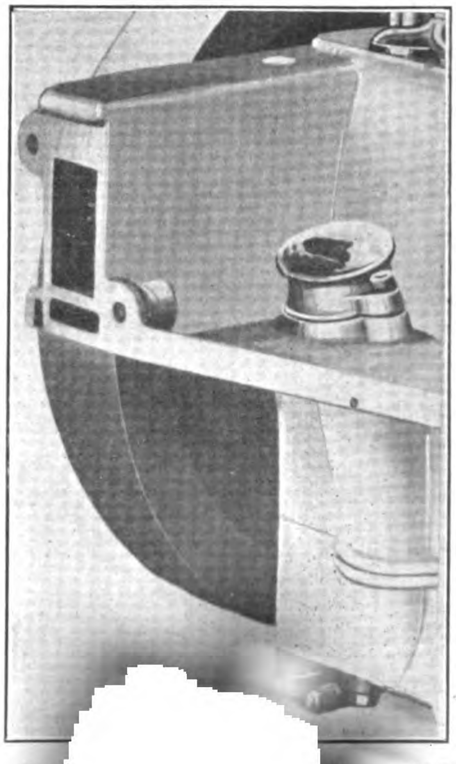


Fig. [illegible] stem

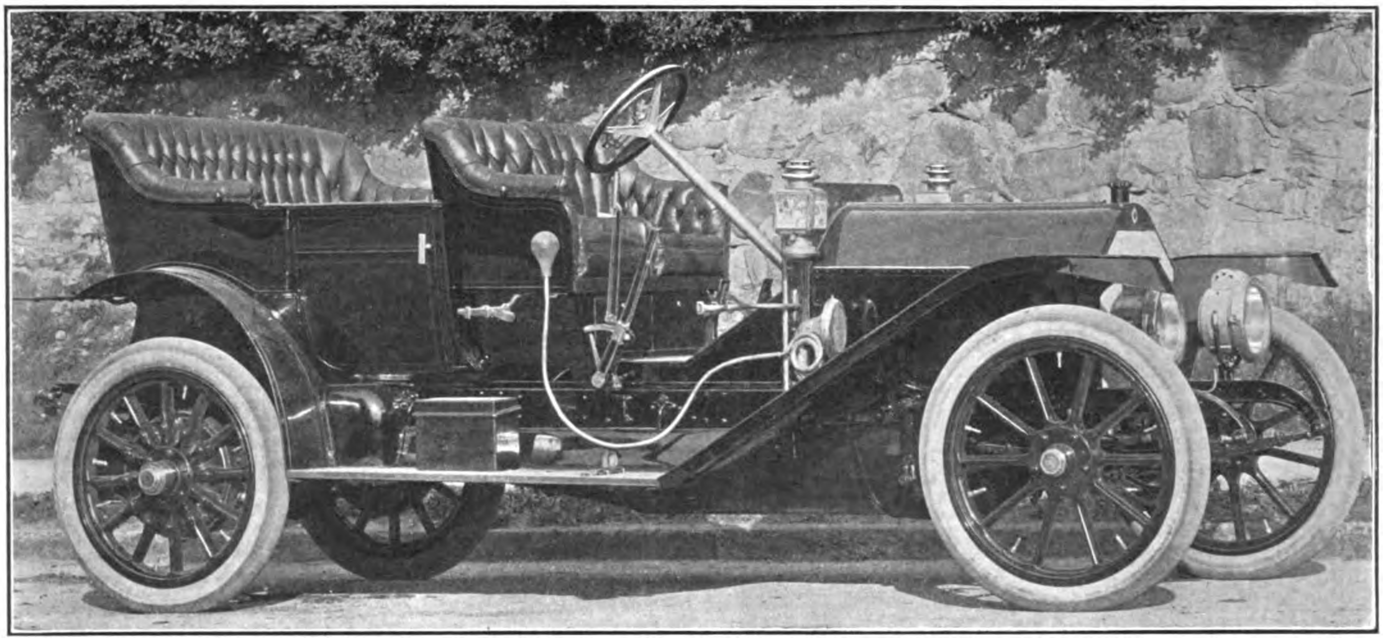


Fig. 1—Side elevation of Six-Forty Touring Car showing wide side entrance, flaring mud guards, ample room, and large diameter steering wheel

Palmer & Singer Offer Four Models for 1911

ADHERING to their 1910 policy, Palmer & Singer announce four models for 1911—two six-cylinder and two four-cylinder cars. The sixes will be the Six-Sixty and the Six-Forty; the fours, the Four-Fifty and the Four-Thirty. The demand for more power by the four-cylinder clientèle of the company has been met by the introduction of the Four-Fifty, while the new Six-Forty has been introduced for those of the Palmer & Singer six-cylinder devotees who desire a lower-powered, smaller car. The Six-Forty is equipped with either five-passenger touring or closed body, as is the Four-Fifty. The other models are offered in the same wide range of body equipment which characterized the 1910 cars. Uniformity characterizes the principles of construction underlying all four models; the engineering motif being the same for all the cars made.

The reliability and smooth-running qualities of the Palmer & Singer are to be attributed in large measure to the special triple jet carbureter used on them. By its use the mixture of gasoline and air is automatically controlled so that it always suits the motor speed and the climatic condition, giving uniformity and economy of fuel.

While the pressure feed system is normally used, gravity feed will be provided on small runabouts, if desired. Pressure is supplied by a pressure regulating valve on the exhaust side of the motor, having a special safety adjustment. A gauge and hand air pump on the dash are provided.

All Palmer & Singer motors have been designed for the high-tension dual ignition system with separate spark plugs, both being located on the inlet side of the motor. A battery high-tension distributor and single vibrating coil on the dash and a Bosch magneto are provided, a switch permitting either, or both, to be employed.

Barring the difference in sizes, the models are identical in design and workmanship with the Six-Sixty, except that an annular ball bearing is used for the front crank-shaft bearing of the Six-Forty, the cylinders of the little six are cast en bloc, three together, and the valves on the smaller four are both on the same side.

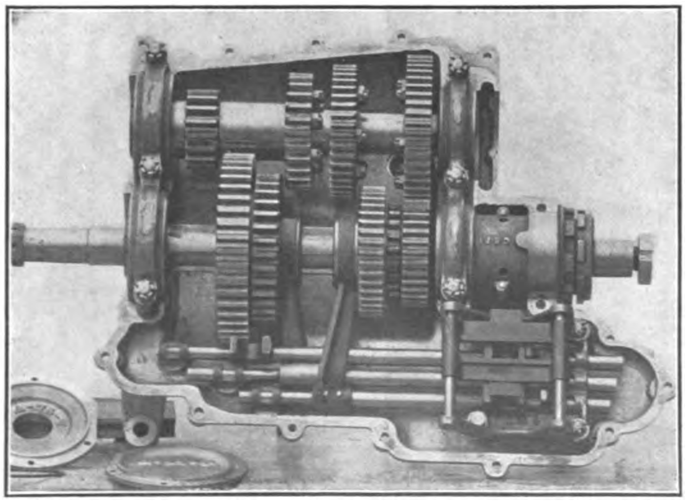


Fig. 2—Four-speed selective sliding gear transmission, with annular type ball bearings, and selectors within same housing

The clutch is housed in the flywheel in the two larger models, while in the smaller pair it is in a separate oil-tight compartment of the transmission case to economize space and permit the use of a longer propeller shaft.

The drive is direct through integral gear on the fourth speed on the Six-Sixty and Four-Fifty models, and direct on the third on the lower-powered cars.

Thirty-six-inch wheels, front and rear, are the standard equipment on all except the Town Car, with conical roller bearings on the larger models and imported annular ball bearings on the smaller. Diamond tires, of a size suitable to the weight of the different models, and amply large in all cases, are Palmer & Singer standard equipment.

Mechanical Refinements on a Six-Cylinder Basis

The general appearance of the car is shown in Fig. 1, referring to the 40-horsepower, 6-cylinder power plant, and among the prominent points is the fact that the length of the bonnet is not marked, which is an indication that the 6-cylinder power plant is compactly designed.

The new "Little Six" motor is shown in elevation in Fig. 4, looking at the right side with magneto in front, driven from a shaft which extends out of the halftime case, the other end of the shaft having a pinion which meshes with the halftime gear system. The carbureter is located in a mid-position, high enough up to be accessible, and is connected by a straight away

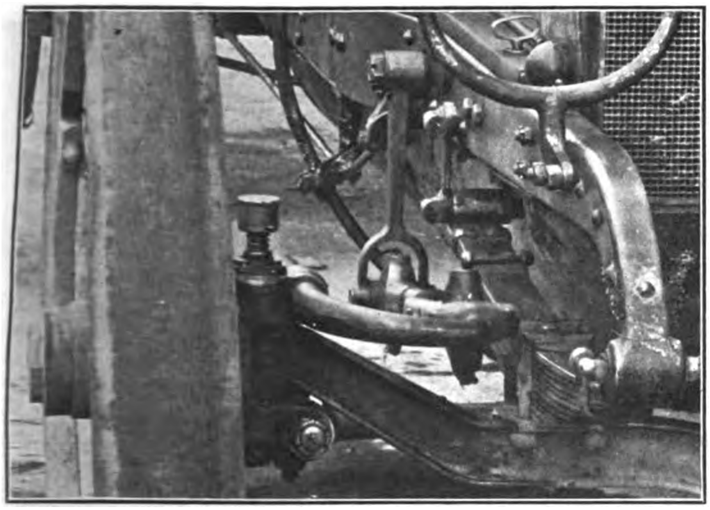


Fig. 3—Detail of front axle presenting an I-section with flat perches for semi-elliptic springs, substantial knuckle with a through pin and means for lubrication

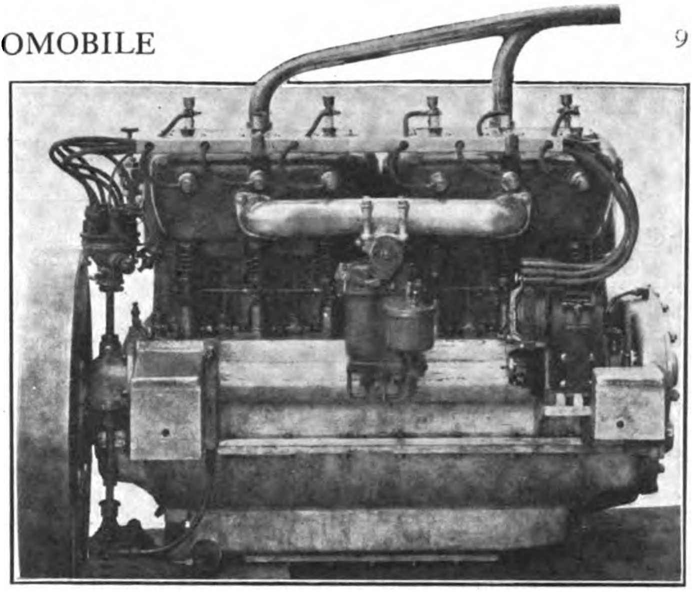


Fig. 4—Right side of "Little Six" motor, showing magneto in front, connections to spark plugs and timer at back, also the carbureter and its manifold connections

manifold to the two pair of cylinder castings, there being three cylinders in each casting. The wiring from the magneto extends in a loop up to a box, and a lead is distributed out of the box to each of the spark plugs in turn; some of the leads pass beyond, back to the timer, which is located at the rear of the last cylinder above the line of the diameter of the flywheel; rotation is given to the timer by a vertical shaft through a gear set on the end of the camshaft. The crankcase is in two halves flanged on the horizontal center and below the dip of the connecting rods, a long oil well is provided, and oil circulation is maintained by means of a gear pump which is driven by a vertical shaft in line with the vertical shaft which gives rotation to the timer. There is a cover on the underside of the lower half of the crankcase which may be removed at will and sediment as it collects in the bottom of the oil well may be scraped out through this accommodation. The flywheel is of large diameter and relatively light, considering the flywheel effect afforded; the spokes are fan fashion, and serve for pulling air through the radiator in the cooling process.

In order not to confuse the situation, the illustrations and discussion here will be confined to the simple process of indicating the character of the work done, and the methods of design, it being the case that Palmer-Singer engineering is common throughout the four different models which are offered to 1911 patrons. As an illustration of transmission gear work, Fig. 2 is presented. It shows a four-speed and reverse sliding gear system of the selective type with the selective mechanism enclosed within the same case. The lay shaft is short and relatively thick, with all of the gears flanged on, excepting low, which is formed integral. The sliding members are of substantial construction, slip over splines cut integral, and direct on "high" is obtained by the meshing of an external with an internal involute type of gears. The shafts throughout are centered on annular type ball bearings of large sizes, and they are accurately fitted into their housings in the lower half and maintained in position independently of the upper half, bolting yokes being used for the purpose. The upper half of the case serves merely as a protection, and handhole covers are provided therein for the purpose of inspection. The detail of the reverse gear is shown in Fig. 5; it runs on a spindle in a yoke of a bell crank member which oscillates on a pinned fulcrum under the direction of a cam, which engages a roller attached to the free end of the bell crank member. Instead of sliding into reverse, this pinion is swung into mesh, describing an arc equal to the radius from the center of the fulcrum pin to the center of the pinion pin, so that engagement of the reverse pinion is in the radial relation with its mate.

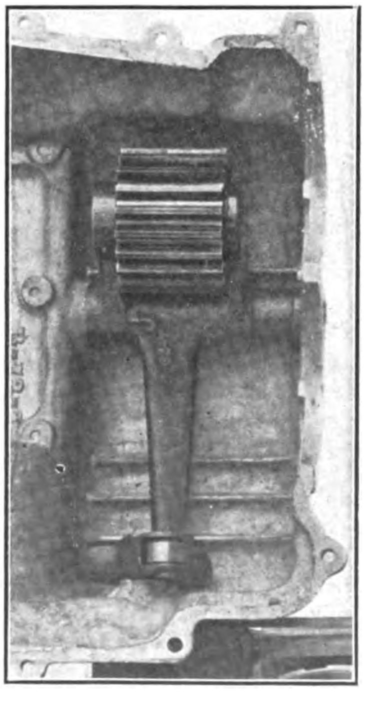


Fig. 5—Detail of reverse mechanism which lays in lower half of gear-case and is operated by a sliding cam engaging a roller on end of lever

As a further indication of the methods of design utilized in these products Fig. 3 is offered. It shows the I-section front axle, method of supporting the half-elliptic front springs, shape of the chassis frame at the point of fastening, how the lamp brackets are bolted on, and the steering knuckle with its large pin, and a substantial grease cup to provide lubrication, also the steering arm and a perspective of the connecting link between it and the steering lever which extends out to the chassis frame from the steering gear. Substantial universal joints are used in the steering system, and locking nuts obtain at every point so that when the parts are assembled in their tight relation they are so maintained, but disassembling is relatively simple, due to the definite means employed, and the locking nuts which may be undone as an initial effort.

Worthy Points for Special Mention

In the two larger models the clutch is housed in the flywheel, whereas in the remaining models it is in a separate oil-tight compartment of the transmission case. In all models the multiple disc type of clutch is used; it is composed of 47 discs of saw-blade steel, operating in an oil bath. The clutch spring is adjustable, and the clutch trunnion is lubricated by two grease cups. Transmission is by propeller shaft to the live rear axle, and the bevel gear set is of nickel steel. The rear axle is of the full floating type, and hardened square ends engage with the differential pinion. Steel dogs transmit the power from shafts to road wheels. The rear axle housing is trussed, and a large removable cover gives access to the differential set for purposes of inspection and lubrication. Imported annular ball bearings are used throughout. The details of the brakes are worked out to a fitting end. The service brake operates by a foot pedal, is of the internal expanding type lined with "Raybestos," and the emergency brakes are operated by a side lever, they being of the external constricting type. The channel section frames have four cross members.

Empire "Twenty"—Hails from Indianapolis

PROCEEDING on the theory that a plethora of models means increased cost of production and a corresponding increase in selling price, the Empire Motor Car Company, of Indianapolis, is devoting the best energies of its entire plant to the production of the Empire "20" Model C—a two-passenger roadster, swung low and presenting a stylish, racy appearance. Every detail throughout the distinctive and exclusive design is executed with the two-passenger idea in mind. Rumble seats, surrey seats and other combinations are not offered, and it is evident at a glance that the car is not in the convertible class.

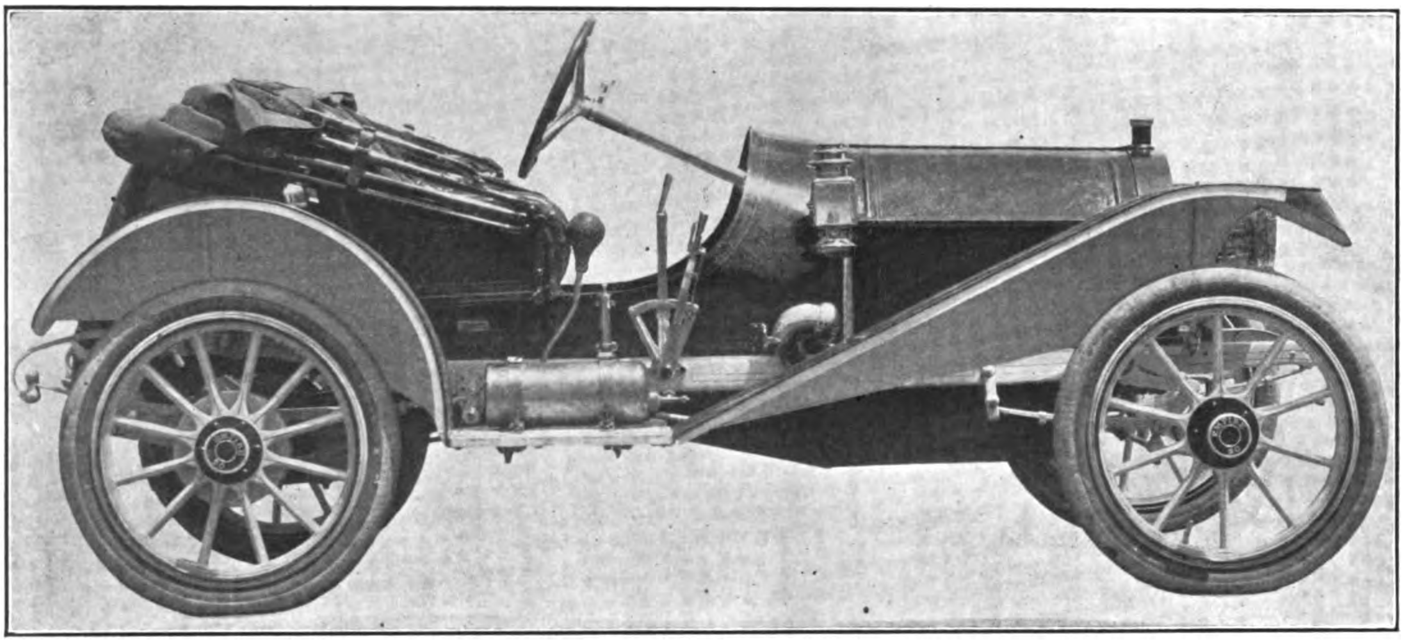


Fig. 1—Side View of Model C Empire "Twenty" Automobile, showing flaring mud guards, low seat, convenience of side levers, etc.

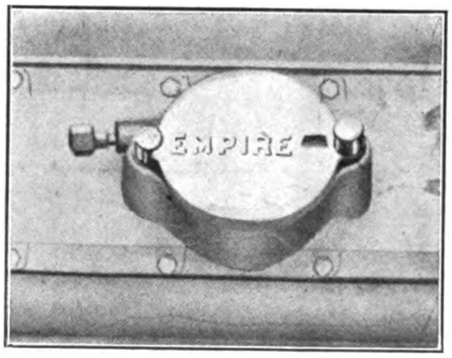


Fig. 2—Removable handhole cover on detachable plate of upper half of crankcase

The Empire "20" is not an assembled car, being made entirely within the company's plant. The spring suspension, the design of the seats and their location with reference to the axle, the drop frame, the large wheels and the enclosed dash are points of refinement that give the car exceptionally easy riding qualities and make it a roadster of the most comfortable type.

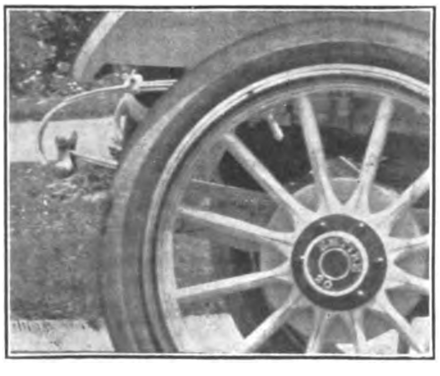


Fig. 3—View of rear suspension, showing three-quarter elliptic springs

Unit Power Plant

The motor is of the 4-cycle, water-cooled type, rated at 20 horsepower, with T-head cylinders having valves on opposite sides as shown in Fig. 5. In this view, the magneto is indicated on the left side of the motor toward the front, and a Wheeler & Schebler carbureter is located back of the magneto, but high enough up to be in a perfectly accessible position. The halftime gears are enclosed in an oil-tight case, and the magneto is driven by a stub end shaft which projects back from an extension of this case, the other end of the shaft having a pinion which meshes with one of the halftime gears. The cylinders are of the barrel type, cylinder head, intake and exhaust manifolds, also the water jacket, being cast integral. This type of cylinders presents a neat and symmetrical exterior, and from a thermodynamic standpoint offers advantages which result in economy of performance.

The magneto is supported by an auxiliary, utilizing the dual system of ignition. Lubrication is by means of four deep compartments formed in the crankcase into which the connecting rods dip, and provision is made on the caps for the picking up of sufficient oil to produce copious lubrication. The capacity of the lubricating system is three quarts of oil, and a hand pump is provided for replenishing purposes. In the cooling system a vertical tube radiator is employed, and circulation is on the thermo-syphon principle. The clutch is of the cone type, leather-faced, and the leather is held into intimate engagement by means of six plungers actuated by springs. The general appearance of the car is shown in Fig. 1; it is designated as

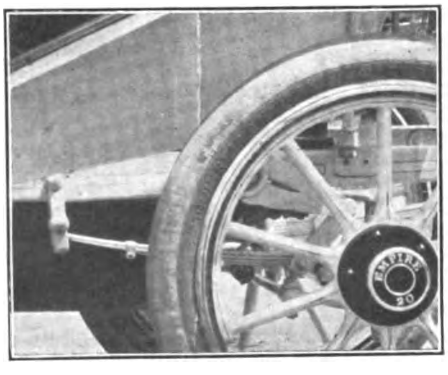


Fig. 4—Part of front suspension, showing details of half-elliptic spring shackle.

Model C Empire; presents a racy appearance, and affords protection to the occupants of the seat due to the considerable overhang of the dash. In this view the cape top is folded back.

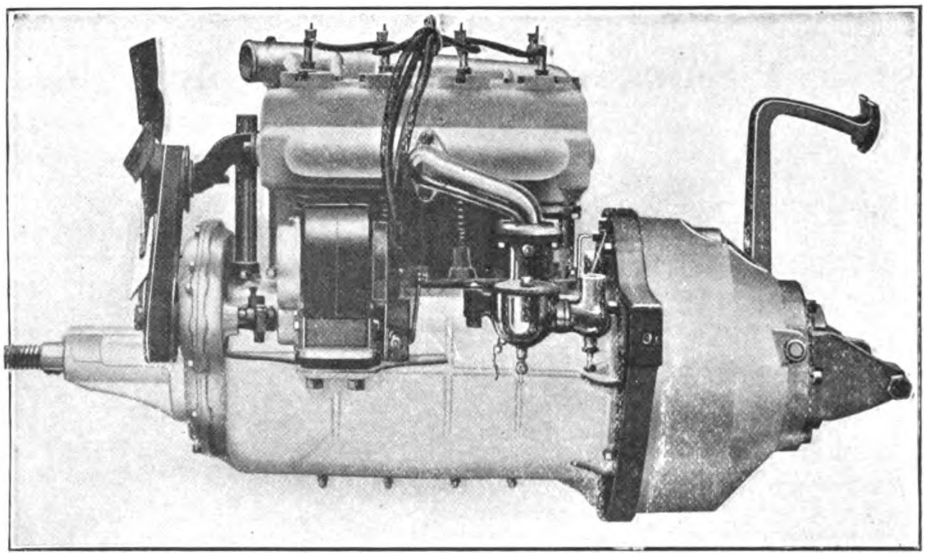


Fig. 5—Side view of self-contained power plant showing magneto and carbureter on left side of the motor

Carefully Thought-Out Details

Fig. 2 shows a quick detachable handhole cover on the crankcase, which is fitted to the crankcase plate; the latter is bolted on and may be readily removed if, for any reason, it is desired to have access to the bearings. Fig. 3 shows the three-quarter elliptic springs, and the method of shackling, also the wheel hub, wood work, and large diameter brakedrum. Fig. 4 presents the shackling of the half-elliptic front springs, also shows the front-wheel construction and the shock absorber, together with the method of attaching same. Fig. 6 is a view of the rear axle showing the three-quarter elliptic spring, its mounting on the perch, the fastening of the shock absorber, also the brakedrum, how it is protected from mud accumulations, and other details along engineering lines. Fig. 7 is a view of the driver's side, showing the relation of the seat to the dash, side levers, oil pump, rake of the steering post, and the Prest-O-Lite tank on the running board.

General Characteristics of the Model C Car

The 20-horsepower motor has cylinders 3½ x 4-inch bore and stroke respectively, and in the construction of the car it was the idea to maintain a certain harmony of the relation of the parts to each other, taking into account the maximum possible torque of the motor and the greatest strain which could be brought to bear in a breaking effort. The side frames are of pressed steel, open-hearth stock, 3½ inches deep, with 1½-inch flanges, with a 3¾-inch drop at the rear.

Among the other advances there are questions of refined material, as the crankshaft, which is drop forged of special alloy steel, and thereafter heat treated to impart rigidity and kinetic qualities. The bearings are of Parsons white bronze, and the fitting is done with precision. The camshafts are drop forged in one piece with integral cams; cementing stock is used, and the cam faces are hardened to a sufficient depth to survive in service. The valve dimensions are large, the head being 1¾ inches in the clear, which is half the diameter of the piston. The compression is regulated with a view to utilizing these large diameter valves to advantage, and the torquing performance of the motor is on a constant basis as the speed increases.

Selected second-growth hickory is used in the wheels, which have 10 spokes in front, 12 in rear, with Q. D. rims. The tires are 32 x 3½ inches both front and rear.

The blue body, of sheet metal, semi-torpedo type, with inclosed dash, and cream running gear, is an especially natty combination.

The equipment of the Empire consists of 6½-inch gas lamps with nine-inch flare, brackets included; oil side lamps, tail lamps, horn, complete kit of tools, tire repair kit and tire pump.

The price is $950, f. o. b. Indianapolis. As regards extra equipment—a Racy type top will be fitted for an additional $50; folding glass front, $25; Prest-O-Lite tank, fitted and gas line installed, $20; 60-inch tread (for Southern travel), $20.

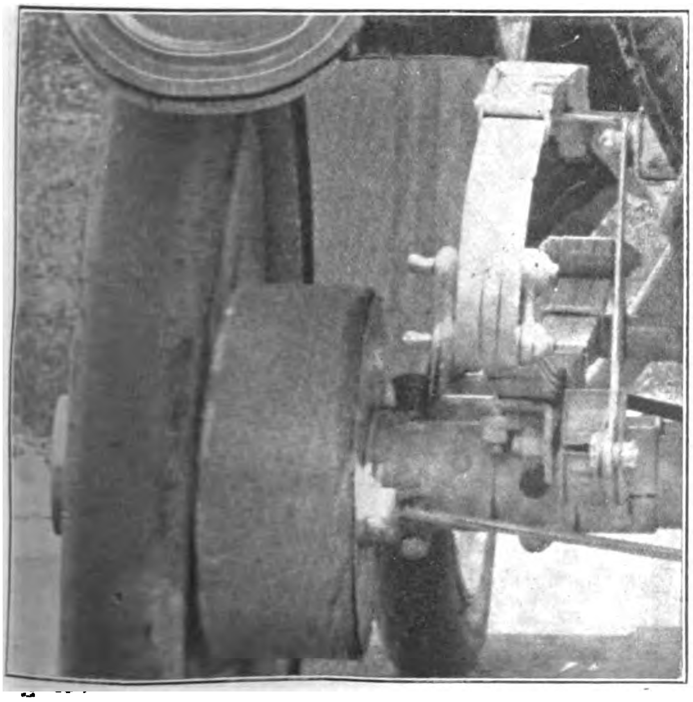


Fig. 6—Rear view of three-quarter-elliptic spring suspension, enclosed brakedrum, and anchorage for spring support

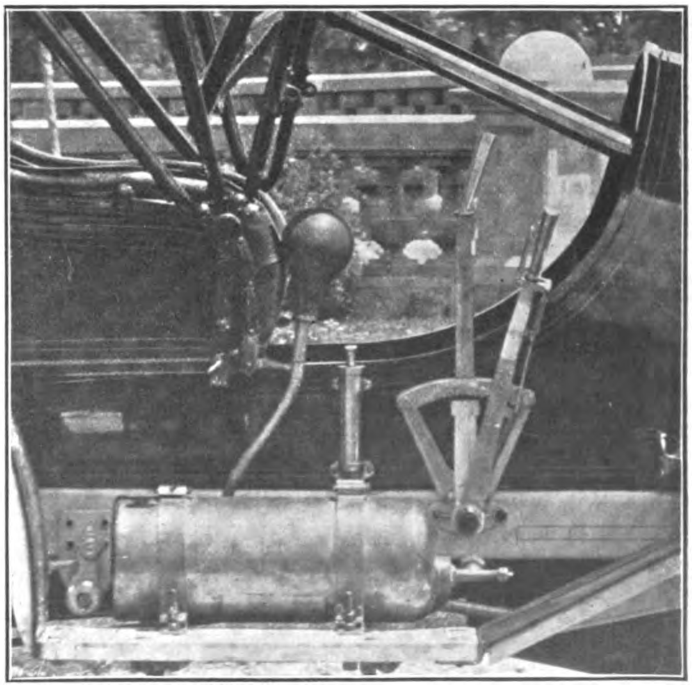


Fig. 7—Side view at left side of seat, presenting side levers and Prest-O-Lite tank on running board

Abstracts from the 50 Best Foreign Papers

Digest Along Technical Lines for the Engineer

Means for operating a motor at high temperatures and without water or air cooling by separating piston stroke from gas expansion——Spring suspension which reduces up and down motion——Common sense in calculation of valve springs——Paris 'bus run with coal gas.

Radical means for avoiding radical cooling of internal combustion motors are suggested by Martin-Saxton, an engineer. The only reason for intensive cooling is the need of lubrication between piston and cylinder, which requires a temperature of less than 300 degrees for the interior cylinder walls. And, for a little matter of lubrication, one encumbers the motor with elaborate apparatus which is liable to get out of order. Moreover, this cooling absorbs 44 per cent. of the heat, 24 by convection and 20 by radiation. It must be gotten rid of. Impossible! No, simplest thing in the world. All that is necessary is to separate the working chamber of the hot gases from the zone of the necessary sliding joint between piston and cylinder. The cylinder *C*, in which the piston plays, is prolonged upward by means of a closed cylinder of slightly larger interior diameter, which is to be the working chamber for the gases and whose walls may be of any material, provided they will resist the pressures, the temperatures and the vibrations. Then, the piston *D* is surmounted with a plunger *B* of an exterior diameter slightly smaller than that of the stroke-cylinder, and of such length that at the top of the stroke it obstructs the gas chamber almost completely and at the bottom of the stroke it masks the stroke portions *C* against the heat from the gas chamber. By this procedure the sliding joint between piston and cylinder is never reached by more gas than that which penetrates through the slight clearance between the plunger and the cylinder walls and receives only an insignificant quantity of heat. Hence the walls don't get hot and lubrication is accomplished without any difficulty. Cooling is dispensed with. In the industrial motors, fuel economy is paramount; the heat losses should be reduced to a mimimum; the walls should be non-conductors. The gas chamber should be coated interiorly and the plunger exteriorly with refractory material. To avoid premature ignition, the explosion type should be abandoned for the type giving relatively slow combustion and expansion of the gases, as by employing separate pumps for the liquid fuel and for the air. (Some trouble may be apprehended in making the fuel reach the gas chamber without disintegration through highly heated pipes and valves.)

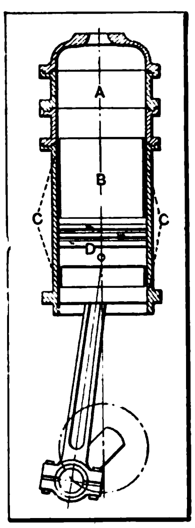


Fig. 1—Martin Saxton Motor

With a light motor, as shown in Fig. 1. fuel economy is secondary, and it should be sufficient to use belts of metallic walls separated by rings of non-conductive material. By having several belts and several rings, the temperature of the ring nearest the stroke portion of the cylinder may theoretically be reduced to less than one-half of the degrees reached in the exhaust gas, even if the insulation rings are supposed to be very thin. To prevent dislocations from expansions and contractions, encasings with limited lateral play are employed.

As in these light motors the walls are metallic, they will radiate exteriorly and will not reach temperatures which will produce premature combustion, hence any type of motor may be used: four-cycle, two-cycle, high or low compression, rapid or slow ignition. To effect a transformation of an ordinary motor, only the combustion chamber need to be changed and a plunger added to the piston. Simple! (The author must have in mind, it seems, the addition to his system of the ordinary air-cooling provisions, if he shall hope to avoid premature ignition.) Valves might get red hot. They, too, should be kept away from contact with the superhot gases. By a special arrangement each valve is masked except at the moment when it functions. This arrangement consists, as shown in the illustration, Fig. 1, in a plate secured to the valve, which, when the latter is closed, almost completely obstructs access from and to the combustion chamber. It is, in fact, a sort of auxiliary valve which does not quite reach its seat. It acts in the same manner as a metallic screen, preventing the inflammation of the gas contained in the valve chamber. Besides, the valve chamber is insulated from the motor by joints of refractory material, and might, if need be, be provided with air-cooling flanges. The system promises a considerable lightening of motors, greater reliability of light motors, greater fuel economy and the removal of troubles with cooling apparatus and cylinder oils.—*La Vie Automobile,* June 11.

A spring suspension system by which much of the motion required of spring action is transformed from vertical motion, which shakes the occupant of the vehicle, into horizontal motion, has been tried in practice in Germany, and is shown in part in the accompanying illustration, Fig. 2. Unfortunately, the elements are omitted which would explain how the recoil of the spring is utilized or disposed of. Apparently the spring, which is suspended from *x* to *y*, must be a combined extension and compression spring mounted, possibly in telescoping tubes, under a tension corresponding to the normal weight of vehicle body and load. The system is mentioned as the Deussen Suspension. By its use the front and rear portions of the automobile frame are both shortened, and the wrought iron shapes which hold the bell levers are riveted to the frame ends. The helical spring is secured, as mentioned, to the upright arms of the bell levers, while the horizontal arms are shackled to the wheel axle in a manner the details of which are as yet withheld from publicity. When the wheel axle is pushed upward by an inequality in the road, the shock is transmitted through the shackles and the horizontal arms, *a—b,* to the bell-lever bolts and the upright arms, *a—c,* the latter spreading and extending the spring. By suitable choice of the lengths of the arms very considerable obstructions may be surmounted with very little raising or lowering of the vehicle body. At the trials it was noticed that very uneven ground produced some horizontal motion of the vehicle body, which was noticeable but not disagreeable to the occupants, while the vertical motion was much smaller than with any combination of leaf springs and pneumatic tires.—G. Wentz in *Der Motorwagen,* June 10.

Calculation of the dimensions and strength of valve springs on the basis of a graphic development of the velocity-curve produced by a given shape of the cam and an acceleration-curve developed from the velocity-curve, formed the difficult subject of a treatise by von Doblhoff, of which mention was recently made in these columns. As slight variations in the temper of valve springs, as well as the preferences of the designer with regard to cam shapes, would cover a considerable range, the treatise seemed to illustrate a design method remarkable for its refinement more than for its necessity. Hubert Schimpf, another German engineer, has taken up the gauntlet, however, and by analysis of his colleague's work finds errors in the graphical developments, and he designs a new acceleration-curve, from which he then proceeds to draw inferences with regard to what constitutes the most favorable form for cams, with a view to using springs of the smallest practicable tension as well as the other considerations relating to the timing of valve action. He arrives at the conclusion which empiric designers had already adopted, that neither the cam shape nor the strength of the springs, which depends upon the cam shape, may be calculated without a compromise between the requirements. In other words, a rapid and definite valve lift will involve a strong spring and increased wear of parts, while a noiseless valve action cannot be realized without sacrifice in the form of a more or less dragging valve lift and valve closing.—*Der Motorwagen,* June 10.

Among the many motor 'buses offered to the Paris General Omnibus Company is one that employs neither gasoline, alcohol nor benzol as fuel. The Cazes, produced by a firm having made a specialty of stationary and kerosene motors, has its own coal-gas producing plant, and consumes low grade coal gas as fuel. In accordance with the new requirements of the Paris municipality, it is a single deck omnibus with first and second-class places and a rear entrance on which two passengers can be carried. The motor is forward, under a bonnet, unlike the present vehicles, which have their power plants under the driver's feet. Special attention has been paid to suspension and the abolition of vibration, and with this object in view the 'bus is mounted on long semi-elliptic springs, and in addition has pneumatic shock absorbers attached to the forward dumb irons and linked up to the front axle just below the spring clips by means of a rod. This is contrary to usual practice, in which the springs have been connected up direct to the shock absorbers. The front springs, too, are shackled at their forward end in a manner first introduced by the De Dion Bouton Company. Although the 'bus is being used as a demonstration vehicle with the hope of convincing the company of its superiority over all other makes, the manufacturers have very little to say about its distinctive features. They declare that its gas-producing plant, carried by the side of the driver, allows this vehicle to be run at a fuel cost of 9 cents a kilometer, compared with 55 cents for a similar vehicle employing gasoline. In comparing such figures it is necessary to take into account the fact that gasoline in France costs from 38 to 40 cents a gallon, and that there is in addition a tax of practically 18 cents on all that is consumed in the city of Paris. Under such conditions the operating company is closely concerned in finding an economical substitute for gasoline, and it is here that the Cazes Company believe they have an advantage.

The mechanical features of the omnibus are four separate cylinders, water cooled by pump circulation, and only differing from the standard gasoline motor by the nature of the intake piping. Ignition is by high tension magneto. A cone clutch is employed, a four-speed gear box is fitted, and final drive is taken to the rear axle by side chains contained in oil-tight metal cases.—W. F. Bradley.

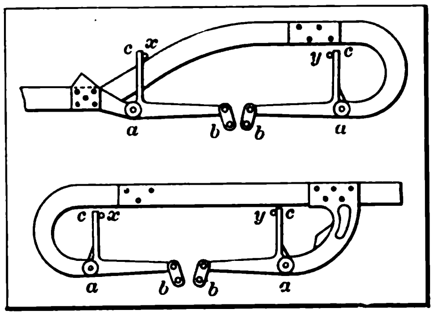


Fig. 2—Diagram of Deussen Suspension

It rests with automobile engineers to supply the scientific methods which may be required in the development of motor travel through the atmosphere, since the engineering talent specifically engaged in aviation is too busy with the fundamental problem to pay much attention to refinements not directly connected with design. The haphazard planning of aviation meets without reference to the science of meteorology, which might safeguard the success of these trials and exhibitions, grates on the trained sense which loves to fit means to ends with some accuracy. And, on the other hand, it has already been proven that the science of the weather has much to gain by applying itself and its resources, heretofore largely restricted to the laboratory, to the very definite determinations and forecasts which aviators will so greatly appreciate. Among the first cares is the devising of really suitable instruments for measuring the velocity of the wind at various altitudes. At the recent meet at Lyons the assistance of André, the director of the Lyons Observatory, was secured, and weather reports announcing atmospheric movements from the surrounding territory were received twice a day, and ingenious instruments were erected, one of which indicated the velocity of the wind by sound signals. A description of the instruments is supplied.—*Revue de l'Automobile Club du Rhône.*

Studies in Aviation Theory and Practice

By MARIUS C. KRARUP

STABILITY for aeroplanes, as has been shown in previous installments, is one of the two principal elements which must be materialized in aeroplane design in order to secure and maintain equilibrium, the other being control of the relative positions of the supporting planes through the actions of the aviator. An excess of stability would render control impossible or impracticable. For example, if stability sets up a resistance of 100 pounds against a deviation of 70 degrees from the normal horizontal poise of the machine, a control action meant to cause such a deviation would be required to overcome this resistance of 100 pounds, before it could become effective. If the deviation were to be accomplished in one second, as might easily be required for safety in avoiding collision with another aeroplane, treetops or any other obstruction, the effort of overcoming the resistance would have to be concentrated in the same short period, and this would tax the aviator too heavily. Laterally the stability can perhaps be allowed to be more pronounced, because centrifugality will help the aviator to produce the canting of the machine, which is necessary for holding one's course at a turn in horizontal direction. And departures from lateral horizontally is not otherwise required for travel. These simple considerations show at once that the stability which is secured by locating the center of gravity far below the planes may be bought too dearly. When inertia enters as a factor, as at starts, stops, retardations and accelerations, a very low location of the center of gravity may even actually contribute to loss of equilibrium, as the weighty bottom portions will tend to swing around the more resistant and lighter areas, or the reverse. Stability, as distinguished from equilibrium by control, evidently differs greatly from the same property in boats. It may not be built into the aeroplane in any desired degree, but consists at its best in a certain proportionateness between the weight distribution and the area distribution, and must be figured out and tried out in practice with due regard to all the various things which can happen to an aeroplane, with motor going and with motor stalled, with headwind, sidewind and wind from below or above. It must be proportioned with some reference to the muscular efforts which an aviator can apply and with some reference, too, to the range of control action which the aviator has at his command. The accompanying vignette, for example, tends strongly to prove that lateral stability is much too weakly developed in the ordinary biplane, in which the means for preserving lateral equilibrium by control action do not exist except in slight degree in connection with steering. In the Voisin biplane, shown in the reproduction, the lateral equilibrium is further endangered by the vertical partitions characteristic of this type, while the concentration of weight in the central part of the machine, it is believed, also minimizes the resistance to teetering of the structure.

An objection to this view has been offered to the effect that, even if weights were distributed more evenly along the level of the lower plane, as in the Wright machine, one-half of this weight would be tipped down while the other half was tipped up, and that the result, so far as the lateral balance is concerned, should be the same as with the weight all in the center. In a recent discussion on this point it was brought out, against this construction, that the machine is normally speeding forward and the planes are exerting a considerable pressure downwardly against a stratum of air which is condensed or formed into eddies, while the atmosphere above the planes is correspondingly or at least in some degree rarefied. Also, that there is seldom question of an absolutely one-sided impulsion from the wind. If a gust tends to lift one side of the machine, it will practically always also tend to lift the other side, though with less force. Finally, that the planes intrinsically offer less resistance against upward motion than against downward motion, owing to their shape. In the balancing of the forces acting to upset the machine laterally, the turning axis will therefore not be in the longitudinal axis of the machine, but nearer to the end farthest from the disturbing force, and weight will have to be lifted, not only turned around an axis. As these considerations seem to suggest themselves in connection with the subject, they are here mentioned, but, figuring the matter out with a diagram, only the last argument seems to maintain its force, and it only because the designer who places all weighty portions in the middle is practically compelled to place some of them higher than the floor of the lower plane and higher than he would be enabled to place them by using more "floor space," and as a result the center of gravity is therefore almost of necessity higher in the machine whose working parts are concentrated in the middle than in another in which these parts are spread more widely apart laterally. The important point seems to be that there can be no valid objection to the spreading of the weights, and that the accidents frequently befalling aeroplanes, as instanced in the illustration, seem to indicate that additional stability is required, at least so long as the means for preserving lateral equilibrium by control action are almost wholly lacking, and that one of the methods for securing increased stability consists in lowering the center of gravity, by spreading these parts out more than is usually done, while yet keeping the working parts inside of the general contours of the machine.

But it must be remembered, of course, that lowering of the center of gravity is less unobjectionable for the fore-and-aft equilibrium than for the lateral balance, and it may possibly be found that better means exist for avoiding lateral falls. Among the available means to this end, and relating to stability rather than to control, are pointed wings (planes), wings turned up at the ends and wings with elastic portions which ride easy over the "bumps in the air."

As equilibrium must depend upon a compromise between burdensome control and clumsy stability, and stability can probably not be obtained, in whatever degree shall finally be found desirable, without some sacrifice of sustentation, it is scarcely possible to do more than to mention the factors involved and the expedients at command, while the trained judgment of each individual designer, which must after all be supreme in matters which are beyond all quantitative figuring, must decide how much to concede to a low center of gravity, how much to pointed wings or wings at an angle or to the provision of resilient surfaces. As generalities, even when unavoidable, make irksome reading, the writer proposes to prevent drawings in a subsequent issue of an aeroplane in which his individual judgment on the subject, as well as the other connected subjects relating to sustentation, control, propulsion and materials, is exemplified.

In connection with lateral stability in the aeroplanes of current design, a matter relating to the maintenance of lateral balance may here be mentioned, though it relates to control rather than to built-in, automatic stability against lateral disturbance. For obviating a lateral fall the present day aviator depends almost wholly on speed, which is a control factor, but the adroit ones among the aviators, when threatened with a fall to the right, turn to the right—like a bicycle rider does under similar circumstances—without using the steering rudder, however. That is, they warp the planes or turn the winglets (ailerons). By this action increased sustentation is produced on the side to which the machine is tipping, and less sustentation is at the same time produced on the opposite side. But it seems that the warp system has a considerable advantage over the winglet system with regard to the aviator's chance for saving himself by this means, for, while the winglets produce a certain amount of action, they do not affect the action of the main planes, which remains as the large constant in which the small variant loses much of its proportionate effect. Structurally an aeroplane built with the warp system should, therefore, have the superior lateral equilibrium, while in automatic stability the two types are about equal, neither of them having any adequate provisions, the stationary vertical planes with which they may be equipped having a steadying effect only in calm weather and within the range of security which is produced by speed, and depends upon this factor.

How far true stability depends upon the location of the center of gravity, and how far and in what manner it depends upon the location of the areas and their slant or direction, remains the principal question for discussion.

In the automatic stability of aeroplanes the following factors are involved: Weight, area, direction of areas, center of gravity or distribution of weight, distribution of areas, shapes of areas, propulsive force, location of the propulsive force (including its direction) and, finally, the largest and most disturbing factor, the wind, coming, as it may, from all imaginable directions, and varying in power in the most unforeseeable manner. In general, gravitation makes weighty portions lead in the earthward direction and makes the area portions trail above, provided these area portions are not turned on edge, but continue to offer a greater air resistance to the downward movement than the weighty portions. Momentum, which is a product of the propulsive force and the weight, makes weighty portions lead in the momentary direction of motion, and makes area portions trail. Propulsion divides air resistances equally around the axis of propulsion; that is, any plane vertical upon the axis divides the total air resistance against propulsion in equal halves. The wind makes area portions lead in the wind's direction, and the weighty portions trail, but may attack one part of the structure in one direction and another part at a different angle, and its peculiar action upon planes which are held obliquely to the wind's direction as well as all the modifications of the direction of its thrusts, as due to the shapes and angles of incidence of the areas which it attacks, must, of course, be considered. In designing an aeroplane so as to produce automatic stability, to whatever extent is practicable, all the factors and forces just referred to must be reconciled. Whether the machine is propelled by its power, or is gliding by gravitation, or is halted in its progress by a sudden wind, there must be a certain amount of progressive resistance against deviation from that poise of the machine in the atmosphere, which means safety. The only simplifying element in this maze seems to be the fortunate circumstance that the large movements of the atmosphere, which carry the machine out of its course, perhaps, with relation to things on fixed earth, need only be figured on in so far as they are resisted by the propulsive force, or by the gravitation utilized for propulsion in gliding. A few diagrams will illustrate the proportions and shapes which serve automatic stability, constantly with reference to the idea, however, that this property may be realized in aeroplanes only in limited degree, as absolute stability would defeat the purpose of the machine as a vehicle for transportation.

Rejuvenating the Old Automobile

By G. J. MERCER

PROCEEDING along the lines as laid down for the previous efforts in this direction, the old body is utilized in the new undertaking, and the fore-door is designed so as to conform to the general appearance of the body as a whole. Fig. 13 shows how the body will look when it is rebuilt, and the shape of the overhang of the dash in order that it will join with the door post, making a workmanlike and artistic job. Fig. 14 is a detail of the fore-door on the entrance side with dotted lines which will be serviceable to the body maker, and Fig. 15 shows the disposition of the side levers, and the modification which will have to be made to accommodate them, while Fig. 16 is a plan of the new work.

Illustrating a modern fore-door type of body as it would appear on a Locomobile "Thirty" automobile, giving all information required by a body maker, and showing how the car will appear when completed. In this case the side levers are disposed of so that the sliding gear lever comes inside and the emergency brake lever falls to the outside.

Glancing at Fig. 15, it will be observed that the quadrant comes low enough to permit of bringing the gear level inside, it being perfectly straight as shown in the dotted lines, but the emergency brake lever comes to the outside, and while it is straight for its whole distance, it is bent sharply at a point just above the quadrant, and the handle is far enough out so that the operator, when he grasps the same, will have room for the hand without scraping against the head of the door. In the construction of this body, a bent ash pillar *A* in one piece forms the framing around the door at the back and bottom, this piece terminates at *B*. It is fitted to the front of the seat and fastened to the same with screws, reinforced by plates or straps. A sufficient offset is given to compensate between the distance across the underbody and that at the bottom of the seat.

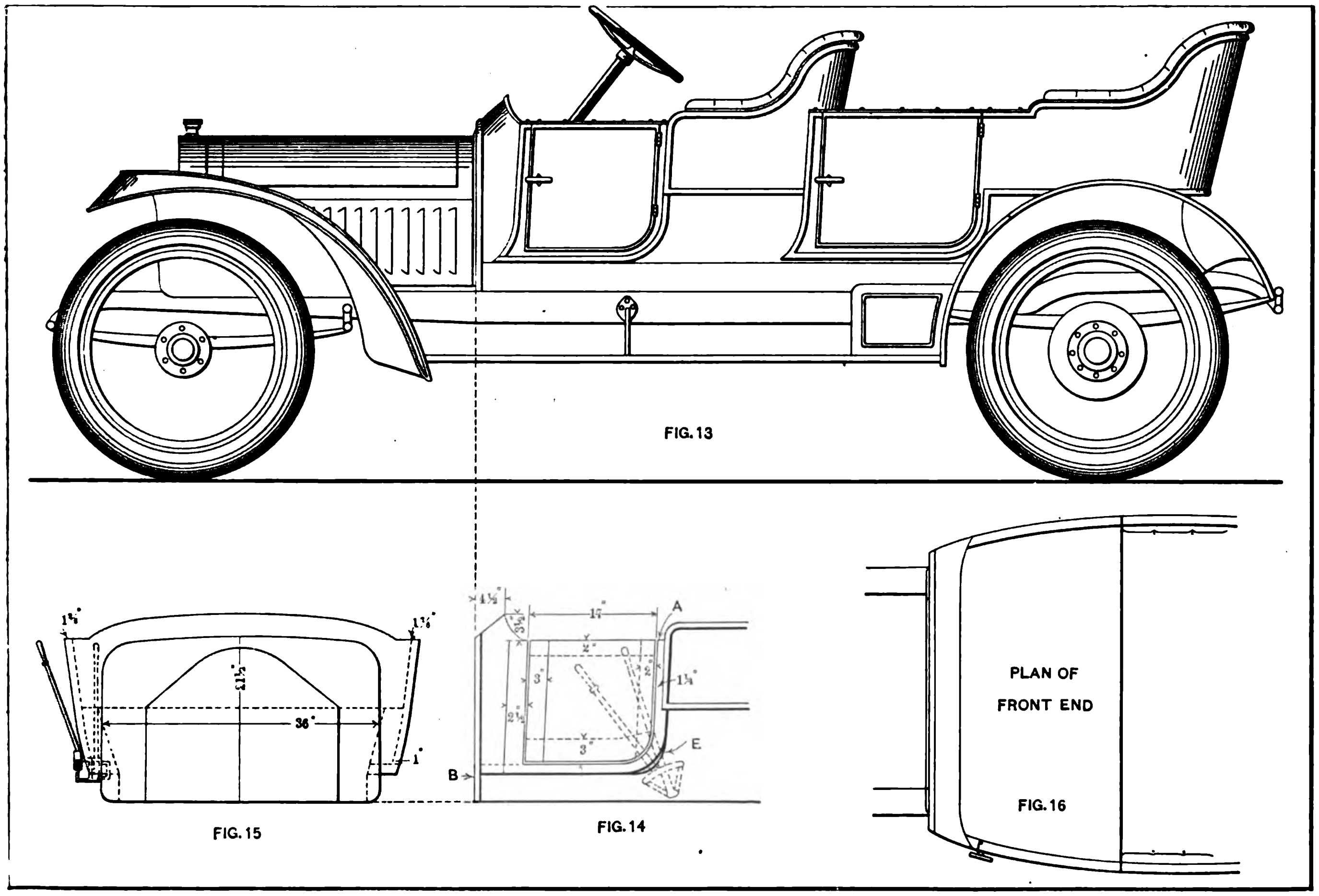


Fig. 13—Fore-door appearance of the Locomobile "Thirty" when the old body is changed over. Fig. 14—Detail of the new fore-door work. Fig. 15—Front elevation. Fig. 16—Plan

Forced Lubrication—Trend in English Practice

By R. K. MORCOM

(Fifth Installment)

CONCLUDING this paper on forced lubrication, tabulations of a statistical character are offered in order to show the methods in vogue in many of the best examples of foreign makes of automobiles, giving such detailed information as will permit the interested reader to judge for himself as to the practices abroad when reference is had to this important phase of automobile engineering. The conclusion is that lubrication is of the first importance, to be sure of a continuity of performance of the automobile from day to day, but also to influence in favor of a low cost of maintenance and a long life.

STATISTICAL TABLE SHOWING THE LUBRICATION METHODS IN

Name of Car	Adams	Ariel	Argyll	Alldays	Austin	Albion	B. S. A.
H.P.	16	31	15.8	10/12, 14/18, 20/25	15	16 and 24/30	15/20
Lubrication System	Forced feed, constant level	Forced	Forced	Forced	Forced	Albion patent	Dip with constant level
Type of Pump	Gear pump	Gear	Gear	Rotary	Vane	Albion patent mechanical lubricator	Gear
Size of Pump	1/16 in. by 7/8 in. 16 pitch	10 teeth 8 pitch 1¼-in. face	....	....	....	Measured quantity forced to each bearing	½ gallon p.m.
Size of Suction and Delivery	⅜-in. delivery Other ducts drilled in crank case	9-32	5-16-in. bore	⅜-in.	¼-in.	....	5-16 in.
Sight Feed or Pressure Gauge	Positive forced tell-tale indicator on dash	Gauge	Gauge	Gauge	Gauge	....	Sight feed
Particulars of Filter	Gauze cylindrical	Filtered thrice— (1) Pocket filter (2) Barrel filter (3) Surface filter	Gauze filter above sump	Gauze filter near bottom of crank case	Inside reservoir	Strainer at filling plug	Gauze cup between pump and sump
Relief Valve	Automatic	Automatic	Adjustable from dashboard	Automatic	Adjustable	....	....
Working Pressure	2–3 lbs. sq. in.	5 lbs. sq. in.	10 lbs. sq. in.	8 lbs. sq in.	2–5 lbs. sq. in.	....	....
Speed of Engine	1,500	1,000	1,000	1,000	900	1,000	1,400
Speed of Pump	½ engine	625	500	½ engine	700	6	½ engine
Pump Drive	Spiral gears from cam shaft	Spiral gears from cam shaft	Cross shaft and worm gear from cam shaft	Skew gears	Spiral gear	By ratchet from worm gear or engine	By cam shaft
Position of Pump	Bolted to side of sump	Top of crank case	Front left-hand corner of crank case	Outside of bottom of crank case	Central, outside reservoir	In lubricator	On cam shaft
Oil Reservoir	Sump	Sump	Sump	Sump	Separate reservoir	....	Sump
Oil Flash Point	Vacuum A	Price's Motorine C	320 deg.–350 deg.	Price's heavy engine	213 deg. F.	Vacuum A	170 deg. C.
Viscosity	Vacuum A	Price's Motorine C	$\frac{212 \text{ deg. F.}}{70 \text{ deg. F.}} = 1 = 25$	Price's heavy engine	367.6 at 15.5 deg. C.	Vacuum A	9.7 at 50 deg. C. Water = 1
Consumption	....	....	....	....	....	800 m.p.g. on 16 600 m.p.g. on 24	1,000 m.p.g.

Name of Car	Metallurgique	Motobloc	N. E. C.	Napier	Panhard	Renault	Rover
H.P.	18	14/16	20, 30, 40	45	18–30	14–20	15
Lubrication System	Forced	Gravity	Mixed	Forced	Panhard patent	Gravity	Gravity
Type of Pump	Gear	(Alternative)	Plunge pump to crank shaft Vane pump for circulation	Gear	Panhard patent	Centrifugal	Vane
Size of Pump	....	1-10 litre	....	80 g.p.h. at 600 r.p.m.	Very small	....	1 quart p.m
Size of Suction and Delivery	⅜ in.	1.5 and 2.0 cm.	....	....	⅜ in.	½ in.	3-16 in.
Sight Feed or Pressure Gauge	Pressure gauge	Sight feed	Drip feed to cylinders on pressure system	Pressure gauge	....	Sight feed	Sight feed
Particulars of Filter	Gauze filter in bottom of sump	On dashboard	Seven gauzes	Gauze cylinder	Gauze filter on return vent to oil tank	In centre of radiator	30 mesh gauze in sump
Relief Valve	Automatic and Adjustable	....	....	Automatic and Adjustable	Automatic	....	....
Working pressure	2 lbs.	....	Slight	10 lbs. sq. in.	....	....	....
Speed of Engine	1,500	1,200/2,200	....	1,200	900	1,100	1,000
Speed of Pump	750	½ engine	Engine speed	600	450	½ engine	500
Pump Drive	Skew gears from cam shaft	Eccentric off cam shaft	....	Skew gear off cam shaft	Off end of exhaust cam shaft	Off cam shaft	Bevel gear
Position of Pump	Back of engine bottom of sump	Dashboard	....	Back end alongside sump	Between fly-wheel and crank case	In crank chamber	Below front end crank chamber
Oil Reservoir	Sump	Tank	Filter tank	Sump	Oil tank	Sump	Sump
Oil Flash Point	....	Vacuum A	....	620 deg. F.	....	....	....
Viscosity	....	Vacuum A	....	....	....	....	....
Consumption	1,500 m.p.g.	150/200 m.p.g.	500 m.p.g.	....	....	500 m.p.g.	600 m.p.g.

VOGUE IN MANY OF THE BEST MAKES OF FOREIGN AUTOMOBILES

Crossley	Charron	Deasy	De Dion	Daimler	Lanchester	Lancia	Minerva
15.6	15.6	14 and 18	9 to 35	15, 22, 33, 38 and 57	28	20 and 24	26
Forced	Gravity	Mechanical	De Dion forced feed	Semi-mechanical	Forced	Forced	Combined splash and pressure
Gear	Gear	Gear	Gear	Gear	Gear	Gear	Gear
Two 1¼-in. gears, ⅝ wide	....	....	....	1½ g.p.m.	2–⅞-in. gear wheels, 2-in. long, 12 teeth in each	....	1¼-in. wheels
5-16 in.	⅜ in.	....	....	3/8 delivery	Suction, 4–¼-in. holes. Delivery, 1–5-16 in., 2–⅛-in., & 1–3-16 in. bore.	Suction, ⅜ in. Main delivery, ⅜ in. M. B., 3-16 in Gudgeons, 1-16 in.	¼ in.
....	Sight feed	Sight feed 14 Pressure gauge 18	Pressure gauge	....	Tell-tale	Pressure gauge	Pressure gauge
Gauze filter in sump	In oil tank	Gauze filter in sump	Gauze covering sump	Gauze in base chamber and drilled plate in pump	Over bottom of pump	In sump	Grill full length of crank case
Adjustable	....	....	Automatic and adjustable	....	....	Automatic	....
10 lbs. sq. in.	....	....	....	....	40 lbs. sq. in.	15/17 lbs. sq. in.	....
Up to 2,500	750–1,500	1,000	1,500	1,400	2,000	1,000/1,600	1,800
½ engine	½ engine	....	....	1,000	4,000	½ engine	900
Direct off cam shaft	Direct off cam shaft	Gear off cam shaft	Parallel drive from cam shaft	Spiral gears from eccentric shaft	Gear wheels from crank shaft	Off cam shaft	Shaft connected to ½ time shaft
Front corner, over ½ time wheel	End of cam shaft	In sump	Inside ½ time gear	In engine base chamber	Bottom of crank chamber	Rim end cam shaft	Outside crank case lower half
Sump	Oil tank	Sump	Sump	Sump	Engine base	Sump	Sump
Price's H	402 deg. F.	Vacuum A	....	....	....	520 deg. F.	....
Price's H	980 at 60 deg. F. 39 at 250 deg. F.	Vacuum A	....	....	....	75 secs. at 210 deg. F	....
500–800 m.p.g	200–300 m.p.g	....	....	....	....	700 m.p.g.	....

Rolls-Royce	Sunbeam	Singer	Sheffield-Simplex	Talbot	Vauxhall	Valveless	Wolseley
40/50	12/16	16/20	45	12, 15, 20, 25 and 35	20	22	Various
Forced	Forced	Forced	Semi-mechanical	Mechanical	Forced	Forced	Forced
Gear	Gear	Gear	Gear	Plunger	Plunger	Vertical Plunger and distributor diaphragm	Gear
....	....	....	6 g.p. min.	15 m/m dia.	¾-in. diameter ½-in. stroke	5-16-in. bore 3-16-in. stroke	....
½ in.	¼ in. outside	⅜ in.	¼ in.	10 m/m	¼-in. bore	¼ in.	⅜ in.
Pressure gauge	Pressure gauge	Pressure gauge	Pressure gauge	Both	Pressure gauge	Pressure gauge	Pressure gauge
Lowest point of sump	Gauze in centre of sump	Bucket shape in top of oil tank, easily removable	Gauze in mouth of sump	Detachable tubular gauze	3½-in. dia. gauze surrounding suction valve	Gauze in tank	Copper gauze in sump
Automatic, can be set to required pressure	Automatic	....	....	....	Automatic and Adjustable	None	None
15 lbs. sq. in.	....	5 lbs. sq. in.	4 lbs. sq. in.	....	10/15 lbs. sq. in.	....	5–20 lbs. sq. in. depending upon speed
1,000	1,000	1,360	1,000	1,100	1,000	1,000	....
500	500	680	500	550	500	20	Crank shaft speed
Skew gears	Direct from cam shaft	Off exhaust cam shaft through skew gears	By spiral gears from cam shaft	From cam shaft	Eccentric on cam shaft	By worm gear	Spiral gear off cam shaft
Lower portion crank chamber	End of cam shaft	Back end bottom of base chamber	Low down on crank chamber	In sump	Rear end of cam shaft	Front of engine	Side of engine
Sump	Sump	Oil tank	Sump	Sump	Sump	Oil tank	Sump
500 deg. F	....	Vacuum A	250 deg. F.	....	Price's Motorine "C"	470 deg. F.	420 deg. F.
1,130 secs. at 120 deg. F.	....	Vacuum A	....	....	Price's Motorine "C"	50 secs. at 210 deg. F. (Sayboult M/C)	175 at 140 deg. F.
1,000 m.p.g.	....	700/800 m.p.g	200 m.p.g.	....	2,000 m.p. 1¾ gal.	1,130 m.p.g.	600 to 1,400 m.p.g.

Lost Motion Denotes Danger to the Autoist

Importance of properly fitting keys discussed; fetching up on a taper requires pressure; taper pins must be free from oil and fit in a reamed hole; some means for preventing levers from floating off shafts discussed; lamps deteriorate if they are not fastened to the brackets in a secure manner and methods are discussed.

LIFE as it relates to an automobile will be long or short, and the cost will accumulate, accordingly as the parts are kept in their proper relation, which involves inspection and adjustment as the occasion requires. The rotative members are protected if they are "booted" and a sufficiency of good lubricant is supplied, remembering, however, that the unctuousness of lubricating oil, when it departs, as it will in service, must be supplanted in a new supply of oil, considering, too, that the residuum (when unctuousness no longer obtains) has all the deteriorating charactertistics of a gummy mass, with a goodly sprinkling of abrasive material intermingled.

Taking it for granted that this phase of the automobile problem will receive its quota of attention, it remains for the autoist to inspect his car at frequent intervals, for the purpose of noting whether or not the linkages and levers are a tight and proper fit with the members to which they relate. Keys, if they are to measure in ability just sufficient to check up with the strength of the shaft after the keyway is cut, have to be quite small. On the other hand, if the keys are relatively large the shaft will be relatively weak. Designers, in view of the problem involved, are disposed to put the limit on the strength of the key, rather than to cut into the reserve strength of the shaft. Considering this wise provision, it is necessary to make sure that the keys are a proper fit, that they bear tightly on their sides and that they do not bear on the metal in the radial plane. In fitting keys, they are given a very slight taper, and when the workman is fully alive to the exigencies of key service he does the final fitting, utilizing Prussian blue and a dead smooth file, refitting sufficiently to make sure that the final driving of the key will fetch it up against the sides with a considerable amount of pressure, avoiding at the same time the damaging of the key, or the spline in which it fits.

If it requires a workman of no mean skill to properly fit a key so that it will stay in place and do its work with certainty, it goes without saying that an unskilled autoist is afforded an excellent opportunity to fail in his attempt to refit a key after it has been in service long enough to show signs of crushing, but it is not to be expected of an old key that it will serve any very good purpose if during inspection the autoist finds that the key is loose and he simply drives it home with a hammer with the expectation that this kind of key-fitting will be a near approximation to the character of the work which is done by a careful workman during the initial effort. When a key works loose in service and shows signs of wear it is time to dispose of it, and it will then be necessary to redress the keyways and fit in a new key. The fitting will have to be done with even greater care than originally, because the faces of the keyway will never be as good as they should be with a new car.

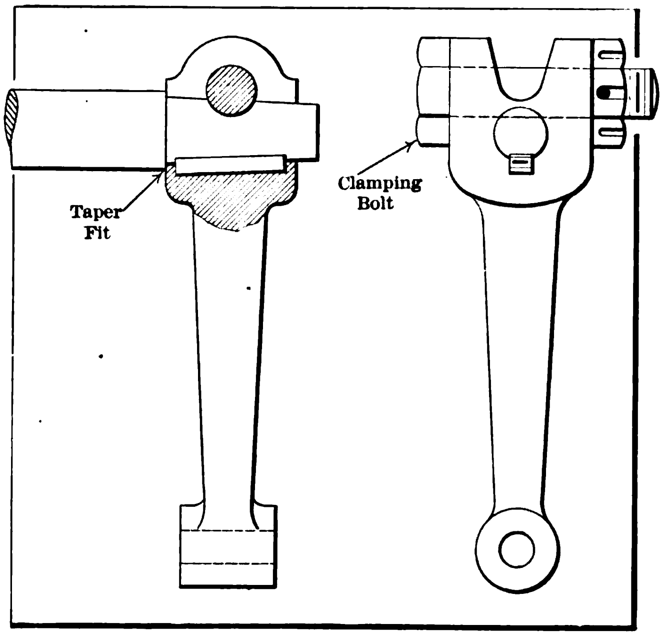


Fig. 1—Showing a lever with a key on a tapered shaft with a clamping bolt and locking nut

One way to maintain a tight relation of the key to its spline is shown in Fig. 1, which is of a lever on the end of a shaft with a taper fit of 3-16 of an inch to the foot, measuring from the center; in addition to the key, the hub of the lever, being split, is provided with a clamping bolt, and the bolt cuts the diameter of the tapered shaft where it passes through. The hub is a neat fit on the shaft, and the key is side-fitted with accuracy. The clamping bolt is then inserted, and the nut is set up until the clamping effect is sufficient for the purpose. The key is imbedded in the hub of the lever and the keyway is cut for the whole distance of the taper, parallel to the axis of the shaft. The clamping bolt has a locking nut, but the autoist must take into account the fact that the bolt will elongate in service, and that the nut ought to be taken up a little from time to time until the initial elongation of the bolt is supplanted by final rigidity.

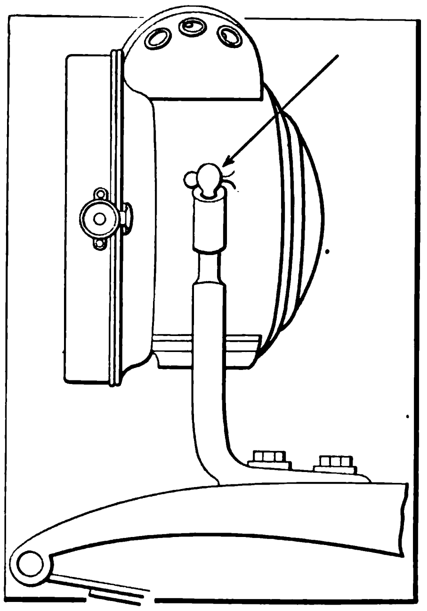


Fig. 2—Cotter pin over the washer on a lamp bracket placed to prevent the lamp from jarring loose

The clamping fit shown in Fig. 1 is on a round (tapered) shaft. In steering post work, however, it is not uncommon to use a square shank on the protruding end of the shaft. This idea is shown in Fig. 4. The square shaft is tapered and this character of fit, considering the four-sided shank, demands more attention than that which must be accorded the round shaft, because the latter may be reduced to its proper diameter by grinding methods. When the square shaft is properly sized, and the hub of the lever, with its broached hole, is "blued" and scraped to a neat fit, the clamping bolt is brought into play in precisely the same way as was described for Fig. 1, but there is just the same difficulty due to the tendency of the bolt to elongate in service, and the only way to overcome it is to take up on the locking nut as the occasion requires. The way to find out if a lever is loose on its shank is to take hold of the lever and see if it has any shake; there should be no sign of lost motion, but it rarely ever transpires that clamping bolts, if they are put under sufficient pressure initially, will continue in service without elongating, so that the autoist who finds his levers in a shaky condition should not be disappointed, but he is laying the foundation for a respectably sized repair bill if he fails to take action with reasonable promptness.

Fig. 3 shows a lever which is held on the shaft and prevented from rotating by a taper pin. It is a poor idea, nor can it be expected that the taper pin will hold out very long. With trouble of this sort, and it means trouble sooner or later, the average autoist finds himself in a quandary. When the old taper pin gives out he selects a nice, shiny new one, and he drives it into the hole with about the same force that the tup on a spile driver attacks the end of a spile. It is all to no purpose. No matter how much pressure is put on the taper pin it will not stay in place anyway unless the hole is re-reamed, to do which requires the proper use of a sharp reamer of the right size; even then, if the shaft is hardened, nothing good can come of it unless it is annealed before reaming. Finally, if a taper pin is to be regarded as efficacious, it must be cleaned thoroughly, removing all traces of oil, before it is inserted in the taper hole or else it will come out again; this is what lubricating oil is for. The walls of the holes serve as a bearing for the pin and if a lubricant is furnished there will be no metal-to-metal contact. In order to have metal-to-metal contact, which is what is wanted to keep a pin in place, the oil must be removed.

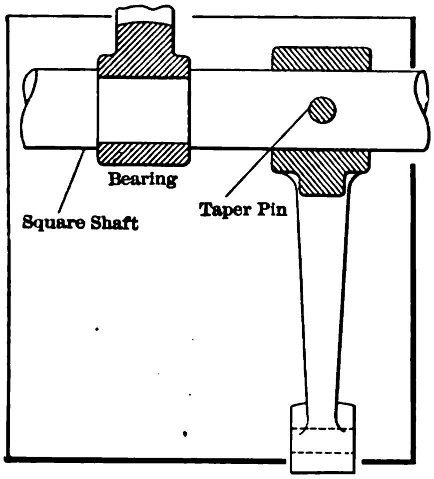


Fig. 3—Taper pin placed to prevent a lever from rotating on the shaft

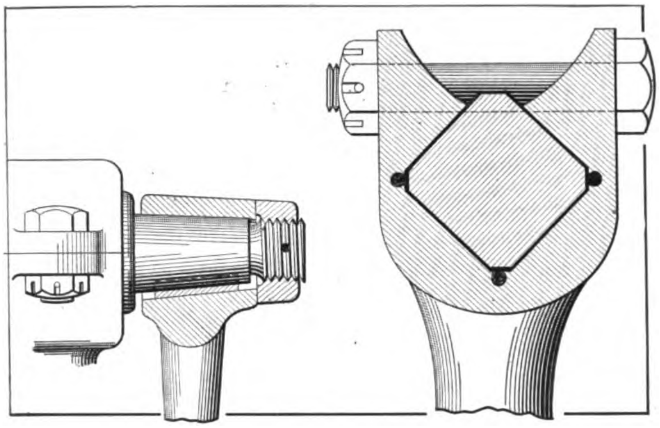


Fig. 4—Square shaft with a broached hole in a clamping lever hub and a bolt with a lock nut for clamping purposes

Lamps to give satisfaction, even if they are rightly designed, must be so installed that they will stay in place. This is not always the case, and Fig. 2 is used as an example to suggest one of the several ways which may be resorted to in order to hold the lamps in place. The brackets should be of steel and securely bolted to the frame.

Testing Steel—For Impact, Bending, Etc.

By BERTRAM BLOUNT, W. G. KIRKALDY and Capt. H. RIALL SANKEY.

(Third Installment)

Continuing the story of the tests as outlined in the last installment, the authors show the methods by which the tensile, chemical, and tensile-impact tests were carried out, and the results obtained. A diagrammatic sketch of the apparatus designed for the tensile-impact tests will assist the reader to a better understanding of the process.

THE following are some of the points attended to in the matter of selecting the position of test pieces.

When dealing with the steel plates, all test specimens were prepared lengthwise or in the direction of rolling, and it was not deemed necessary for the purposes of this investigation to include tests in the crosswise direction. As far as practicable the small specimens were taken from the same relative position, in order to minimize differences arising from difference in position. It was found impracticable to eliminate altogether effects due to position; for instance, the repeated bend specimens were taken near the skin surface, as would naturally be the case in ordinary workshop practice, and they then did not quite correspond in position with the small impact tensile and small static-tensile specimens, because the provision of suitable heads for holding necessitated the center or body of those specimens being located somewhat further in from the exterior surface.

Again, it should be noted that the standard-sized tensile specimens were made for the purpose of establishing the ordinary test data regarding the various types of steel and not for the purpose of comparison with the small specimens.

Tensile Tests

The tensile tests were carried out in the usual way and the standard test-pieces were made in accordance with the provisions of the British standard specifications. The small test pieces were 0.357 inch diameter with 2-inch gauge length. Mention need only be made as to the determination of the elastic stress. The procedure followed was that observed by the late Mr. David Kirkaldy, who, when commencing his testing operations, adopted the definition for the elastic stress as that where the rate of stretch ceases to be proportional to the load applied. This is determined by observing the rates of extension of the test-piece at regular increments of stress, and wherever the rate of extension increases the load is then noted.

As a matter of interest for this communication, the yield point, as evidenced by the drop of the steelyard of the testing machine, has been added; but Mr. Kirkaldy desires to point out that the practice at his testing laboratory has been steadfastly to combat the recognition of the "yield point." It is not

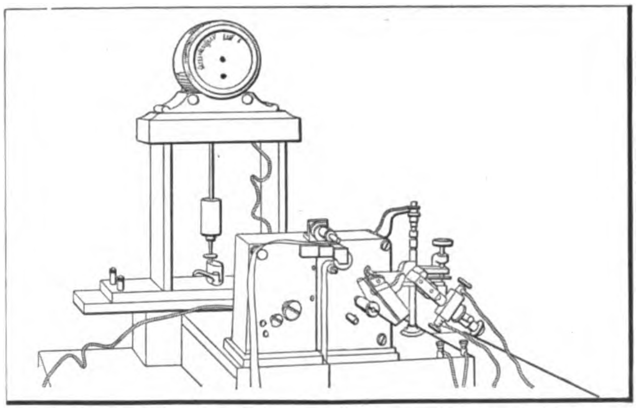


Fig. 4—Time recorder with half-second pendulum clock

a reliable criterion of the elastic limit, and he thinks that it ought to be discouraged. It is only during very recent years that he has been constrained to include this "yield point" in his official reports owing to the pressure put upon him by engineers insisting upon having it; as a *modus vivendi* he has therefore included it in his reports where wanted; but it has even then always been in conjunction with the determination of what he deems to be the elastic stress.

Chemical Tests

The following is a short description of the methods adopted for making the chemical tests which were carried out in Mr. Bertram Blount's laboratory:

Carbon, silicon, sulphur, phosphorus and manganese were determined in all the specimens, and in addition chromium and nickel in the specimen of high tensile steel intended for automobile parts. The methods of analysis employed were those usually accepted by steel chemists, and it is sufficient to indicate briefly which of the several methods recognized as reliable were preferred.

Carbon was determined by dissolution of the steel in potassium cupric chloride, its collection on asbestos in a tube closed with a perforated platinum cap and combustion in a quartz tube in a stream of purified air (not oxygen), the gases being passed over heated copper oxide.

Silicon, sulphur and phosphorus were determined by the methods given by Blair without modification.

Manganese was determined by Rothe's method, depending on the solubility of ferric chloride in ether for removing the bulk of the iron, followed by a basic acetate separation.

Nickel was estimated by a method depending on the formation of a double cyanide of nickel and potassium incompetent to dissolve silver iodide. A gravimetric method was also employed, consisting in removing the bulk of the iron as in the Rothe process, separating the manganese as dioxide and precipitating the nickel as sulphide in acetic acid solution, the small quantities of nickel remaining associated with the iron and manganese being separated by a basic acetate precipitation in the usual manner.

Chromium was determined by fusion of the product of the dissolution of the steel with sodium carbonate and potassium carbonate, the operation being repeated and the chromium reduced from its solution as chromate. and weighed as Cr_2O_3.

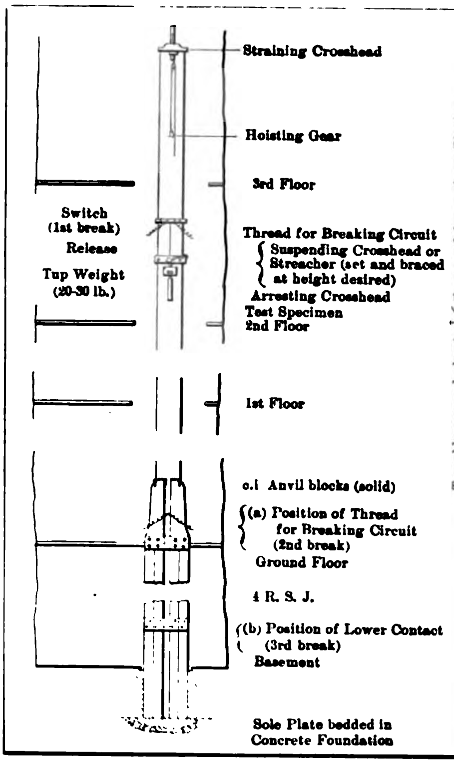


Fig. 2—Diagram of apparatus designed for impact-tensile tests

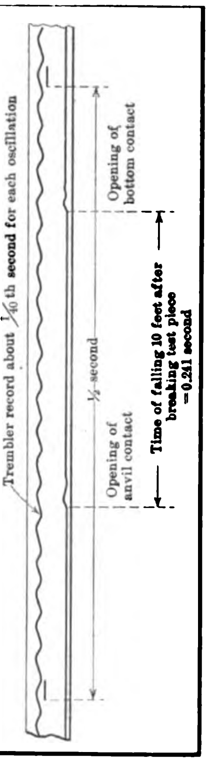


Fig. 5—Reproduction of record from time recorder

Tensile Tests

The general principles on which the machine used for these tests has been designed were referred to in the first installment. Fig. 2 gives a diagrammatic elevation of the machine and Figs. 3 and 4, Plate 1, some of its details. The anvil consists of a couple of castings weighing 400 pounds each, and securely bolted to four upright H-section steel columns, which in turn are bedded in concrete. The joint between the castings and the steel columns was machined and carefully fitted; the effective weight is 2,000 pounds and in this way an adequate mass has been given to the anvil. The edges of the casting are protected at the place where the blow from the tup has to be received by hard steel strips carefully bedded and securely bolted to the casting.

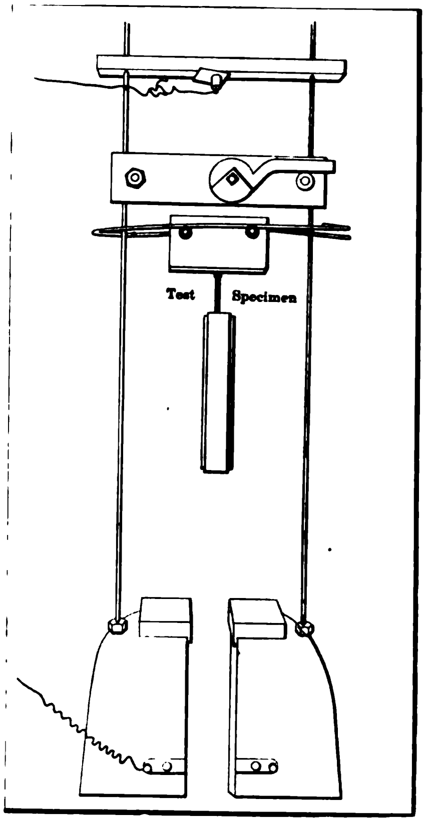


Fig. 3—Details of impact-tensile testing machine

The test piece connects together the "tup" and the arresting crosshead, the lower grip being fixed to the tup and the upper one to the crosshead, as shown in Figs. 2 and 3, and special care was taken in designing the ends of the test-pieces and the grip so that the line of pull would sensibly pass through the axis of the test-piece. The combination of crosshead, test-piece and tup is allowed to fall freely, there being no contact between the crosshead and the two wires shown in Fig. 2 on this page. and it will be seen that when the crosshead strikes the anvil its motion is suddenly arrested, but that none of its energy is communicated to the test-piece. The energy in the tup is, however, exerted on the test-piece and ruptures it, and with a given height of fall the weight of the tup is so chosen that there will be an energy excess to insure breaking the test-piece with one blow.

A stretcher is fixed to the two wires illustrated in Fig. 3, at any height desired, so that by connecting the crosshead to it any desired fall of the tup can be arranged for up to 40 feet. The connection of the crosshead to the stretcher is made by a suitable releasing catch. This catch is so arranged that the crosshead and the tup are instantaneously released without imparting any side motion to them—a more difficult thing to do than might at first sight appear. The tup was so designed that additional side pieces can be added to it. The smallest weight weighs 10 pounds and it can be increased to 20 pounds by steps of 2 pounds.

The energy applied to the test-piece at the moment of rupture can be accurately calculated from the height of fall, since it is a free fall, and as already stated the measurement of the remaining energy is determined from the velocity the tup has immediately after rupture. This measurement is made by observing the time interval between the breaking of two electric contacts, one placed immediately after rupturing the test-piece and the second 10 feet lower down. The energy absorbed by the breaking of the specimen is then determined.

Questions That Arise—General in Scope

Best way to locate cracks in cylinders; how to take automobile gasoline off of wearing apparel; reagents used in testing storage batteries; variations of the depression around carbureter nozzles; effect of such variations; functions of the intake manifold from the carbureter point of view; facility offered by tortuous passageways in the process of vaporization.

[152]—What is the best way to locate a crack in a cylinder if it is barely, if at all, discernible, especially if it is desired to determine how extended it is?

Moisten the surface of the metal with kerosene all around the suspected surface; rub off the oil and then chalk it over; the oil in the crack will exude and discolor the chalk: in this way the crack may be traced.

[153]—Would it not be good to know how to remove grease and other accumulations which are so prone to attack one's garments, especially when a repair by the roadside must be undertaken, and no provision is made for suitable over-garments of an appropriate character?

An old duster will protect the roadside repair man's clothing; if none is at hand and grease does find its way onto the garments, the cleaning process to employ depends upon the character of the cloth in the garment to be cleaned.

How to Clean Garments of Automobile Oil and Grease

Cotton cloth: rub with lard, then apply soap, in quantity to saponify the lard. Wash alternately with water and turpentine.

Woolen cloth: same as for cotton cloth.

Linen cloth: apply soap, or oil of turpentine, alternating with a stream of water under some pressure.

Silk fabric: apply lard, then soap, after which wash with benzine and water alternately; let the water fall from a height, or use a stream under some pressure.

Caution: Before proceeding to clean a delicate fabric, it will be a good precaution to try the process out on a sample of the same material, with a view to noting if there is some peculiarity of the fabric that will resist cleaning—it might be made worse.

[154]—What is the relation of nitrogen to oxygen in atmospheric air, under a pressure of one atmosphere, and at a temperature of 60 degrees Fahrenheit?

(*a*) To find the quantity of nitrogen, by volume, in atmospheric air, corresponding to one volume of oxygen, proceed as follows:

$$N = O \times 3.770992 \quad \ldots\ldots (1)$$

(*b*) To find the quantity of oxygen, by volume, corresponding to one volume of nitrogen, proceed as follows:

$$O = N \times 0.265182 \quad \ldots\ldots (2)$$

Volume changes with temperature; which must be considered.

[155]—What list of re-agents is used in storage battery work?

REAGENTS USED IN TESTING ELECTRIC STORAGE BATTERIES

Formula.	Reagents. Name.	To Make Solution, Proceed as Below.
$Ag\,N\,O_3$	Nitrate of silver.	1 part salt, 20 parts water, in orange colored bottle.
$K_3\,Fe\,Cy_6$	Potassium ferrocyanide, Red prussiate of potassium.	1 part salt, 12 parts water.
$K_4\,Fe\,Cy_6$	Potassium ferrocyanide, Yellow prussiate of potassium.	1 part salt, 12 parts water.
$N\,H_3$	Aqua ammonia, Ammonia water.	Purchase 16 degs. B., in glass-stoppered bottle.
K O H	Liquor potassæ.	Purchase ready for use, green glass bottle.
$Ca\,H_2\,O_2$	Hydrate of calcium and water, Lime water.	½ grain of lime to 1 oz. of water.
K I	Iodide of potassium.	1 part salt to 20 parts water.
$H_2\,S\,O_4$	Concentrated sulphuric acid.	Purchase 66 degs. B. sulphuric acid.
Cu	Copper filings.	Purchase test copper.
$Fe\,S\,O_4\,7\,Aq$	Green vitriol, Proto-sulphate of iron.	1 part salt, 8 parts water.
Au	Gold leaf.	Purchase as required.
H Cl	Muriatic acid, Hydrochloric acid.	Purchase concentrated acid in glass-stoppered bottle.
$Sn\,Cl_2$	Proto-chloride of tin.	1 part salt, 10 parts water.

[156]—What is the depression around the nozzle in the average carbureter as measured in ounces?

In view of the marked effect it has on the power of a motor, it should be maintained at the lowest possible limit. It is frequently estimated to be about 8 ounces per square inch. It has been found to exceed 32 ounces (2 pounds) per square inch.

[157]—What is the function of this depression?

The gasoline raises to near the opening of the nozzle, and the force which induces it to spray out is represented in the depression. This depression is below the atmosphere so that it is what is normally described as a partial vacuum. The difference between the pressure of the atmosphere and the depression (vacuum) represents the force which moves the gasoline out of the nozzle, more or less as a spray, into the air current as it is induced by displacement of the piston of the motor where the gasoline is taken up and more or less vaporized as it mingles with the inrushing air, thus producing the fuel mixture for the motor.

[158]—To what extent is vaporization attained around the nozzle?

It is probably true that vaporization starts at the instant the spray of gasoline is picked up by the air, and the intensity of this action depends upon the extent to which the pressure is lowered.

[159]—What are the influences for complete vaporization?

If the vaaporized gasoline is in spherical formation, or approximately so, the smaller the spheroids are, the more efficacious the result will be. Since vaporization is only possible if enough heat is delivered to the gasoline vapor to equal its latent heat of evaporation, it follows that there must be enough heat in the inrushing air to accomplish this end, but the spheroids must be small enough and offer sufficient surface, so that the heat transfer can be accomplished within the time available.

[160]—Does the length of the intake manifold affect this situation?

Since it is highly improbable that the gasoline, as it is sucked out of the nozzle, is in minutely subdivided particles, it follows that the heat-laden air will be retarded in the intermingling process and much more time is required in the process of vaporization than that available if the manifold is of small diameter and short. In view of these facts it is not out of place to consider that the manifold is but a part of the carbureter, and that it should be long enough to serve for the purpose of giving enough time to permit the air to give up its heat to the gasoline to form vapor. In other words, the intake manifold performs the function of a mixer.

[161]—Since the mixture will travel fast if the area of the manifold is restricted, why not make the manifold of large area, and in this way add to the period of time without having to add to the length of the manifold for the purpose of affording the requisite time to complete vaporization?

It is true that the larger area would afford its measure of compensation, but designers are debarred from resorting to this means for the reason that the rate of flame travel in the mixture must be below the rate of travel of the mixture, or, when the inlet valves open, flame from the combustion chamber will fire the inrushing mixture and will travel down to the carbureter, thus making what is commonly termed "popping in the carbureter."

[162]—Is it possible to prevent "popping in the carbureter" by designing the intake manifold with this end in view?

If the area of the intake manifold is sufficiently restricted, popping in the carbureter will be avoided, even though a spark plug be placed in the intake manifold and a spark applied, if the timing of the spark is such as to induce it after the intake valve opens.

What Side of the Road Should an Auto Take?

Editor THE AUTOMOBILE:

[2,317]—Will you please answer the following questions: When an auto driver wishes to pass a horse and buggy going the same way, which side of the road should the auto take? Under such circumstances, does the Ohio State Law oblige the driver of the horse to give the auto one-third of the road? A. E. E.

Lodi, Ohio.

When an automobile driver wishes to drive his car by a vehicle ahead, it is his duty to see that the road ahead is clear and pass the approaching vehicle on its left side. The law, whether or not there is a specific expression, is so construed that carelessness or recklessness must not be indulged in. Even if the law should provide for an allowance of one-third of the road for a horse-drawn vehicle, it does not necessarily follow that an automobile driver would be safe in passing the horse-drawn vehicle, either at a high speed or in such a way as to scare the horse; it would still be necessary to exercise "due caution."

Trouble is Tappet Rod Sticks

Editor THE AUTOMOBILE:

[2,318]—I have a two-cylinder motor of the opposed type, and it runs along very nicely excepting on occasions when the motor suddenly shuts down. I have gone over the timing, ignition system, carbureter, and pretty much everything, but the mysterious trouble above noted is still in the car. SUBSCRIBER.

Buffalo, N. Y.

Referring to Fig. 1, you will observe that the valve stem is offset from the tappet rod, and it is very likely that the guides are somewhat worn. The pressure comes on out of a straight line, and a certain amount of heat causes the lubricant in the guides to gum up. Your trouble, under the circumstances, is due to the sticking of the tappet rod, and you will be able to overcome it by using a stouter spring on the valve or hooking an auxiliary spring into an eye in the foot of the tappet head so that it will snap back and hug the face of the cam all the time instead of staying open, as shown.

Piston Rings Are Worn; Lost Compression

Editor THE AUTOMOBILE:

[2,319]—I have a two-cycle motor which works to my satisfaction for a part of the time; at other times I fail to get any good out of it at all, and I judge from indications that the compression is almost nil. W. A. L.

Harrisburg, Pa.

You will probably find that the piston rings are of stout section and lack flexibility. The ports are also wide, and as the rings sweep over the ports they tend to fall in; the result is that the corners of the rings are worn over the diameters which sweep the ports, and not being pinned, they float so that there is no compensation between them. A new set of well-made rings should help you out, although the remedy will be but partial if the cylinder bore is out of true. Regrinding the cylinders would be the further remedy. Fig. 2 is offered as a rough illustration of the idea here presented.

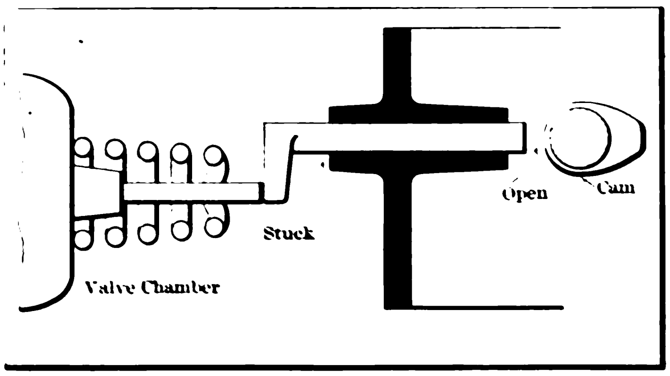


Fig. 1—Depicting offset tappet and showing how it sticks if it is not lubricated

Supply the Right Amount of Good Oil

Editor THE AUTOMOBILE:

[2,320]—My motor smokes every time I put oil in the crankcase, and continues to do so for upward of a half hour after I start out. The rough sketch enclosed shows how the oil is carried in the lower half of the crankbox, and the trouble is that I do not know when I put in enough oil; being afraid of lubricating trouble I am inclined to use an excess, but how am I to do otherwise with safety? READER.

Wheeling, Va.

Taking the liberty to revise your sketch as shown in Fig. 3, it is with the idea of putting a standpipe on the end of the drain cocks, which standpipe should be high enough so that it will project upwards within the case just the amount which will fix the desired oil level, so that the scoops on the ends of the connecting rods will dip into the oil each time they cross the bottom dwell point. Alongside of the drain cocks plugs are placed, one for each chamber, for the purpose of draining all the oil out of the wells at intervals in order that the quality of the lubricant may be kept up to a reasonable standard. It will be readily understood that after oil is put into the crankcase, if the drain-cocks are open, the excess of oil will drain out, leaving the exact right amount for working purposes.

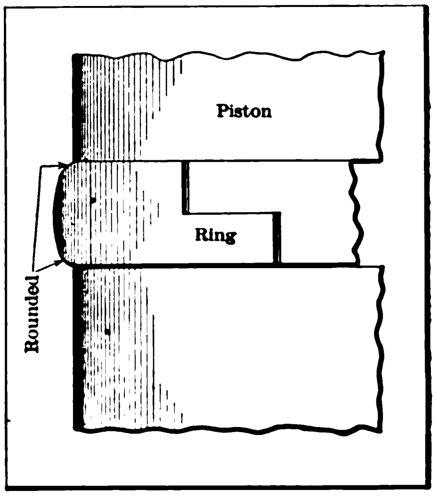


Fig. 2—Showing rounded corners of the piston rings due to the rigidity of design and wide ports

Turning Over Speed in Miles Per Hour

Editor The AUTOMOBILE:

[2,321]—I am much interested in your discussions in relation to the operation of automobiles, and I judge from talks which I have had with other beginners like myself that the question of safety on a curve is one which might be profitably exploited, and it ought to be of some assistance were one to know something of the border line of safety. Can you enlighten readers of "The Automobile" on this subject? K. A. C.

Bowling Green, Ky.

No two makes of automobiles perform precisely alike in this respect. Much depends upon the distribution of weight on the four wheels, and upon the center of gravity of the car as a whole. Assuming that the distribution is equal on the four wheels, and that the center of gravity is approximately in the plane of the axles, the curve, as shown in Fig. 4, will serve for the purpose. In this curve the turning arc is given in feet, as ordinates at the bottom of the chart, and the speeds at which the car will capsize are given as abscissa.

Discussion of Carbon Cracking Phenomenon

Editor THE AUTOMOBILE:

[2,322]—In your reply to letter No. 2,304, you mention free carbon as a second cause of sooting. I wonder if you are not perpetuating an error in this matter. I have experimented a great deal with oils since first driving an automobile and my experience goes to indicate that the presence of free carbon is a good sign rather than a bad one. This is so contrary to the accepted belief that some explanation is necessary. I early decided that the hotter the engine could be run the greater would be the economy, and possibly the power, and the less the radiating complications. The hot engine necessitates a high-test oil, and a hot engine will "crack" the fuel or oil much more rapidly than a cool one and, therefore, will soot up or carbonize more rapidly than a cool engine unless the heat is up to a still higher point where the carbon burns as it should and disappears. My water-cooled engines were not as hot as this but were hot enough to carbonize quickly.

My experience was, therefore, as follows: The low-test oil cracked, smoked, and sooted rapidly. The high-test oils remained on the cylinder walls and did not need to be fed in such a large amount. The low-test oils could be clear, almost white, and, therefore, probably free from "free carbon." The high-test oils were darker in color, which was quite manifestly due to "free carbon." When one takes a clear oil and mixes lamp-black with it to make it look like the darker oil, he is surprised at the small amount of lamp-black needed to effect the coloring. So small is the actual weight of black that it seems negligible. But the thought for your readers to keep in mind is that all mineral oil is a composition of hydrogen and carbon; that the large proportion of carbon is what adds the lubricating ability, and that the larger the proportion of combined carbon the better the lubricating ability generally; that gasolene and kerosene contain enough combined carbon to soot an engine quickly if "cracked," or separated, as they may readily try by turning the carbureter needle to get too much fuel and form a black smoke; that only as much fuel and oil should be used as the air will burn; that burning oil makes a very slow flame, and so yields very little power; that an excess of oil uses air which should be used by a proper amount of gasolene; that less of a high test oil will serve better than more of a low test oil; that the high test oil does not burn nor crack, as does the lower test oil. (This is readily proven by noting that an excess of gasolene makes a black smoke, whereas an excess of oil usually makes a blue vapor.)

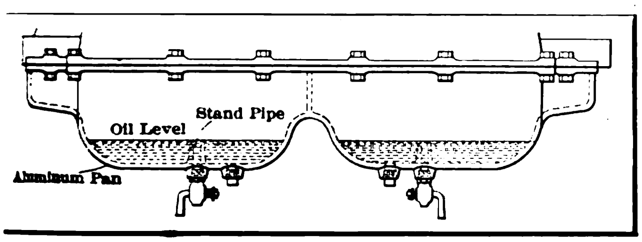


Fig. 3—Oil wells in the lower half of the case and method suggested to maintain the proper level

From the above I trust it will be seen that the other portions of your answers are correct, and that free carbon, instead of being an objectionable feature, may be evidence of a good oil, and therefore is not to be avoided.

The other thought in this connection is that engines may be run so hot as to burn the carbon deposits; carbon is simply fuel in solid form. That "red particle" of carbon which is supposed to cause preignition will burn and disappear if given sufficient free air for its combustion. If it does not get red enough to burn it does not get red enough to pre-ignite. The great trouble is that the driver, in striving to get maximum power, will feed all the fuel the air will take, and there is no free air left to burn this free carbon. The remedy for this is to use larger engines and have the gasolene needle where it can be reached so that when full power is not needed the mixture may be lean with plenty of free air. This not only burns the carbon but is economical and avoids odor.

CHAS. E. DURYEA.

Reading, Pa.

Temperature Must Favor the Boiling Point

Editor THE AUTOMOBILE:

[2,323]—Your reply to letter No. 2,309 indicates that you believe the temperature of the motor is an essential condition in spark starting. I am sure this is wrong. Gasoline will vaporize at ordinary temperatures and so will make an explosive mixture in the cylinder even when the engine is cool. The only requirements, then, are to have the piston where it can receive an impulse effectively and to have a mixture of proper quality, hot or cold, and to make a spark. If the engine is to start when cold the cylinder oil must be very thin, so the engine can turn easily. The mixture should be overfat. When the engine stops the hot walls will expand the charge and force out some of it past the rings; then, as the engine cools, pure air will be drawn in. If the charge is of proper economic proportions this air will reduce it so it will have but little power, but if overfat in the first place, the addition of air will make it more powerful, and taking out the spark plugs may be an advantage. From the above it will be seen that spark starting is not in line with economy, and, therefore, not to be considered as an unclouded good.

Your comments on the loss of heat in the air-cooled engine (page 1,138, issue June 23) seem to me incorrect. By using graphite for lubricant, and alcohol for fuel, it is possible to make an engine that need not be cooled worth mentioning; such an engine radiates the wall heat into the new charge and this heat is not lost. I use this simply as an illustration to show that the hotter the walls of an engine the less the heat loss. In the paper in question we must assume that the walls receive a fixed quantity of heat per impulse. To maintain the outer surface at 100 degrees centigrade requires a large amount of radiator surface for two reasons; the amount of heat to be dissipated is greater and the ability of the radiator is less, but if the walls can be worked at 200 degrees centigrade they will radiate more heat back into the new charges, and lose less by outward radiation; second, the radiating substance, being hotter, will part with its heat to the air doubly fast, and so need not have so large a surface. This is plainly shown by my experience with air-cooled engines having copper spines. Although of the 2-cycle type, they keep workably cool without the use of a fan, because the copper both carries the heat out quickly and parts with it to the air rapidly. There is a most noticeable difference in two engines of same size, one having cast-iron flanges, and the other having copper spines. The cast-iron flanges will be so cool one can feel them with the hand, without getting burned, but the copper spines will be sizzling hot, yet the iron cylinder will be overheated on a hard pull, while the copper spined one will be in fine working order.

CHAS. E. DURYEA.

Reading, Pa.

The temperature of boiling of automobile gasoline is all that is necessary—it may be low.

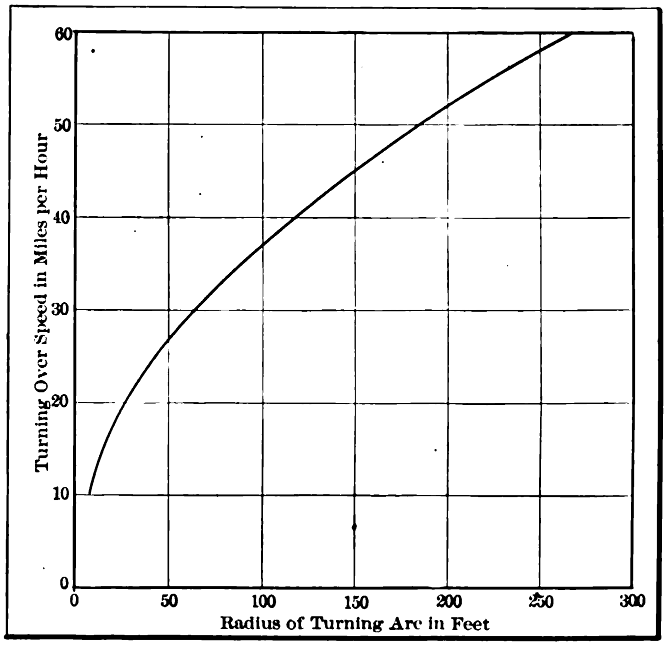


Fig. 4—Curve charted to indicate the speed of turning over of a car on a curve

Makes Motoring Pleasant: A. C. of Cincinnati


Dr A.B. Heyl


D. McKim Cook
1st V Pres.


Dr C.L. Bonifield
Pres.


G.W. Drach
2nd V Pres.


Dr L.S. Colter
Sec.


Well Equipped Office


Billiard and Pool Room


The Dining Room


E.J. Carpenter


L.J. Merkel

CINCINNATI, July 4—Reared upon the foundation principle of making the use of the automobile more pleasant to the residents of Cincinnati, the Automobile Club of Cincinnati has grown mightily; waxed strong in numbers and powerful in influence. Still in its infancy, measured in terms of time, the club has over 800 active members, each of whom is the owner of an automobile and an enthusiastic subscriber to the platform of the organization.

Like kindred bodies all over the country, the Automobile Club of Cincinnati is composed in large measure of the best and most influential citizens of its community. The roster of the club reads like a selected list of the leaders of the Ohio metropolis in all prominent lines of endeavor.

The club has been in existence only about two years in its present form, but it is accounted one of the important factors in the life of the city. No great project of a civic character is undertaken without consideration by the automobile club, owing to the fact that members of the motor organization are leaders in practically all the civic organizations of Cincinnati.

While the declaration of principles of the club contains only a single statement, its scope is so broad that every possible line of activity is included within its terms and the way the members attack the various problems touching upon the "rendering pleasant of the use of the automobile," is refreshing.

Without being in any sense a sporting organization, the club takes part in a wider program of sports than many clubs that are ostensibly devoted to that branch of motoring. The Tours and Runs Committee is one of the busiest subdivisions of the club and while a large part of its work is informal, nevertheless, it is particularly useful and efficient.

It is not a social organization, despite the fact that many of the leaders of Cincinnati's exclusive society belong among the [illegible]

It is not a political organization in any view, even though Cincinnatians are all politicians and the city is the home of the President and of the most prominent candidate to succeed Mr. Taft in that exalted office. Both Taft and Governor Harmon are enthusiastic automobilists and both are indirectly connected with the automobile club.

Tourists who have visited Cincinnati this season are impressed with the work of the club long before they reach the city. For miles around, practically every crossroad is decorated with signs showing directions and distances. Such a thing as police persecution may be said to be unknown and Col. Paul M. Milliken, Chief of Police, co-operates heartily with the club to protect motordom from injustice, while the club responds by firmly squelching any tendency on the part of the motorists to break the law. Mulct laws, either State or municipal, are nipped in the bud in a way that might seem mysterious if one did not understand the work of the Automobile Club of Cincinnati.

The Queen City is built like Rome, on seven hills, each of which presents a distinct problem to the owner of an automobile. It possesses much wealth and social prestige and as a consequence the proportional ownership of automobiles is very high. The city streets, drives and boulevards have a national reputation and the surrounding roads are excellent in the main. As a result, the pleasure of automobiling is splendidly augmented by natural conditions and with surprising speed the art of man is being applied to them. This work, directly or indirectly, may be laid at the door of the Automobile Club of Cincinnati, which is elaborately housed in the Gibson House, in Walnut street.

The club is managed by a Board of Governors consisting of fifteen members. The present board is composed of President Charles L. Bonifield, one of the leading surgeons of the United States; first vice-president, D. McKim Cook; second vice-president, G. W. Drach; secretary, Dr. L. S. Colter; treasurer, Louis J. Merkel; consulting engineer, E. J. Carpenter, and the directors, Dr. G. M. Allen, J. P. Orr, George W. Cleveland, William Perin, Dr. A. B. Heyl, Dr. C. C. Fihe, A. P. Streitman, E A. Conkling, Carl F. Streit and Charles W. Ireland.

These gentlemen represent the front rank in the vanguard of Cincinnati's progress along all lines of advancement. Finance, the professions and business interests of all kinds are included and the members who do not hold office are quite as prominent as those who do.

When any undertaking of the club needs to be financed the organization does not have to conduct street fairs or go begging. It dips into its own well-lined pocket and supplies the motive power. It holds monthly meetings and the President frequently calls special meetings of the membership, but the bulk of the club's work is done in committee-room. The difference between the operation of the club and some others is that "it gets action on everything it undertakes."

That does not mean that every project submitted to it is forced through successfully, but it does mean that the pigeonhole is not overworked.

In general way the activities of the club may be summed up under the following heads: First, in the erection of signboards throughout the territory over which the club presides; second, in the registration of chauffeurs; third, in favorable publicity; fourth, in controlling speeders and potential lawbreakers; fifth, in scrutinizing legislation; sixth, in boosting its membership; seventh, in conducting such functions as the annual outing of the orphans; eighth, in presenting entertainments that really entertain; ninth, in promoting sociability, and tenth, in insisting, quietly, effectively or truculently as the case may be, upon a square deal for the motorist.

These ten principles, all depending upon the first and greatest aim, that of "rendering the use of the automobile more pleasant," are only slightly different from the avowed purposes of nearly every other club in the land. The real difference lies in the way they are enforced and made effective.

Dr. A. B. Heyl, one of the directors of the club, is also secretary of the Ohio State Automobile Association and makes the Cincinnati Club his headquarters. This is a big advantage to the prestige of the club and a convenience to touring motorists. There is more independent action among Ohio motordom than there is in a big majority of similar State organizations. This is shown in numberless ways, but is particularly emphasized in the legislative situation.

A great motor speedway is being projected across the river from Cincinnati, and when the course is built and ready it will be only natural that the Automobile Club of Cincinnati will take a more prominent part in the sporting end of the work than it does at present. As it is, the club declines to be identified with race meetings that are founded upon the simple effort to gain dollars. As a matter of fact the money-making features of motoring do not appeal very strongly to the organization.

Coming Events in the Automobiling World

Jan. 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Pleasure Cars and Accessories Exclusively.
Feb. 6-Feb. 11, '11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill-Climbs, Etc.

July 1-10	Los Angeles, Cal., Road Carnival of Licensed Dealers.
July 8-9	Grand Circuit Meet, Churchill Downs, Louisville, Ky.
July 9	Hill Climb, Morison, Col.
July 9	Plainfield, N. J., Hill Climb of Plainfield Automobile Club.
July, Middle of	Richfield Springs, N. Y., Hill Climb.
July, Middle of	Grand Rapids, Mich., Road Race of Grand Rapids Automobile Club.
July 16-18	Motor Contest Association Tour to Catskill and Hill Climb Up Kaaterskill Clove.
July 18-23	Milwaukee, Wis., Tour of Wisconsin State Automobile Association for Milwaukee Sentinel Trophy.
July 28-30	Detroit, Mich., Summer Meeting Society of Automobile Engineers.
July 30	Wildwood. N. J., North Wildwood Automobile Club. Speedway Races and Club Run.
Aug. 1	Minneapolis, Minn., Reliability Run of Minneapolis Automobile Club.
Aug. 3-5	Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 4	Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Aug. 15	Start of Munsey Tour.
Aug. 17	Cheyenne, Wyo., Track Meet.
Aug. 31	Minnesota State Automobile Association's Reliability Run.
Sept. 2-5	Indianapolis, Ind., Speedway Meet.
Sept. 3-5	Wildwood, N. J., Reliability Run and Speedway Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 5	Wildwood, N. J., Track Meet.
Sept. 5	Cheyenne, Wyo., Track Meet.
Sept. 5	Denver, Col., Road Race, Denver Motor Club.
Sept. 5	Los Angeles, Cal., Speedway Meet.
Sept. 5-10	Minneapolis, Minn., Track Meet at State Fair.
Sept. 9-10	Providence, R. I., Track Meet.
Sept. 10	Los Angeles, Cal., Mount Baldy Road Race.
Sept. 10-12	Seattle Wash., Race Meet.
Sept. 17	Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept	Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.
Oct. 1	Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 3	Louisville, Ky., Reliability Run, Louisville Automobile Club.
Oct. 6-8	Santa Anna, Cal., Track Meet.
Oct. 7-8	Los Angeles. Cal., Speedway Meet.
Oct. 8	Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 15	Long Island Motor Parkway, Grand Prize, Automobile Club of America.

THE AUTOMOBILE

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LAST of the Glidden Tours is here, so it is claimed by those who make a point of prognosticating.

* * *

AERONAUTICAL performances, of which there are now plenty, tell a many-sided story; practicability is pictured in the whole situation. Some men claim that "Drednaughts" are no longer worth the price of metal it takes to build them, counting the value of the metal on a "scrap" basis. The main part of the story of the utility of the aeroplane is entirely overlooked; the great Western plains, with thousands of square miles of level country, alive with herds of cattle, running over with sheep, growing in agricultural importance, must be the near-future land of the "plane."

* * *

THE herdsman, with his "plane" will be able to do more and better work; it will cost him less than in the old way; he will be able to protect his cattle as he never could before, and the influences on the cost of beef will be so great that humanity will take very kindly to the "winged steed."

* * *

LOST motion, as it creeps into machinery, starting with the watch, passing through the reaper, locomotive, and no less in the automobile, represents the effect of time and service in the machines that are well cared for assuming that they are properly made. If good material is not used, or assuming that the character of the workmanship is poor, the extent of lost motion is more or less independent of time, and belongs in the land of speculation.

* * *

LUBRICATION, if it is properly cared for, if the good lubricant reaches the areas that are under pressure and the influence of relative motion as well, will do more to stave off old age than any other influence. Present practice abroad is given a measure of attention in THE AUTOMOBILE this week, and, while it may not be necessary for American designers to look about, the fact remains that it is not bad practice to keep abreast of the doings of others.

* * *

WHILE foreign technical papers pay rather too much attention to "sporting events" to suit the average American engineer, the fact remains that, of the 53 papers of this complexion which "go to press" regularly, some of them are up to a high standard, and the "abstracts" which appear weekly in THE AUTOMOBILE are culled for the purpose of affording to the American engineer a clear insight into the doings abroad, as they are depicted in the more reliable of these foreign papers.

* * *

INDIANAPOLIS has its Speedway events at sufficiently frequent intervals to keep before the public the fact that American-made automobiles are up to the scratch. It may not be generally appreciated that the hardest service that can be put upon an automobile is that due to speed. Weight is a factor, but this influence is only in direct proportion from the life-of-the-automobile point of view. Speed influences the life of a car quite differently; life is inversely proportional to the square of the speed. The Indianapolis Speedway is doing a great service for the automobile; it affords the speeding conditions necessary to bring out the staying qualities of the cars as no other test would do. Makers appreciate this fact and they owe much to the pioneers who had the hardihood to build the speedway.

* * *

STANDARDIZATION is a condition that cannot be present in automobiles unless it is first induced into the materials of which the automobiles are made. It is the purpose of the Society of Automobile Engineers to work on the material question until it succeeds in establishing a set of standards. The "Mechanical Branch" of the A. L. A. M., made good progress with this question, but inactivity for a couple of years has introduced "The frog in the well" plan which does not wholly solve the problem—bull-dog tenacity is the new idea.

* * *

BETWEEN the acts whipped into shape by the legislative "axe grinders" there are other features for the automobile to support. The latest idea was advanced by the men who champion the Long Island railroad in its campaign of extermination. It is now claimed that autoists, being more numerous than trains, should be required to protect the railroads by having "flagmen" at the grade crossings to warn trainmen.

S. A. E. Takes Lead in Standardization Work

Seamless steel tubing is being worked upon to reduce the number of sizes specified in every-day work; standard for square holes to be decided upon; broaches for square holes to be limited in number; valve-seat reamer angles will have attention; uniform standards for materials and tools will pay dividends; limits of tolerance to be defined.

HOWARD E. COFFIN, President of the Society of Automobile Engineers, states that the below copied letters, by H. S. White, of the Detroit Seamless Steel Tubes Company, and G. E. Merryweather, of the Motch and Merryweather Machine Company, hit the nail as squarely on the head as do any of the other communications which have been received by the society.

Up to the present time there has been an utter lack, upon the part of the engineers affiliated with the motor car, the accessories, or the raw material trades, of any general effort toward uniformity in the specifications of motor-car materials. This work cannot longer be neglected. It is of the most vital importance to the purchasing department, to the engineering department and to the business management of every concern whose interests are in any way connected with the motor-car industry.

The Society of Automobile Engineers is the only organization in existence at this time through whose channels the desired results may be obtained. The society is undertaking this work, and if given support in accordance with the importance of the end to be attained, will soon be able to show, in many directions, an improvements which may best be spelled in actual dollars and cents to the manufacturer and to the motor-car user.

The letters referred to are most worthy of careful reading, as being representative in every way of the general attitude of the machinery and raw material supply houses. Mr. Merryweather's letter is as follows:

CLEVELAND, O., June 21—Confirming recent conversation with President H. E. Coffin, I believe that the move of the Society of Automobile Engineers to standardize various material specifications, gauges and practices will be of the greatest value to the automobile manufacturers as well as to the material supply houses. Such work would also be of great value to the manufacturers of machine tools, and of small tools, and would greatly facilitate deliveries upon such goods and would decrease their cost to the manufacturer to a remarkable degree, because it would make it possible for the tool manufacturer to make up and carry such equipment in stock upon a commercial basis. A large percentage of this kind of work is now done to special order, because of infinitesimal differences in the specifications of every automobile manufacturer.

As only one of the many cases in point, take as an instance the broaching machine. If the automobile engineers would settle upon a standard for squared holes, giving distances across corners, and other dimensions in some definite ratio to the diameter of the shaft, and would tabulate this data for general use, it would mean an immense saving, both in time and money, over the present method of making each broach to special order, and one at a time.

Broaches for transmission gears, to be fitted upon shafts, with three or four keyways, should receive the same standardizing treatment as should those for squared holes. Valve-seat reamers, of two or three different angles of seat, could very well be standardized, and made up in a quantity commercial way in the various necessary diameters.

This same principle of recommended and tabulated standards could be carried out in innumerable directions to the very great benefit of the industry. Uniform standards in the specifications of materials, and tools, would insure immediate delivery to the manufacturer.

We believe that the work in this direction upon the part of the engineering organization is of very great importance and wish you every success along these lines.

(Signed) G. E. MERRYWEATHER.

Seamless Steel Tubes Demand Attention

DETROIT, June 18—Confirming by conversation with President H. E. Coffin yesterday in regard to standard sizes of seamless steel tubing for automobile construction we are preparing a card showing such standard sizes and will submit a rough draft of this card to you next week.

We cannot impress too strongly the importance, not only from the tube manufacturers' standpoint, but from the automobile manufacturers' view, of the necessity for the automobile manufacturers confining their orders to standard sizes. You can readily understand that if the tube manufacturers can work at their mills on standard sizes only, that they can increase their output and in that way make more prompt deliveries of material. Furthermore, if working only on standard sizes, the quality of the tube is bound to improve, as it goes without saying that when a workman turns out a regular product he is more inclined to become expert than if his energies are split up on a variation of sizes and gauges. On pick-up orders, some things that every automobile manufacturer is forced at times to purchase, if they have adopted a standard size, they can more readily secure what they want.

This matter was agitated some three years ago and at that time automobile manufacturers were ordering approximately 1,600 different sizes and gauges, but to-day there are only about 800 or 900 different sizes. The standard sizes listed to-day by the two manufacturers represents about 300 different sizes and gauges, and it would seem from the two manufacturers' point of view that a standard size could just as well be adopted as some odd size. After the adoption of the table of standard size in accordance with the rough draft we proposed to submit to you it would mean merely consulting a trade book or framed table in the drafting room, to find out what was a standard size, and then make their plans accordingly. We give below a memorandum of a few odd sizes which have been ordered recently:

(OD, outside diameter; ID, inside diameter.)

7-8 OD x 1-8 wall, 1 1-4 OD x 1 ID, 2 9-16 x .142 wall, 1 1-8 x 1-8 wall, 1 21-32 x 1 3-16 ID, 1 9-16 x 1 3-16 ID, 2 11-16 x 2 5-16 ID, 2 11-16 x 2 3-16 ID, 2 x 9-32 ID, 2 3-8 x 1 5-8 ID, 3 3-8 x 2 3-8 ID, 1 3-16 x 3-4 ID, 15-16 x 5-32 wall, and .855 x 7 gauge.

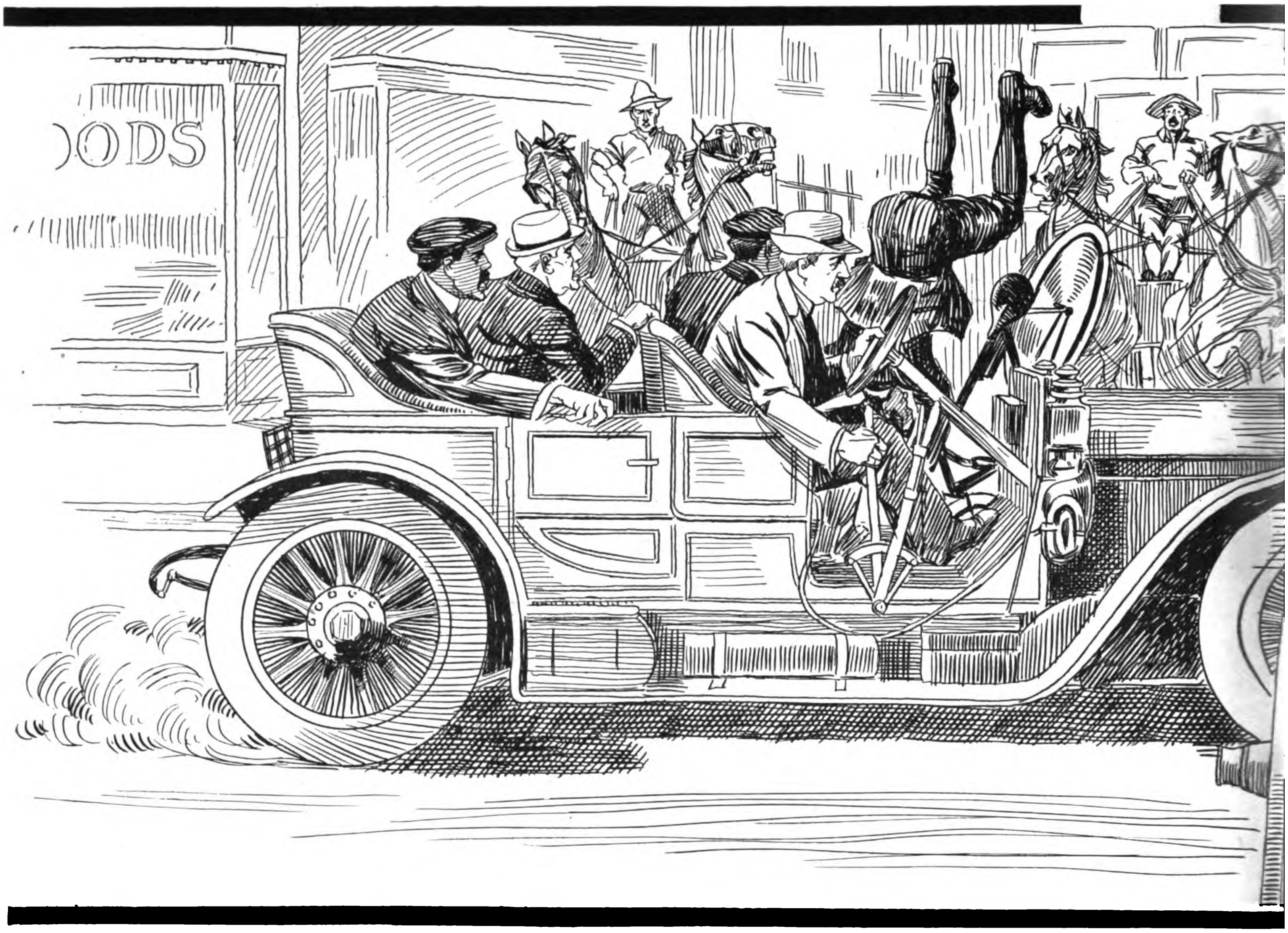
Any of these sizes mentioned above could have been changed by the automobile manufacturer in his original plans to a standard size. Take a tube ordered with a 1-8-inch wall, which size is not listed as a standard gauge, but 11 gauge could be used just as well. The 1-8 inch representes .125 inch and 11 gauge .120 inch.

On the question of variations, there seems to be a general opinion among automobile manufacturers that seamless tube is a finished product and can be furnished practically the same as a machine job. This is not the case and the automobile manufacturer should treat seamless tube as a raw product. This is particularly true where absolute accuracy is required, and in purchasing this material they should take this into consideration.

Tubes smaller than 2 inches OD will vary .005 inch minus to .005 inch plus on both the OD and ID. Tubes 2 inches and larger will vary from .010 inch minus to .010 inch plus on both OD and ID. The wall may vary not more than 10 per cent. of the specified thickness. Any tube which would meet with the above specifications would be passed by the tube mill inspector.

I would respectfully suggest that the Society of Automobile Engineers adopt as standard the sizes which will be shown on the card to be issued, and that the variations outlined above be also considered as standard by the society.

(Signed) H. S. WHITE.



SEEN IN NEW YORK: AUTOMOBILE ENTERS CONGESTED THOROUGHFARE FROM A

Long Island Railroad Regulating Automobile Traffic

JUST as it did thirteen years ago, Tally-ho Crossing of the Long Island Railroad at Valley Stream, took grisly death toll Sunday afternoon, when a swift train of the railroad crushed out the lives of Miss Jeanette P. Crawford and her sister, Miss Charlotte M. Crawford. Andrew Crawford, father of the dead girls, and himself a well-known manufacturer and sportsman, escaped death by a miracle, and Charles Neugebauer, chauffeur, was dangerously injured.

The grade crossing, like many of those of the Long Island Railroad, was inadequately protected. Despite the fact that the topography of the adjacent country renders it a constant peril, only a bell arrangement had been provided to warn travelers, and the survivors say that it was not rung.

In 1897 a tally-ho full of Sunday school pupils was run down at the identical spot where Sunday's accident occurred, and several of the children were ground to death.

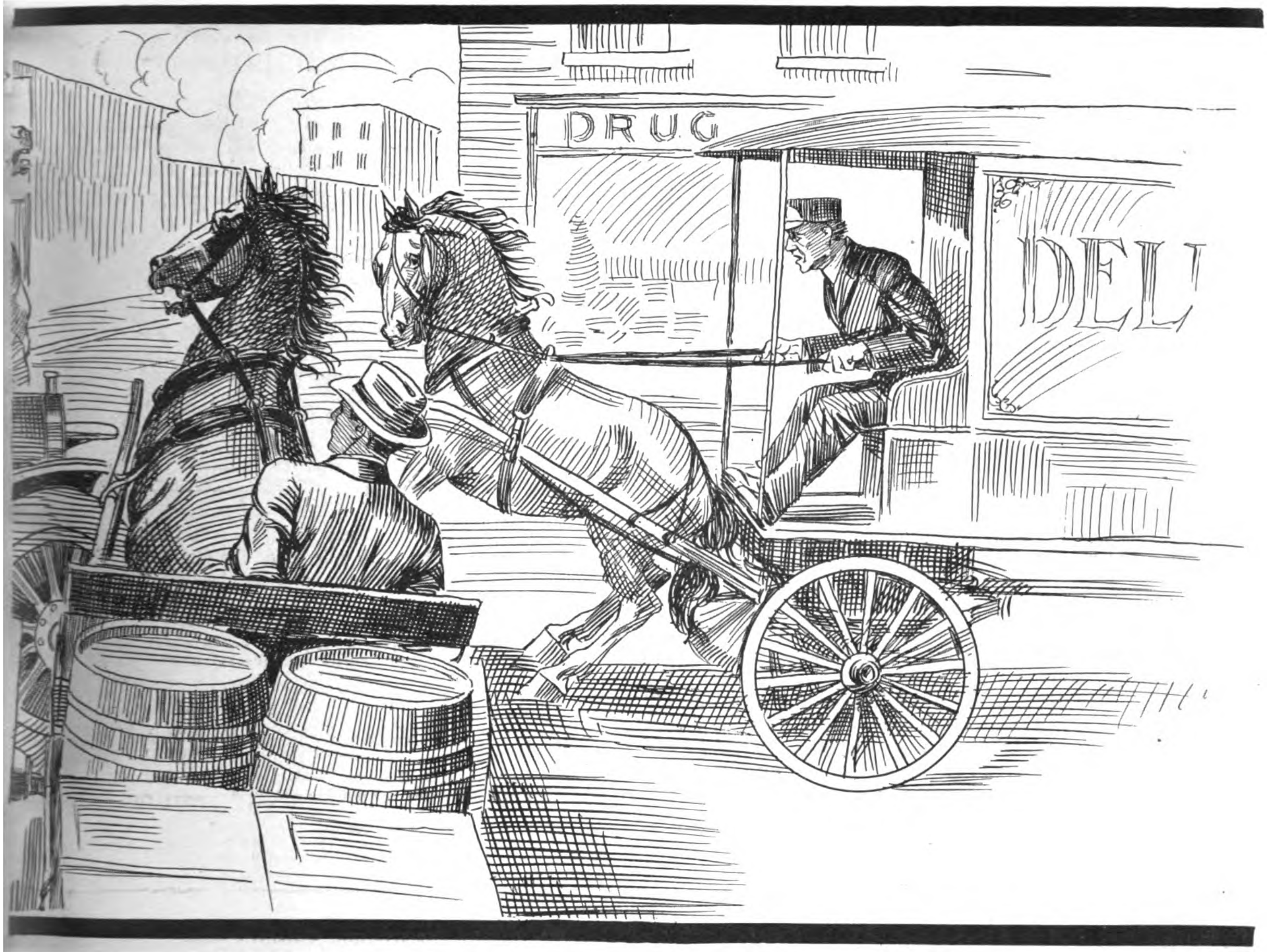
The Long Island Railroad Company is and has been a powerful influence in Long Island politics and economics. If one might lay a finger upon the most potent force that has been exerted to control and regulate automobiling on Long Island, that finger would rest not far from the headquarters of the Long Island Railroad Company.

It has always been sharply opposed to fast and reckless operation of the automobile and it has been whispered that moderate and legal motoring never met with much enthusiasm from the railroad management—at least as far as it applied strictly to the public.

In defence of the railroad company it has been said that if the Crawfords had not owned a motor car, the young women might be alive to-day. On the other hand, it has been pointed out that if the Sunday school children had not been taken out for their picnic in a tally-ho thirteen years ago, they might now be active members of the community, instead of sleeping on to eternity, under tear-wet mounds of green.

The position of the railroad company is entirely justified. If no pedestrians, carriages, tally-hos, automobiles or other conveyances of human beings ever cross the death-trap at Valley Stream, there can never be another fatal accident at that point unless, perchance, spreading rails or some mechanical defects in the trains cause a wreck. The company believes in enforcing the law—at least in the enforcement of some laws. Just why it should show favoritism about upholding those affecting the automobile in preference to those aimed at protecting the general public is a mystery.

In the meantime, unless the railroad company diverts a moiety of its energy now expended in "regulating" automobile traffic to the protection, or, better yet, the elimination of its numerous ghastly grade crossings, the people of the great State of New York can only look on, puzzled that the efforts of such a great corporation to prevent loss of life meet with no better success.



LATERAL AND IS RUN INTO BY A BICYCLE—DUE CAUTION WAS NOT OBSERVED

Chicago Motor Club Selects Elgin Race Dates

CHICAGO, July 4—So far this year no American road races have been run with the exception of a minor event in California, but the prospects are that this fall will see a series of brilliant contests. In a word, there will be a circuit starting in the West and winding up in the East, which will bring on five big road races within six weeks. This was assured when it was announced the latter part of the past week that the Chicago Motor Club had selected August 28 and 29 for its two days of road racing at Elgin.

While this matter has been in contemplation for some time, it was not until the night the Glidden tour finished in Chicago that the matter was brought to a head. At that time the Chicago Motor Club and the Elgin Automobile Road Racing Association signed a contract, the former to do the promoting of the races and the latter to finance them. The Elgin Automobile Road Racing Association is composed of prominent citizens of the town who are loyal enough to the city to give their time and money in advertising it in this manner. The Elginites have agreed to raise $20,000 to meet the financial requirements of the race.

This means the start of a circuit that will jump from here to Lowell, Mass., in case the Bay Staters decide to repeat their program of last year. After that there will be the Vanderbilt Cup race on the Long Island Motor Parkway on October 1. The Saturday following, October 8, there will be run at Philadelphia the third annual Fairmount Park road race. The circuit will wind up October 15 on the Long Island Motor Parkway with the running of the American Grand Prix.

The plans of the Chicago Motor Club at Elgin call for the running of three races simultaneously on August 28. These will be for the smaller classes. The 160-230 cars will run 144 miles and the winner will get $300 in cash besides the cup; the 230-300 class goes 180 miles with the same prizes up; while the 301-450 division travels 216 miles and the winner gets $400 cash and a cup. On Saturday the big race will take place. It will be for cars under 600 cubic inches and of a minimum weight of 2,300 pounds. The distance is set at 306 miles, and in addition to the trophy there will be three cash prizes of $1,000, $300 and $200 respectively for first, second and third.

Military protection will be secured for these races, and the course that is to be used will be the 9-mile circuit, which is exactly 1 mile west of the business center of the town. The course is declared to be a remarkably fast one, there being no roads crossing it, while the roads are particularly wide and the ditches shallow. There are only four turns in the course and one of these is a hairpin. At no place will it be necessary to shift a gear, unless perhaps at turning a corner. It is proposed, however, to bank these turns, and the chances are that the circuit will be good for 70 miles an hour by the time it is ready to race on.

Cobe Trophy Feature of "Fourth" at Indianapolis

(*Continued from page 2*)

on Burman, but the man in the Marquette-Buick was not to be denied, and dashed across the tape with the speed of a cannonball. He had covered the 40 miles in 31:46.02, 50 miles in 39:47.86, 80 miles in 64:24.48, 90 miles in 1:12:27.84 and 100 miles in 1:20:35.63, all of these new records for the 301-450 class. Dawson in the Marmon landed the 60-mile record in 48:15.29, and the 70-mile in 56:05.65.

Burman in the Buick Special carried off the honors in the mile time trials which opened the day's sport, showing 58:35 for the sprint, which was faster than Aitken in the National, Hearne in the Benz, Robertson in the Simplex, Wilcox in the Simplex, and Merz in the Empire could do. In the races that followed, Robertson in Herreshoff, Chevrolet in the Buick and Marquette-Buick, and Grant in the Alco were among the winners. The Greiner National and the Aitken National also scored, while the handicap was won by George Robertson in the Simplex. Aitken's victory was in the free-for-all, in which he defeated a choice field which included Robertson in a Simplex, Hearne in the Benz, Wilcox in the Simplex, Zengel in the Chadwick, and Burman in the Buick Special.

INDIANAPOLIS, July 4—It was indeed a well-satisfied throng that witnessed the wind-up of the three-day race meet on Monday, the Fourth of July, and a most befitting sane Fourth celebration it proved to be.

Event No. 2, a 10-mile race for cars in the 161-230 class, was put on first to try out the track. There were six starters in this race, including Sutcliffe in a Maytag, Kenyon' in a Fuller, Miller in a Warren-Detroit, Endicott in an E-M-F, L. Chevrolet in a Buick, and Burman in a Buick. Sutcliffe, Endicott, and Burman got away together in this event, but the end of the first lap found Chevrolet in the lead, with Burman about 50 yards behind him, with the rest stringing along about 100 yards behind him. The race was a romp for Chevrolet and for Burman, the former finishing first in 9:12.23, and the latter second.

Event No. 1 was next with three Herreshoff cars driven by Roberts, McCormick and Herreshoff as starters. It was a 5-mile event for stock-chassis cars of Class B, Division 1, having 161-cubic inches piston displacement or under. Roberts took the lead in this event and was ahead by about 200 yards at the end of the first lap, and at the finish he stretched the distance to about 300 yards, with Herreshoff second and McCormick a slow third. The time was 5:32.87.

Event No. 3 was a 5-mile race for stock-chassis cars with a piston displacement of 231-300 cubic inches. Seven cars lined up for the start in this event, with Fox in a Pope-Hartford, Moore in the Great Western, Davis in a Great Western, Cook in a Black Crow, Stinson in a Black Crow, Heineman in a Falcar, and Pearce in a Falcar. While these cars were lined up, and before the race was started, the Remy Trophy, and the Remy Grand Brassard, won in the 100-mile race Saturday, were presented to Robert Burman.

Pearce's Falcar got away first at the start, but Heineman immediately forged ahead and took the lead, while Moore killed his engine at the start and dropped out of the race. Heineman won in this event, with Pearce second, and Stinson third. The time was 4:44.31.

Cobe Trophy Was Then Competed For

At 3:10 fourteen cars lined up for the Cobe Trophy race, the big event of the afternoon, which was open to all stock-chassis cars having 600 cubic inches piston displacement or less. The distance was 200 miles. The fourteen starters included Wilcox in a National, Fox in a Pope-Hartford, Kincaid in a National, Aitken in a National, Cook in a Black Crow, Stinson in a Black Crow, Harvey in a National, Grant in an Alco, Harroun in a Marmon, Dawson in a Marmon, L. Chevrolet in a Marquette-Buick, Burman in a Marquette-Buick, A. Chevrolet in a Marquette-Buick, Pearce in a Falcar, and Wishard in a Mercedes-Simplex. A. Chevrolet in a Marquette-Buick led the field at the end of 10 miles, closely pursued by Burman and Kincaid. Burman led till the 180th mile, when the Dawson Marmon swung into the lead and was never headed.

Details of the Doings on July Fourth

Event 1, stock chassis cars, Class B, Division 1—160 cubic inches piston displacement and under. Distance, 5 miles

No.	Car	Driver	Time 2 1-2 Miles	Time 5 Miles
19	Herreshoff	Roberts	2:50.00	5:22.88
21	Herreshoff	Herreshoff	3:04.08	5:55.35
20	Herreshoff	McCormick	3:23.25	Too far behind for time

Event 2, stock cars, Class B, Division 2—161-230 cubic inches piston displacement. Distance, 10 miles

No.	Car	Driver	5 Miles	10 Miles
35	Buick	L. Chevrolet	4:46.43	9:12.23
36	Buick	Burman	4:48.88	9:21.77
26	E-M-F	H. Endicott	5:03.92	9:51.22
2	Maytag	Sutcliffe	5:03.49	9:51.55
5	Fuller	Schwitzer	5:18.73	10:17.86
24	Warren-Detroit	Miller	5:04.10	——

Event 3, stock chassis cars, Class B, Division 3—231-300 cubic inches piston displacement. Distane, 5 miles

No.	Car	Driver	2 1-2 Miles	5 Miles
44	Falcar	Heineman	2:30.56	4:44.31
45	Falcar	Pearce	2:37.68	4:55.45
17	Black Crow	Stinson	2:39.62	4:57.19
3	Pope-Hartford	Fox	2:45.85	5:31.53
15	Great Western	Davis	2:57.03	5:44.32
16	Black Crow	Cook	2:46.65	5:45.84

Event 4—Not run. Scratched from program

Event 5, stock chassis cars, Class E—Opened only to registered amateur drivers in accordance with definition of racing rules of the A. A. A. Distance, 5 miles

No.	Car	Driver	2 1-2 Miles	5 Miles
48	Mercedes	Wishard	2:17.30	4:21.34
12	National	Greiner	2:17.25	4:21.35
1	National	Tousey	2:27.12	4:54.82

Event 6, Cars Class D—Free-for-all open race. Open to all cars entered at the meet. Distance, 20 miles

No.	Car	Driver	5 Miles	10 Miles	15 Miles	20 Miles
22	Benz	Hearne	3:34.48	6:58.55	10:25.17	14:06.72
8	National	Aitken	3:39.97	7:01.17	10:35.29	14:18.37
43	Buick Special	Burman	3:36.10	7:03.79	11:00.97	15:39.17
32	Marmon	Harroun	4:04.16	7:53 62	11:44.22	16:13.96
18	Chadwick	Zengle	4:17.02	8:03.20	11:44.23	....
29	Stoddard-Dayton	Tripp	4:04.99	7:57.20	....	....

COBE TROPHY. DISTANCE 200 MILES. STOCK CHASSIS

Car No.	CAR	DRIVER	10 Miles	20 Miles	30 Miles	40 Miles	50 Miles	60 Miles	70 Miles	80 Miles
31	Marmon	Dawson	8:38.21	16:31.97	25:55.81	34:07.05	42:18.78	50:21.35	58:22.49	66:21.30
40	Marquette Buick	Burman	8:27.78	16:25.12	25:48.30	33:59.41	42:05.33	50:16.05	58:20.37	66:21.12
30	Marmon	Harroun	8:34.92	16:26.60	25:48.98	35:57.91	44:06.28	52:18.37	60:23.06	68:20.88
27	Alco	Grant	8:23.66	16:25.80	25:51.84	35:40.52	43:51.07	51:59.35	61:48.26	70:00.43
39	Marquette Buick	L. Chevrolet	8:36.44	16:30.98	25:52.55	34:04.93	44:03.69	53:42.57	61:48.06	69:49.54
17	Black Crow	Stinson	9:23.79	19:32.00	28:28.20	37:28.76	46:25.91	55:23.83	68:18.62	77:23.65
16	Black Crow	Cook	9:39.95	19:49.78	28:58.38	42:40.15	52:06.16	61:13.59	70:19.17	79:26.15
41	Marquette Buick	A. Chevrolet	8:18.72	16:17.75	25:22.97	34:31.53	42:26.30	50:19.94	58:13.27	66:14.65
45	Fal-Car	Pearce	9:23.55	19:32.17	28:27.98	37:28.46	46:24.33	55:20.83	64:16.23	73:13.77
7	National	Aitken	9:59.38	25:48.77	34:01.36	46:00.19	62:08.04	70:14.77	78:15.10	86:09.74
6	National	Kincaid	8:28.10	16:21.41	27:32.17	37:33.21	48:29.27	64:55.47	83:26.57	105:21.72
48	Mercedes Simplex	Wishard	8:28.41	16:33.55	26:15.70	34:49.65	43:29.04			
1	National	Wilcox	8:38.21	16:34.61	25:28.15	34:12.30				
3	Pope-Hartford	Fox	8:45.09	16:46.07						

Will the Aeroplane Nullify the Dreadnought?

WHAT the effect of the aeroplane will be as a measure of military offence and defence was foreshadowed when Glenn Hammond Curtiss recently dropped fifteen out of twenty-two dummy bombs within the outline of a battleship, which was simulated by a series of flag-buoys at Keuka.

Time after time the aviator crossed the target from side to side, dropping pellets of lead from varying distances and heights in order to demonstrate the efficiency of the aeroplane as a military force.

The conditions of the test were hardly those that would be met with ordinarily in service, for the target was stationary and, naturally enough, made no effort at offence or defence. It was shown that at low elevations the aviator was able to drop the bombs with accuracy and at 300 and 400 feet heights they scored center shots every time. When Curtiss shot his flying machine up to 900 and 1,000 feet, his bomb practice was not so good.

His machine was specially equipped with canoe-floats and this part of his preparations for the test received a thorough try-out, as he found it necessary to descend abruptly during one stage of the experiment and landed gracefully upon the smooth surface of the water. The canoes sustained the aeroplane and the aviator suffered nothing worse than a slight wetting.

The news of the accomplishment of Curtiss sent a thrill of apprehension clear around the world. Every foreign capital, as well as Washington, was tensely interested. The significance of the feat was apparent to all; not so much from the simple fact that bombs could be dropped from an aeroplane under favorable conditions so that they would strike a mark of the same size as a $10,000,000 battleship at anchor, as it was the fear of what a few simple developments might bring forth. If it is now possible to land dummy bombs on the deck of a great Dreadnought, in natural course of development, it is not improbable that the aeroplane will soon be able to drop torpedoes carrying 100 pounds of the highest powered and most concentrated explosive upon a similar mark with equal or greater accuracy.

All naval authorities agree that if enough high explosive can be detonated upon the deck of any ship, the ship must be destroyed. Therefore, the perturbation over the achievement of Mr. Curtiss is acute all over the world.

The Austrian Government, which recently laid down four super-Dreadnoughts, was palpably shocked. Archduke Leopold Salvator, at Vienna, exclaimed that international law will have to prohibit the use of aeroplanes in naval warfare. Prof. Parseval, a distinguished German scientist, said that he believed that an elevation of 1,200 feet was sufficient to protect an aeroplane from the secondary battery of a battleship and that at this height the aeroplane would be able to land bombs all over the ship. Hiram Maxim and Thomas A. Edison declared that further development of the aeroplane along this line was only a little way in the future.

In the late Russo-Japanese war, when the Japanese battleship fleet was blockading Port Arthur, the ships traveling leisurely up and down the narrows within a comparatively short distance of the beleaguered city, half a dozen aeroplanes capable of swooping down from the fortress in the dead of the night and dropping 100 pounds of nitro-glycerine down the funnels of the battleships, would have proved a moral deterrent that might have changed the fortunes of war even though no practical trial of their prowess was attempted.

The past week has also seen a number of interesting trials of the aeroplane in more peaceful lines of endeavor. Mrs. William K. Vanderbilt, Jr., made a trip in a Farman biplane as a passenger of Clifford B. Harmon, over the course of the Garden City Club, New York.

On Saturday Mr. Harmon, under peculiarly favorable conditions of wind and weather, broke the world's record for sustained flight when he drove his immense biplane 125 miles in two hours and three and one-half minutes. The machine weighs slightly more than 1,000 pounds and is the same machine with which Louis Paulhan set the old mark at Los Angeles, when he flew one hour and fifty-eight minutes without descent. Mr. Harmon took a circular course, widening the swings as the flight grew longer. The air was still during most of the trial and the start and landing were without special incident. Mr. Harmon has planned several ambitious flights for the near future.

Charles K. Hamilton, the hero of the great inter-city flight between New York and Philadelphia, gave a remarkable exhibition of his mastery of the air in his home town, New Britain, Conn., Saturday. After a number of preliminary attempts, he arose perfectly, circled the city and turned up Main street, sailing from the city limits to City Hall.

Two Cars of Solar Lamps a Month

One of the instructive and interesting items of automobile activity is the monthly shipment of two carloads of Solar lamps from the manufacturers, the Badger Brass Manufacturing Company, to the Chalmers-Detroit Motor Car Company. Solar lamps are now used as part of the regular equipment of 85 per cent. of the high-grade American cars, according to statistics compiled by their makers. Aside from automobiles, these lamps are made for bicycles and motor boats of all kinds.

Great Western's Winning Climb

The showing of the Great Western "30" in the free-for-all event of the hill climbing contest held at Pittsburg, Indiana, recently, was specially creditable. The great Western only recently has essayed to capture laurels in races on the flat and up hills, and its performances have proved decidedly meritorious on all occasions.

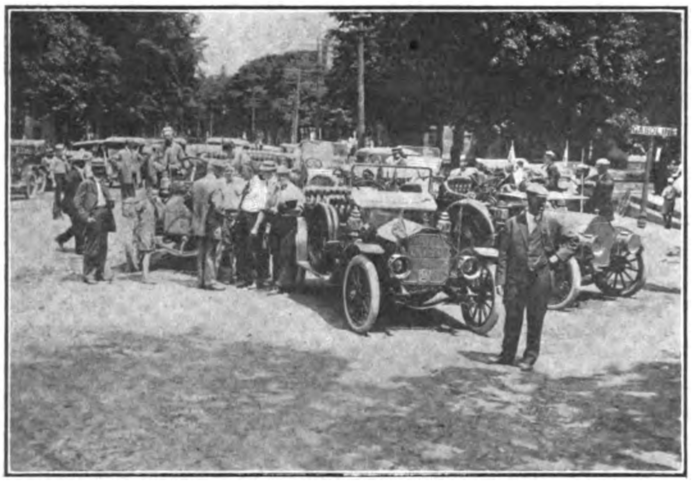
In the event referred to, four Buicks, one Oakland and Ford competed unsuccessfully with the Indiana car.

CARS, 600 CUBIC INCHES PISTON DISPLACEMENT OR LESS

90 Miles	100 Miles	110 Miles	120 Miles	130 Miles	140 Miles	150 Miles	160 Miles	170 Miles	180 Miles	190 Miles	200 Miles
74:22.23	82:15.24	90:08.52	98:16.63	107:42.20	115:40.77	123:36.23	131.31.77	139:25.61	147:17.07	155:17.93	163:20.14
74:20.80	82:11.96	90:01.21	97:54.08	105:50.36	113:53.30	121:54.25	129:53.52	139:07.83	146:51.63	155:50.75	163:23.67
76:29.63	84:13.23	92:08.53	100:05.94	108:07.42	116:08.26	124:07.37	132:03.72	140:05 95	148:06.44	156:38.94	165:26.34
78:09.39	86:11.67	95:48.58	105:53.19	116:03.98	124:19.10	132:37.95	142:39.44	150:58.29	159:05.28	167:10.69	176:49.30
77:52.22	85:51.82	95:02.54	103:43.77	123:35.67	131:33.65	143:05.30	152:42.50	160:42.88	168:58.64	177:20.36	187:08.02
86:28.11	95:26.92	104:24.24	115:21.43	124:24.62	133:26.66	142:26.05	151:26.87	166:02.35	175:12.28	184:19.16	
88:35.93	102:08.99	111:08.54	124:25.77	133:25.22	142:26.25	153:43.39	162:47.56	171:53.12	180:59.63	190:14.33	
74:14.43	82:10.96	90:00.08	97:54.92	108:10.21	117:14.27	126:22.03	Out in 62d Lap				
82:09.81	90:53.30	99:41.88	108:26.33	117:15.54	126:02.45	134:47.47	Out in 61st Lap				
101:22.95	116:10.05	125:25.67	139:33.35	153:07.89	Out in 55th Lap						
117:43.90	128:02.65	136:04.34	144:06.67	153:59.16	Out in 55th Lap						

Highway Commissioners Prove Road Reliability

ROCHESTER, N. Y., July 4—With a business session in the Monroe County Court House, in Rochester, on Friday morning, the third semi-annual conference of the New York State Highway Commission with its Division Engineers, Section Superintendents, Division Supervisors, and the County Superintendents of Highways, came to a close.


Lima Noon Control: Enjoying scenery and surroundings

The business meeting was held largely for the purpose of discussing the conditions encountered by the members of this conference during the two days trip over the roads of five western counties.

Criticisms were made and views were interchanged as to the methods of conditioning the territory covered.

The principal criticism of the earth roads over which this trip was made was the fact that the many County Superintendents, overzealous to have the roads in fine shape, used poor judgment in scraping them and improving them just a few days before the run. This work served only to fill the center of the roads with inches of flour dust so as to make the travel rather strenuous.

On Thursday night a banquet was served on Ontario Beach at which more than 200 attended. One feature in connection with this run was that out of the eighty-one cars that started from Rochester, carrying nearly 400 persons, not a report of mechanical trouble of serious nature was made, and there were no accidents. So far as could be learned at the headquarters the only delays were due to tire trouble and they were noticeable by the smallness of their number. The cars which carried these road builders were almost entirely privately owned by members of the Automobile Club, of Rochester, and driven by amateur drivers, who did well.

As to the finality of this run the State Engineering Department is getting out a book which will contain a detailed report of all the observations made, together with photographs of the roads, drawings of crossings, bridges, etc., the idea being to perpetuate the good work, and economize cost.

Minnesota Enjoys Three-Day Meet

At the recent race meet staged on the Hamline track, near Minneapolis, a number of fast time trials and interesting contests were developed. The meeting extended over three days, and among the cars that made creditable showings were the following:

Cutting, which won a five-mile handicap event in 5:23.50; Marmon, which won a free-for-all in 5:43.80, defeating Oldfield, and two match races which were won by Cuttings.

Oldfield and Kerscher took part in the exhibition in a prominent way. The events were pulled off in regular order and with good success.

Auto Factory to Locate in Louisville

LOUISVILLE, July 4—Louisville will soon have its first automobile factory. It was announced last night by Berton B. Bales that the American Automobile Company, of which he is the president, will establish a factory in this city to cost approximately $125,000. Operations will begin January 1. The company is now manufacturing Jonz pleasure and commercial motor cars in its plant at Beatrice, Neb., and has orders on hand which will require nine months to fill. The plant in Louisville will be the main factory of the company.

Offices have been opened in this city and members of the company are negotiating for the purchase of a site. The company also has an office in Kansas City and is preparing to open a branch factory there. The American Automobile Company was organized in Arizona in May and has an authorized capital stock of $1,000,000. The stockholders at present comprise business men of Chicago, Kansas City and Louisville.

No water is required in cooling the engine and it is equipped with a two-cycle, vapor-cooled motor. At present the company is erecting a $20,000 extension at its Nebraska plant.

The Radcliff Motor Car Company, distributors of the Stevens-Duryea, has leased 916 South Third avenue and expects to occupy its new salesrooms about July 15. The Radcliff Motor Car Company is a newcomer in the local field.

The Reimers Motor Car Company has increased its capital stock from $10,000 to $50,000. The stock will be divided into $30,000 common and $20,000 preferred. The increase in capital was made to handle its new garage, which was formally opened to-day and to carry a larger stock of cars, supplies and parts. This company is the agent for the Reo and Haynes cars.


There were 81 cars at the noon control at Lima

Quaker Owners Buy a Club House

PHILADELPHIA, July 4—The large brownstone and brick residence at the northwest corner of Broad and Diamond streets, Philadelphia, occupying a lot 25 by 138 feet, and formerly owned by the late Senator Charles A. Porter, was bought Friday from the Porter estate by the Automobile Owners' Association for about $30,000, and will be altered into a club house. It is proposed to build a modern establishment.

Three New Companies and a Club Formed at Detroit

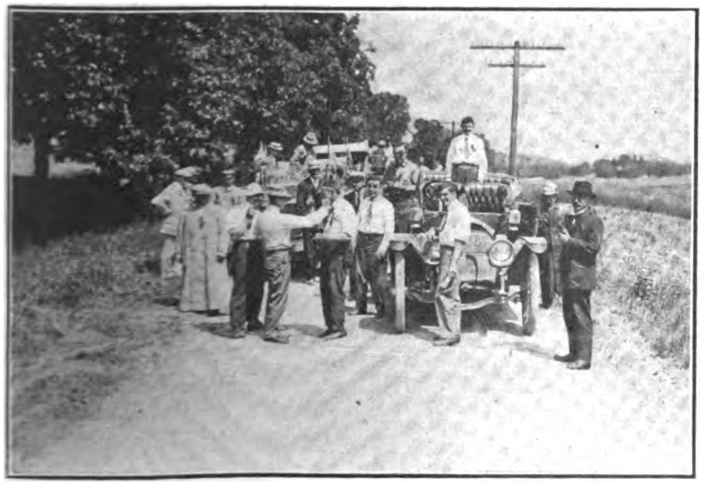
DETROIT, July 4—Three new companies and one new automobile club were announced in Detroit last week. The Exposition was the scene of one announcement, Wednesday night, when the first model H. & F. Electric was placed on exhibition there.

This car has just been completed by Frank D. Hovey and F. E. Foulke, the latter a Kansas City man of long automobile experience. The car has a number of new and different features, among which may be mentioned: a full aluminum body; light weight, 2,200 pounds; large carrying capacity, five to six persons; new battery construction, which yields 140-150 miles per charge; motor and rear axle in a unit. A company is now forming to manufacture the car, upon the construction of which the inventors have a number of patents. This company will, doubtless, be capitalized at $1,000,000. Four sites for the factory are under consideration, and so far has the matter progressed that part of the production for next year, 1,500 cars, has been contracted for. The present car sells for $3,000, but a lower priced model will also be built.

The Brush-Chicago Motor Company has incorporated for $12,000, while the Bower Roller Bearing Company, spoken of in last week's paper as about to remove here from Dayton, has incorporated as a Michigan concern for $225,000. The principal stockholder is given as Charles F. Lawson, Detroit.

At Ecorse the newly formed Jennings Motor Car Company is dickering with the town officials over a site for buildings, with fair prospects of coming to an amiable agreement shortly. This company has just been formed by influential Detroit business men, who wish to locate their factory near the city, but beyond the limit of city taxes.

It was announced from Wyandotte that the negotiations between the Seitz Motor Truck Company and the city had been satisfactorily closed and that the company would remove to the town at once. The town subscribed for $35,000 of the company's stock. J. H. Bishop and W. R. Beatty, representing the company, declared that the new plant would employ 500 men at the start, enlarging the force as necessity demanded.

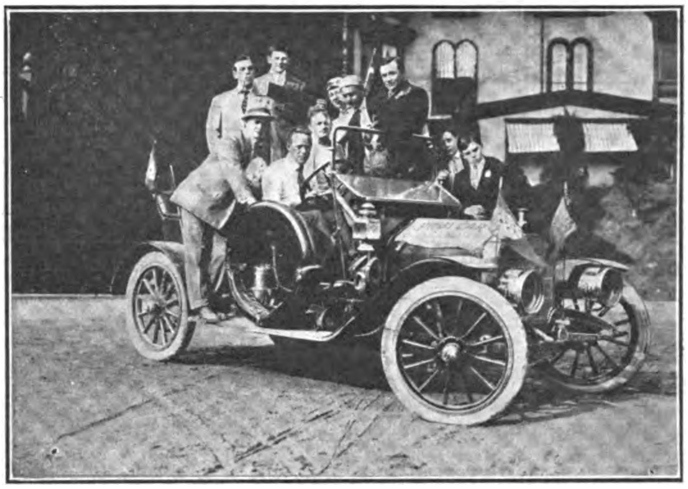


Inspecting McClintock's Cube Block Pavement near Charlotte

The new automobile club formed during the week will be named the Wolverine Automobile Club. A large membership is promised for the near future by the well-known and hustling men who comprise the organizers and first board of directors. The incorporators are: Messrs. Abbott, Brauns, Bryant, Collins, Gill, Gilmour, Mills, Radle and Trege.

During the past week the Hayes Mfg. Co. declared a stock dividend of 25 per cent., thus increasing the capital of the company to $500,000. This company declared a stock dividend last April of 200 per cent. The company now employs 1,100 men and does a business aggregating $1,125,000.

Great preparations are being made here for Elks' Week, which will begin July 11 and last about five days. During this period, the number of cars expected in the city is unusually large, so that extra provisions must be made to house them. Some 10,000 cars are expected.



Secretary Van Tuyler, of the Rochester Automobile Club, at the wheel of the Selden Pilot Car

During the past week, the activity of General Motors stock has been such as to cause much comment. The stock has risen steadily in the face of a lowering of prices in all other stocks, the rise in three days being from 118 to 125. One surmise made in financial circles and going the rounds now is that a stock dividend of 75 per cent. will be declared.

Wednesday night at the Pontchartrain there was given a rather remarkable affair when the representatives of the E-M-F Company and of the Studebaker Automobile Company sat down to a banquet, which was presided over by President Flanders of the former company. The Detroit men present were: W. E. Flanders, Robert Brownson, Frank E. Fisher, B. W. Twyman, Paul Smith, L. H. Rose, George E. Voglesong, Amos. F. White, David Hunt, Jr., L. Logie, H. T. Ewald, D. D. Byers, F. A. Wade, C. F. Garaghty, James E. Spencer, Frank Shaw, G. H. Kleinert, Clarence Booth, Max Wollering, Thomas Walburn, and James Heaslet.

The out-of-town guests were: George E. Keller, South Bend; C. F. Redden, New York city; W. J. Higgins, New York city; E. V. Stratton, Philadelphia; Frank Staley, Indianapolis; H. E. Westerdale, Chicago; A. J. Pray, Columbus; C. R. Dushiel, Milwaukee; H. T. Patton, Louisville; A. E. Thompson, Minneapolis; C. H. Woodruff, Minneapolis; Mr. Honeywell, Denver; L. F. Weaver, Portland, Ore.; C. N. Weaver, San Francisco; Mr. Tehaney, San Francisco; Mr. Williams, Pittsburg; Frank Shaw, Dallas, Tex.; Mr. Witmer, Kansas City; C. C. Snoke, South Bend; C. M. Barber, Oklahoma City; N. P. Berger, Omaha; T. L. Hausmann, St. Louis; Charles A. Malley, Boston; John A. Graham, Fargo, N. D.; E. L. Jacoby, Memphis, Tenn.; E. M. Greene, Syracuse; George W. Hanson, Atlanta; C. M. Love, Atlanta; B. S. Woolraven, Atlanta, and Dr. C. C. Root, Washington, D. C.

Auburn Hill Climb Is Postponed

Owing to lack of preparation, the hill climb of the Automobile Club of Auburn (N. Y.) scheduled to be held Independence Day was indefinitely postponed. It has been announced that the event will be presented later in the season.

National Wins St. Louis Star Trophy Run

ST. LOUIS, July 4—National car, No. 20, driven by Carl Merz, with a final score of 992, was declared the winner of the St. Louis Automobile Manufacturers and Dealers' Association's three-day reliability run for the *Star* trophy, after the technical committee had spent two days inspecting the cars which finished the trip. And, with one exception, each of the thirty contestants which started out from St. Louis June 28 on the run of 418.1 miles made the entire circle, although one was withdrawn before the finish and another was disqualified by the technical committee.

On the final score Oldsmobile, No. 5, driven by B. W. Olin, and Colmbia, 13, driven by Eddie Ernst, tied for second place with 991 each. Fourth place was awarded to Buick, No. 3, driven by Frank Delaney. Its score was 990. The three latter cars will receive certificates for their road scores.

While not one of the thirty cars showed a clean score after the technical examination, eight completed the circle with perfect road scores.

This was the first reliability run of more than one day ever given in St. Louis and the first of any kind to be given by the makers and dealers. One error alone probably is responsible for the fact that none of the cars made the trip without penalization. There was no penalty for reaching the various controls ahead of time and this turned the run into a sort of road race, many of the drivers hitting it up at a 25 and 30-mile rate when they found the road bed to their liking.

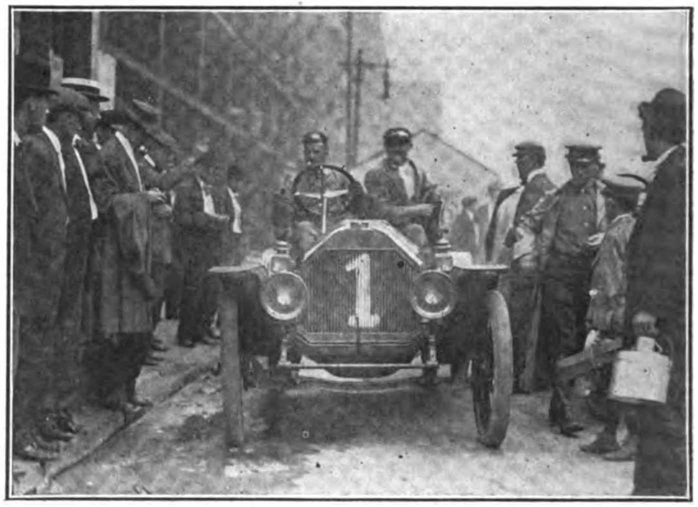
No.	Car	H. P.	Entrant	Driver	Final Scores
20	National	40	General Motor Co.	C. Merz	992
5	Oldsmobile	50	Olds Motor Works	B. W. Olin	991
13	Columbia	48	Maxwell-Briscoe Motor Co.	Eddie Ernst	991
3	Buick	30	Buick Motor Co.	Frank Delaney	990
7	Oldsmobile	70	Olds Motor Works	W. F. Fewell	983
17	Ford	20	Ford Motor Co.	H. L. Bagley	979
28	Moline	30	W. Von Steiger	W. Von Steiger	979
4	Maxwell	30	Maxwell-Briscoe Motor Co.	Val Heinrich	978
27	Amplex	50	Missouri Motor Car Co.	Herman Schnure	977
1	Overland	40	St. Louis Overland Co.	C. E. Goldthwaite	975
6	Mitchell	30	C. M. Barnard	C. M. Barnard	972
19	Haynes	30	Haynes Automobile Co.	Carl Williams	958
18	Pope-Har'd	40	American Garage Co.	Walter Saigeon	957
9	Moon	45	Moon Motor Car Co.	Mat Blavait	956
8	Cadillac	30	Bagnell Automobile Co.	W. F. Bagnell	940
16	Mitchell	30	Weber Imp. Co.	J. H. Little	939
23	Stearns	60	Stearns Motor Power Co.	J. N. Dunwoodie	934
15	Everitt	30	Whittaker M. C. Co., A. J.	Frank Morris	932
12	Moon	45	Moon Motor Car Co.	Hugo Muller	893
21	Inter-State	30	Lindsay Motor Car Co.	H. M. Paine	880
24	Hupmobile	20	General Motor Co.	Roy Anslem	874
2	Moon	30	Moon Motor Car Co.	Eli Colluette	873
11	Dorris	30	Dorris Motor Car Co.	J. T. Rumble	848
14	Buick	30	Buick Motor Co.	James Ladd	770
25	Dorris	30	Dorris Motor Car Co.	J. E. Baker	718
30	Haynes	30	Haynes Motor Car Co.	A. A. Franklin	695
22	Buick	24	Buick Motor Co.	N. C. Tuxbury	691
26	Marmon	32	Missouri Motor Car Co.	Ed Holthaus	
10	Rambler	54	Kingman Implement Co.	Will Smythe	(disqu'ed)
29	Stearns	30	Stearns Motor Car Co.	Koken	(disqualified)

No. 28, Moline, Driven by W. Von Steiger

A heavy rain fell the night previous to the starting of the run. The worst road conditions were on the first day out. After passing St. Charles, 40 miles of gumbo stretched ahead of the contestants. This had been softened by the heavy rain of the night before, and in some places the wheels sank almost to the hubs.

The first day's run was to Hannibal, with 45 minutes for lunch at Troy. This was the most eventful day of the trip. First, the crew of the Haynes car, No. 30, driven by A. A. Franklin, was arrested for a row with a farmer, who disputed the right of way, and the motor of the Haynes was stopped 125 minutes, with the result that the car was penalized 125 points. There also was a penalization for lateness. Rambler, No. 10, driven by William Smythe, got beyond the control of the driver just out of Eolia and rushed down a 20-foot embankment while making a speed of 40 miles an hour, hitting a telegraph pole and turning turtle. The four occupants, fortunately, landed in soft sod and none was seriously hurt. Marmon, No. 26, which was withdrawn, was compelled to limp in the last day from Macon on three cylinders. Stearns, No. 29, was disqualified after the finish when it was found that the brake had been wired to keep it in place.

On the second day's run the rods were fairly good, especially from Hannibal to Macon, where lunch was taken. The Buick pilot car driven by Crusoe, was compelled to halt owing to a broken torsion rod, but was soon repaired, and proceeded from Macon as confetti car. The Dorris car, in which were the officials, kept its position throughout the entire trip without any trouble. The second night control was Mexico. Up to this point, with the exceptions mentioned, everything had passed off smoothly.



Overland, No. 1, with C. E. Goldwaithe at the Wheel

The third day's run from Mexico to St. Louis was the fastest of the trip. The schedule set by the committee was an average of 20 miles an hour for cars of all classes. The road for two-thirds of the way led the contestants over rugged, mountainous roads. As a result much of the way the cars were required to run 25 to 30 miles an hour to make up for the time lost.

The Technical Committee was composed of George P. Dorris, of the Dorris Motor Car Company; Stewart McDonald, of the Moon Motor Car Company, and A. R. Van Antwerp, of the Van Automobile Company.

The cars which maintained perfect road scores were: Overland, No. 1; Buick, No. 3; Columbia, No. 13; Haynes, No. 19; National, No. 20; Inter-state, No. 21, and Moline, No. 28, and Oldsmobile, No. 5.

How the International License Works

PARIS, June 30—There is no need to obtain a driving and car license for every European country it is desired to visit. Slow, old-fashioned Europe has decided that all necessary safeguards can be taken by instituting one international license good for almost every country on this side of the Atlantic. It remains for the United States of America to insist that there shall be as many licenses as there are States.

The new arrangement, which is the outcome of an international conference held in Paris last year, provides for an international pass for both car and driver. The initial formalities are simple: Suppose the automobilist lands in Liverpool, he has his car examined by the local agent of the Motor Union, the Automobile Association, or the Royal Automobile Club. If it meets with the international requirements—and all modern cars do meet with these requirements—the owner is given a certificate stating his name and address, home registration, number of the car, a description of the car, maker's name, type of chassis and motor, the style of body and the weight in kilogrammes. If the car is registered in the United States, and carries an American number, the owner must place at the rear, above his home number, a black plate bearing the two letters U. S. If the car has been bought on landing in England, and is registered in that country, it must carry G. B.; if France is its country of origin and registration, it will carry the letter F.

Thus equipped, the car can be driven in Great Britain, France, Germany, Belgium, Italy, Monaco, Roumania, Servia, Austria, Hungary, Bulgaria, Spain, Greece, Montenegro, Portugal, and Russia, without any registration formalities whatever. In the same way the driver can undergo a practical examination and be provided with a license which will allow him to drive his car in all of the above countries for a period of twelve months without any formalities.

No. 20, National, Winner of the St. Louis "Star" Trophy

It is not necessary that a landing should be made in England in order to obtain this pass. If the automobilist disembarks at Havre the French Service des Mines will issue the necessary passes; if it is Italy or Germany the authorities charged with the supervision of automobiles, will grant the passes.

The new regulations do not in any way change the various customs formalities. In all protected countries it will be necessary to make the usual deposit on the car, or enter by the use of a triptych. Nor are the new licenses obligatory. If it is desired to go through the old formality of declaring the car, having the driver examined and changing the license tags at every frontier station, automobilists are at perfect liberty to do so. American automobilists possessing French cars and driving licenses, and intending to tour in this country only, have nothing to gain by applying for the international cereificate. As most Americans tour in three or four countries whenever they come to Europe, it is safe to declare that practically all of them will take advantage of this reform.

The only regrettable feature is that the United States has not thought fit to enter into this agreement. This would have made it possible for intending visitors to Europe to secure the international passes and affix the international license tag before leaving home. But if this were done, America would be under the obligation of allowing the Englishman, the Frenchman and the German to tour from New York to San Francisco with his home number and an international pass, while the native would have to comply with the automobile law of the different States he traverses. The object lesson is obvious.

Terms of Times-Post Flight Announced

Dates were set Tuesday for the aeroplane race to be given under the auspices of the New York *Times* and the Chicago Evening *Post* from Chicago to New York for a prize of $25,000. The race will start October 8 from the Windy City.

A résumé of the conditions follows: Entries may be made at any time after publication of the terms. There must be at least three competitors or no race. The start shall be 10 o'clock a. m., or as soon thereafter as may be, and shall be simultaneous, if possible. In case of bad weather the start may be postponed from day to day until October 15. Each entered machine must be in Chicago by October 3. The race must be finished within 168 hours from the start. Stops unlimited. Each entrant must have a verified record of one hour's continuous flight in Chicago between October 3 and 8. Repairs may be made en route, but aviators must finish in the same machines they make the start. If the start is simultaneous, the first machine that reaches the finish within the rules will be adjudged winner, but in case the entrants start at intervals due allowance will be made. A flight of equal or of greater length than the proposed course, prior to the race in this country, shall serve to invalidate its terms. The promoters of the event reserve the right to delegate the management of the affair to a recognized aeronautical society if such a course is deemed advisable.

Wright, Curtiss, Hamilton, Baldwin, Seymour, Mars, Willard, Harmon, Bergdoll, Farman, Sommer, Rolls, White, Paulhan and Rougier are mentioned as possible contestants.

Thirty, No. 16, Everitt, Frank Norris Driving

Regal "Plugger" Finishes 22,000 Miles

DETROIT, July 4—Having accomplished its "Around the Circle Tour" of 5,000 miles, the Regal "Plugger" reached home and received a hearty welcome. The route covered by the car on this tour was from Detroit to Boston, to New York, to Kansas City, Lincoln, Omaha, Minneapolis, Milwaukee, Chicago and back to Detroit. Besides following this itinerary, the "Plugger" made numerous side trips, participating in several endurance and roadability contests which swelled its mileage 1000 miles more than was originally contemplated.

Among the sporting events in which it took part en route was the run of the Quaker City Motor Club from Philadelphia to Atlantic City, where the car with its tonneau covered with tags and certificates of numberless cities and towns visited during its journeys that total over 22,000 miles, attracted much favorable comment from participants in the event and large crowds at both ends of the run.

Regal "Plugger" on its way back to Detroit after concluding 5000-mile circle tour

A fairly fast schedule was maintained throughout the whole tour and weather conditions were not regarded by the crew of the "Plugger." Several times the motor was stalled, owing to heavy going, and three times the car was capsized. The gumbo roads of Kansas, which were traversed during and after a series of unprecedented rainstorms, were the hardest problems for car and crew to solve.

The reception of the battle-scarred veteran was in the form of an automobile parade in which 100 cars participated. There was a brass band and a platoon of police and all the other things that go to make up a festal occasion. Mayor Breitmeyer, of Detroit, was the spokesman of the reception committee and said a few kind words of greeting from the entrance of the Hotel Pontchartrain.

The tour just ended began April 11, and from the outset almost to the conclusion, weather conditions were trying in the extreme. Several meteorological records were broken, particularly for rainfall in certain sections and for cold weather and bad roads throughout. One of the features of the work of the "Plugger" on all its tours is the presence of a tattered national banner. This flag was not always in such condition as it was when the car reached Detroit, but has been whipped and frayed out during the course of the numerous tours accomplished by the car. The "Plugger's" crew was: Lee Kuson, driver; George Franklin, Norman Taylor and Roy Dean.

Writing to THE AUTOMOBILE from Detroit, the latter, who was in charge of the tour of the Regal Plugger, has the following to say about road improvements noted upon the itinerary of about 6,000 miles:

Progressing east from Detroit, we began to see more of the macadam road as we got east of Cleveland. From there on to Boston one could readily realize that millions had been spent in making these highways what they are. Massachusetts, aside from the macadam, has found it advantageous also to use oil. This State exceeds all others in this respect.

West of the Mississippi the organization for the improvement of roads has not reached the perfection that prevails in the East, with the exception, I might say, of one State, Iowa. The great "River to River" road from Council Bluffs to Davenport, known as the Great White Sign Post road, is as fine a piece of highway as one would care to travel over. Every quarter of a mile, white sign posts have been placed all along it. When the road turns a hand pointing its direction stands ready to direct the wayfarer. Aside from this sign post road one finds nearly all the roads in good condition.

Good roads enthusiasts in Pennsylvania, especially those living in the district between Harrisburg and Greensburg, might learn an excellent lesson relative to the treatment of roads from what has been accomplished in Southern Indiana and Northern Kentucky, particularly as I found them between Louisville and Vincennes. The Harrisburg-Greensburg road leads over the Blue Ridge and Laurel Range of the Appalachian Mountains. Owing to the fact that McConnellsburg lies in a section that is inaccessible to the railroads, traffic over these ranges is naturally very heavy. But in spite of this fact it would hardly seem that the road question had been given any consideration whatever. For miles leading into McConnellsburg rocks and big stones are so strewn over the highways that it is almost impossible to drive an automobile through this section.

The Louisville-Vincennes road proves conclusively what can be done with such a thoroughfare as lies in the district of Pennsylvania of which I speak. The Hoosiers and Kentuckians fint it advantageous to take the stones from the highways, break them up with heavy crushers and place them back on the roads, with painstaking care relative to the grading, and they have succeeded in constructing an excellent highway. If the Pennsylvanians were to do the same the mountains lying about McConnellsburg could easily be negotiated wtih heavy auto trucks and exportation and importation carried on accordingly. They are attempting to overcome road traffic by constructing an aerial tramway from McConnellsburg to Fort Louden, the nearest railway station. But more could be accomplished were the highways to be put in a traveling condition for automobiles.

It is very interesting to observe the radical change that has taken place in the mind of the farmer relative to his attitude toward the automobile. Not over three years ago, in the majority of cases, the tiller of the soil was antagonistic. Seldom would one find him willing to extend a helping hand or mend his highways for the benefit of the automobile. Many were the occasions when we became stalled in the mud, and then we had to prevail on the generosity of the natives to aid us with their teams of horses and oxen. Compensation for the same was naturally always extended, but invariably it was refused, and almost always an apology was forthcoming on the part of the farmer for the condition of the

Mayor Breitmeyer, of Detroit, congratulating Lee Kuson, driver of "Regal Plugger" roads in his vicinity. Even though in some sections things have not reached a point where organizations are perfected to the point of thoroughly carrying out of good roads projects, the spirit is there and the future looks bright for better results.

Kansas, Nebraska and Iowa are reaping a certain amount of good through a law that allows each farmer fifty cents for dragging the road a distance of one mile and back. This puts the roads in fairly good condition. In some places, however, in order to obtain a good surface for carrying off the water, the matter has been overdone, and too much earth heaped in the middle of the highway. The result is that no one cares to travel on the center of this grade. The teamster or autoist prefers the side of the road, in which case one finds that for miles the center of the highway is grown up with grass, where if a little extra pains had been taken and a roller run over the center of the highway following the dragging it would have been sufficiently flattened down to induce the traveler to take the center of the road.

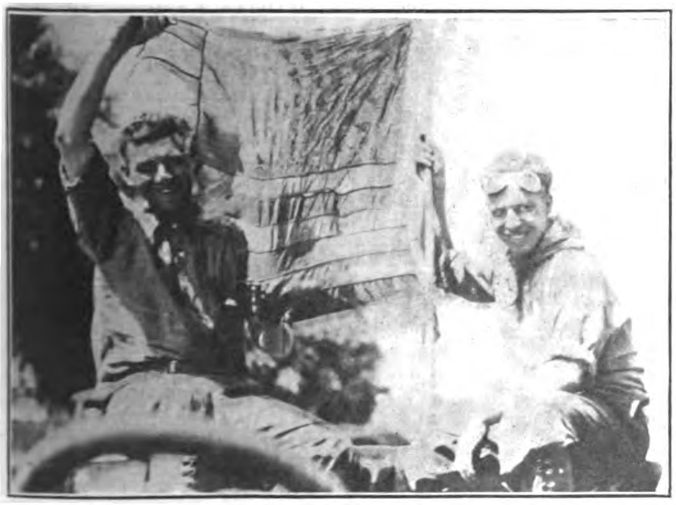
Michigan, Indiana and Illinois could well benefit by the example set by Iowa, Kansas and Nebraska, in the use of the drag. In fact, in some places it would seem that the use of this valuable piece of simple mechanism has been entirely ignored. As a result, in dry weather the roads are exceedingly sandy and rough, and in rainy weather, long stretches of mud puddles.

The greatest natural highways it was our pleasure to pass over lie in the State of Oklahoma. Oklahoma City is an excellent example of the benefits that are to be reaped thereby. Although only some twenty years old, it is a thriving metropolis, containing some 70,000 inhabitants, who own in all about a thousand automobiles. The farmers in the vicinity of Oklahoma City have realized the great value of the automobile and thousands are owned thereabout. With thousands of miles of beautiful, natural highways stretching away from her door, Oklahoma City proves the quick marketing place for the agriculturist with his crops, since with his automobile and the good roads he is able to land them at the market place in a short space of time. If he be a truck gardener he is able to have his produce in the hands of the consumer in much better condition than would be the case were he without the automobile, or level stretches of highway over which to drive it.

Built 380 Miles of Road in One Hour

Council Bluffs, Ia., July 4—The most remarkable feat in the history of good roadmaking was achieved in Iowa last week, when a road extending 380 miles, the entire width of the State was dragged in a single hour.

The dragging was the result of an agitation of more than six months. In March Governor Carroll called a good roads convention in Des Moines, and it was decided to have one piece of road, as nearly perfect as could be made from common dirt, extending from Davenport on the Mississippi to Council Bluffs.



What was left of Old Glory after the Regal completed the 5000-mile circle tour

Farmers along the way were induced to start the gigantic plan at exactly the same hour, and at 9 o'clock on the morning of the appointed day, hundreds of drags were on the job.

Farmers left their work, unhitched their horses from plows and cultivators, hitched them to drags, scrapers and road machines, and went to work.

"Pleasure" and "Commercial" Cars Defined

At the last meeting of the Association of Licensed Automobile Manufacturers, there was a general discussion of words that had crept into the automobile business which, in the opinion of many, were unfair to the trade as a whole. Such expression as "pleasure car," for a machine to carry passengers, was considered pretty poor nomenclature.

The term "commercial cars," as applied to freight-carrying automobiles, was considered a misuse of the term from the fact that all automobiles are commercial and practicable.

The general opinion seemed to be that in future, automobiles should be termed "passenger automobiles" and "freight automobiles," just as the railroads term their equipment "freight cars" and "passenger cars."

Crew of the "Plugger"—Lee Kuson, George Franklin, Norman Taylor and Roy Dean

Jersey Winners Each Rewarded

Each of the eleven cars that finished the recent 15-hour run of the New Jersey Automobile and Motor Club with a perfect score has been awarded a cup. The Motor Record cup goes to the Cadillac, winner in Class A. The Franklin, Haynes, and Buick pair in Class B were presented with cups by the Sunday *Call* of Newark, and the six winners in the other class were cared for by the club itself.

Dallas Dealers' Independence Day Meet

Dallas, Tex., July 4—Without breaking any records or suffering any mishaps, the Dallas Automobile Dealers' Club held its first strictly amateur race meet at the Fair Grounds track to-day. A crowd of fully 20,000 was attracted and the program of seven events proved spectacular and enjoyable. The summary:

Five miles; for cars of 10 to 20 horsepower—

	Car	Driver	Time
1.	Maxwell	Sluder	6:18
2.	Hudson		

Three miles; runabouts—

	Car	Driver	Time
1.	Maxwell, Jr.	Socksteder	7:00
2.	Bush		

Three miles; stripped roadsters—

	Car	Driver	Time
1.	Marion	Funk	5:47
2.	Locomobile	Girard	
3.	Kissel Kar		

Three miles; touring cars—

	Car	Driver	Time
1.	Kissel Kar	Wilson	4:15.20
2.	Moline		
3.	Regal		

Three miles; stock touring cars—

	Car	Driver	Time
1.	Thomas	Lindsay	4:15.20

Five miles; free-for-all—

	Car	Driver	Time
1.	Simplex	Bertrand	5:58.20
2.	Marion		
3.	Locomobile		
4.	Kissel Kar		

In the Realm of the Makers

Palmer & Singer have added a six-cylinder forty horsepower and a four-cylinder, fifty horsepower automobile to their line for 1 [illegible]

The Sup [illegible] Motor Vehicle Company has obtained [illegible] ermit to build a brick factory at 1686 E. [illegible] vood avenue, Buffalo, at a cost of $81,000.

The Moon Motor Car Company, of Indianapolis, has begun the erection of a handsome garage and salesroom on Capital avenue. It is two blocks from the heart of the business district.

John G. Utz, of the Abbott Motor Company, has a new engine, which he thinks will be suitable for aeroplane work. Experiments will be conducted in Detroit during the summer to try it out.

Harry L. Horning, secretary-treasurer of the Waukesha Motor Company, Waukesha, Wis., and Miss Elsie Muir, of Waukesha, were married recently and are now on a wedding trip through the East.

F. J. Manning, formerly connected with the Warner Speedometer Company and favorably known to the automobile trade, has also joined the Matheson Automobile Company as a salesman in the New York district.

The Ferromatic Tire Company, of Manitowoc, Wis., incorporated recently with a capital of $11,500, is now completing its tools, dies, patterns, etc., and plans to start manufacture of the new tire within a few weeks.

CHECK VALVE FOR LIMITING FLOW OF GASOLINE

Illustrating the check valve used on air-tight tanks made by Air-Tight Steel Tank Company, Pittsburg. (See Fig. 1.) When not in use the ball rests in the lower valve seat as shown in B. In this position it opens the ports G2, allowing the gasoline to flow in from the main reservoir as shown by the arrows D.

When pressure is applied in the chamber G2, the ball is forced up to A, closing the ports from G, permitting the fluid to pass on up and through the pipe and hose C.

In practice these valves are doing good work.

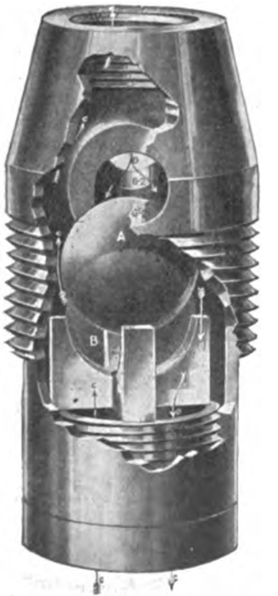


Fig. 1—Air-tight Steel Tank Check Valve

Frederick R. Simms, president of the Simms Magneto Company and founder of the Royal Automobile Club of Great Britain and Ireland has been selected as an honorary member of the Automobile Club of America by unanimous vote.

The Electric Welding Products Company, of Cleveland, has moved into its new factory addition, 94 by 100 feet, three stories high, and has installed new machinery, adding very largely to its capacity. The number of men employed approximates 350.

The Pennsylvania Rubber Company, which recently added $500,000 to its capitalization, making $2,000,000 in all, is now employing over 1,000 men at Jeanette, Pa. Herbert Du Puy, formerly president of the Crucible Steel Company, has assumed the presidency.

The Standard Auto Sales Company, of Youngstown, O., was incorporated with a capital of $10,000 to operate a garage and deal in automobile parts. The incorporators are Randall G. Anderson, A. Powers Smith, W. H. Anderson, J. H. Ewer and W. D. Euwer.

The Cincinnati Taxicab Company, of Cincinnati, O., was incorporated, with a capital of $20,000, to operate a taxicab service and do a general garage business. The incorporators are Frank E. Burnett, Allen L. Marshall, Chas. E. Everett, George B. Johnson and Alexander L. Sykes.

H. B. Harper, for the past two and a half years advertising manager and assistant commercial manager of the Ford Motor Company, as well as editor of the Ford *Times,* has assumed the position of export manager in New York just vacated by R. M. Lockwood.

T. W. Goodridge, prominently identified with the motor industry since its inception, has joined the forces of the Matheson Automobile Company. His first duties will be to establish agencies for the Matheson line of cars from Pittsburg to the coast.

The Troy Wind Shield Company, of Troy, Miami County, Ohio, was incorporated, with a capital of $10,000, to manufacture wind shields and other automobile accessories for automobile and garage purposes. The incorporators are H. F. Douglass, Henry L. Allen, F. A. Dillingham, C. G. Snook and B. Houser.

The Seagrave Manufacturing Company, of Columbus, will soon start to erect another large addition to its plant located in South Columbus. Some three months ago an addition was completed which doubled the capacity of the plant. The plans provide for an additional structure 150 by 200 feet, built entirely of steel and concrete. It is expected to have it completed and in operation by Fall of this year.

Robert M. Lockwood, located at 18 Broadway, New York, has shifted his allegiance from the Ford Motor Company to the Regal Motor Car Company, the position being the same one, that of export manager.

Fig. 2—How the Sonoscope operates

J. H. Dwight has resigned as secretary and treasurer of the Racine Steel Castings Company of Racine, Wis., to become secretary of the Kelly-Racine Rubber Company. S. H. Standish, formerly with the Finished Castings Company of Philadelphia, succeeds Mr. Dwight.

The Wentworth Motor Car Company, Cleveland agents of the Mora Company, gave a 1,000-mile sealed bonnet and starting crank test last week which proved eminently successful. The cars, which were driven by Mrs. Frank Adams and Miss Leota Mora, are both reported to have come through with flying colors.

SONOSCOPE FINDS THE KNOCK

Locating the knocks in a motor is not a difficult matter if they are neglected so that they graduate out of the "click" class, but the time to attack the problem is before the "click" becomes a knock. The American Sonoscope is an instrument which has been designed especially for this purpose. When it is placed in contact with the part whence a strange sound emanates, the little click will be accentuated until it assumes the proportion of the noise which comes from the blow of a trip hammer. It works on the principle of the Blake Transmitter working as a receiver. It occupies very little space and is free from all of the drawbacks of the character of instruments which persist in getting out of order even when horded under laboratory conditions. Fig. 2 shows the instrument being employed, and Fig. 3 is the instrument ready to respond to the demands of the autoist whose ear intercepts a strange noise emanating from the bowels of the motor. It is to be had from the Gaylor Automatic Stropper Company, Stamford, Conn.

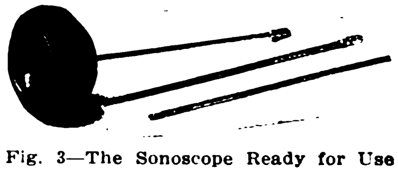


Fig. 3—The Sonoscope Ready for Use

E. L. Jones, formerly with the Anderson Carriage Company, has joined the sales forces of the Remy Electric Company, makers of the Remy Magneto.

Harry W. Doherty, sales manager of the Car Makers' Selling Company, distributors of DeTamble and Anhut pleasure cars and Dart delivery wagons, has gone to the Pacific Coast and will establish there a distributing company for California, Oregon, Washington, Idaho and Nevada, with branches in Los Angeles, San Francisco and Seattle.

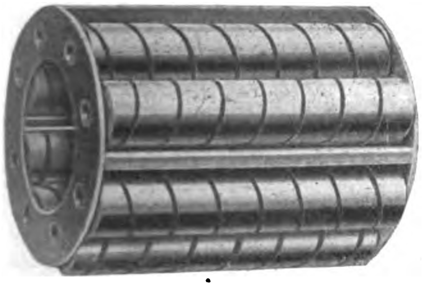


Fig. 4—One of the many types of Hyatt Roller Bearings, Made by the Hyatt Roller Bearing Company, Newark, N. J.

The Starr Automobile Company, of Minneapolis, Minn., has decided to build its proposed plant at Downing, Wis., according to reports from that city. Two blocks of land near the railroad line have been purchased and construction work will begin at once. The main building will be 90 by 200 feet in dimensions, with two 40-foot L-shaped wings. Seventy-five men will be employed at the beginning.

BULL DOG CHASES THE CARBON

The removal of carbon from the top of the piston is an important part of running an automobile engine because if the deposit is allowed to remain it becomes incandescent and preignition results. The engine knocks and thumps and the trouble spoils the running of a good car. A device intended to correct this condition by cleaning off the carbon deposits is the Bull Dog Carbon Remover manufactured by E. S. Michener of New Castle, Pa.

This device is guaranteed by the manufacturer to correct the condition. It is made of special tough, soft wire, so constructed that it will not catch under the valves. It is inserted through the spark plug hole, and, in conjunction with a little kerosene, quickly scours off the carbon if the engine is run without ignition in the cylinder being cleaned for a space of two or three minutes. The Bull Dog may be removed through the spark plug hole when its mission has been accomplished. It sells for 75 cents postpaid.

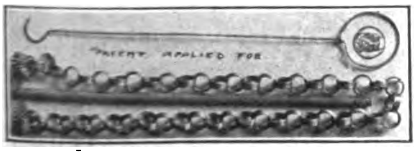


Fig. 5—The Bull Dog Carbon Remover

Agency and Garage News

Roman Jeria, of Para, Brazil, has taken the Brazilian territory for the Cole "30."

The Wood Garage and Auto Company has been incorporated at Niles, Mich., by L. E., F. J. and J. W. Wood.

D. H. Miller, of Water street, Binghamton, N. Y., has taken the agency for the Cole "30" for Central New York State.

The Cole "30" will make its début among New Orleans, La., dealers. The Gentilly Automobile Company has been appointed Louisiana agent.

W. C. Leland, general manager of the Cadillac Motor Car Company, who has been confined to his home for several weeks by illness, has recovered.

The Hennepin Auto Company, 422 First avenue S. E., Minneapolis, has taken the northwestern agency for the Hart-Kraft line of light delivery cars.

New agencies for 1911 Alco cars have been established by the American Locomotive Company with the Van Auto Company, at St. Louis, Mo., and with J. H. Fleming, at Scranton, Pa.

Marmon cars are now sold in Detroit by Collins & Company. Many excellent prospects are reported. Their location at 730 Woodward avenue, well up in Automobile Row, is an excellent one.

Two more branches have been added to the already long list of the Regal Motor Car Company, the latest additions being at Denver and Indianapolis. The first is in charge of E. S. Norton and the latter is presided over by C. C. Rundell.

The Hartford Suspension Company has opened a Chicago branch at 1458 Michigan Avenue under the management of William P. Pollitzer. A machine shop fully equipped with modern tools and in charge of skilled operators has been installed.

The Pierce Arrow Motor Car Company, of Buffalo, has opened a foreign service branch at 22 Avenue de la Grande Armee, Paris, France. Information regarding tours and motor routes and duplicate parts and accessories will be provided at this office which has been established for the exclusive convenience of Pierce Arrow patrons.

The Washington Bridge Auto Company, Inc., has opened its new three-story garage on One-hundred and eighty-second street near Amsterdam avenue, New York. The building is of commodious size, 45 by 119 feet and the entire structure with a well-equipped basement is utilized by the company. There are accommodations for 200 cars. A full line of supplies and accessories is handled. The company has not assumed the agency of any manufacturing concern so far, but arrangements for handling a moderate-priced touring car and a small runabout are being perfected.

The Crow Motor Company, of Elkhart, Ind., has decided to take part in the racing game. The company has entered two stock chassis for the races on the Indianapolis Speedway July 1-4. The company contemplates enlarging its plant in the near future.

Bill Nye, secretary of the Atlanta Speedway Association, has asked for tentative entries for a local race meeting to be held on the Speedway July 23. If enough interest is shown among local owners, a sanction will be applied for and races run on that day.

The Automobile Club of Dayton, Ohio, will hold an automobile carnival on Friday and Saturday, July 15 and 16. The committee on arrangements consists of E. L. Edwards, chairman; John Solliday, Thomas P. Gaddis, A. A. Wentz and Arthur J. Stevens.

SPARK PLUG REFINEMENT OF FITTING INTEREST

Refinements in ignition systems are being made with such rapidity that spark plug engineers are awakening to the necessity on their part of keeping pace with general progress. It is the same problem which obtained between gun-makers and the fabricators of armor-plate a few years ago; no sooner did the gun-maker produce a projectile and a gun to fire it which would pierce 12 inches of alloy steel armor in its hardened state than the fabricator of the armor plate studied the situation sufficiently to make it 16 inches thick and twice as hard as it was before. Now that magnetos are capable of delivering a spark of great energy under high potential conditions, it remains for the spark plug engineers to equal, if not exceed, the progress thus registered. Obviously, a spark plug which will not stand up to the magneto stress becomes the weakest link in the chain. The "Spit-Fire" type of plug is shown in Fig. 6. It is made by A. R. Mosler & Company, 163 W. 39th street, New York, to serve this end.

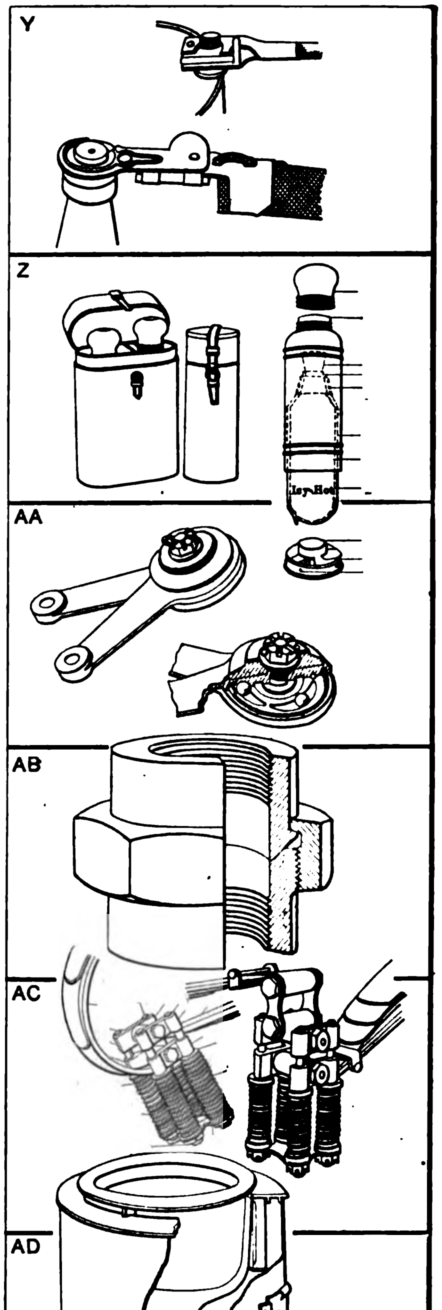
Fig. 6
Fir

Seen in the Show Window

SOMETIMES, when one's motor stops, the cause can be traced to a battery connector becoming loose or breaking—a trifle in itself, but an important item to the autoist. Much worry and sweating—possibly profanity—may be dispensed with by having in one's tool kit a supply of such indispensables. For the Becco connector (Y), manufactured by the Beck Company, of Rockville Center, N. Y., it is claimed that it cannot break or become loose, and that it accommodates itself to all positions of the battery caused by jarring or rough roads or otherwise. Another device marketed by the same company is the Becco terminal, which shows instantly when a cylinder ceases working whether the trouble is due to a bad spark plug or some electrical fault. The sparking gap indicates, when the switch is open, whether the electricity is properly going to the plug.

COMPARED with the early days of automobile touring, the motorist who contemplates a long trip across country nowadays may do so in comparative comfort, if not luxury. A cold drink on a hot day, or vice versa, is a blessing unalloyed, and no traveling kit should be minus some such accessory as the Icy-Hot Bottle (Z), manufactured by the company of the same name, in Cincinnati, O. These are furnished in quart and pint sizes, in black or russet leather, and lined with green velveteen. The outer casing is nickel-plated, and the glass vacuum bottle may be instantly removed from its metal casing for sterilizing, or if broken a new filler inserted. The screw top is in the form of a drinking cup.

HOWEVER excellent may be the spring equipment of a car, the use of some form of shock absorber to take up the constant jar and vibration which are inseparable from a trip over rough roads, is absolutely necessary if the car, its engine and the tires are to be assured of a reasonable length of life. For the device here illustrated, the Ball-Bearing Shock Absorber (AA), now being marketed by the company of the same name at 25 Broad street, New York, the claim is made that they positively neutralize all jounces and jolts without tying, binding or detracting from the best action of springs, reducing the wear on the parts and minimizing to almost the vanishing point the possibility of breakage. They are made of the finest steel drop forgings, with highly tempered double incline ball runways and best steel balls. A metal dust guard protects all wearing parts from dust and grit.



Y—The Becco Connector and the Becco Terminal
Z—The Icy-Hot Bottle and Holder for Touring
AA—The Ball-Bearing Shock Absorber—a Necessity for Rough Roads
AB—The Air and Gasoline-Tight Octagon Kewanee Union
AC—The Velvet Auxiliary Spring—Another Form of Shock Absorber
AD—The Buek Metal Melter—Handy to Carry from Shop to Job

EVERY repairman, garage-keeper and owner of an automobile realizes the necessity of tight tubing. Where a union is necessary in a tube line, either for water or gasoline, a leak is possible unless a positively tight joint can be secured by means of a reliable connection. Some of the claims made for the Octagon Kewanee Union (AB), manufactured by the National Tube Company, Hudson Terminal Building, New York, are the absolute tightness of the brass-to-iron thread connection at the ring; the brass-to-iron joint ball seat; and the possibility of easily disconnecting the joint if necessary. These unions are subjected to a 100-pound air pressure test, under water, to insure absolute tightness.

LIKE riding on velvet—an apt simile when used in connection with the spring-within-a-spring device now being sold by the John W. Blackledge Mfg. Co., 1400-1402 Michigan avenue, Chicago. The Velvet Auxiliary Spring (AC), it is claimed, performs all the functions of the spring link, eliminating all side sway which might have a tendency to bring undue strains on the other parts of a car. The eight coils which support the weight are surprisingly light, and are consequently very sensitive, interrupting and distributing the road shocks so effectually that the sensation is akin to riding on velvet.

LATTER-DAY shop needfuls have a recent worthy addition in the Buek Metal Melter (AD), made by the Frictionless Metal Company, of Chattanooga, Tenn. This handy repair device has the prime merit of being of such size and weight that it may be easily carried from shop to job, saving time and doing away with the necessity of taking job to shop. Gas is the fuel used in this melter, but an advantage claimed for the Buek over other forms of gas-using melters is a 30 per cent. saving, accomplished by means of a warm-draft burner. In operation it is extremely simple, and there is no additional expense incurred for fan blast or compressed air.

ELECTRIC lighting is now being practiced in connection with automobiles on a large scale, and the "Electrobola" is one of the latest bidders for honors in this field. The lamp is in the form of a parabola, 10 1-2 inches in diameter by 7 inches deep and weighs 7 1-2 pounds. It throws a beam of 2500 candlepower, and is aimed at the road 700 feet ahead of the automobile. It is made by the Avery Portable Lighting Company, Milwaukee, Wis.

XXIII NEW YORK—THURSDAY, JULY 14, 1910—CHICAGO No. 2

THE AUTOMOBILE

Excellent Sport at Plainfield Club's Second Annual Hill Climb

BUICK, CHARLES JONES, DRIVER, WINNER 161-230 CLASS

OVER a course that is pronounced by experts to be far and away the most difficult in the East, the Plainfield Automobile Club, of Plainfield, N. J., conducted its second annual hill climbing contest, Saturday afternoon. Some astonishingly good time was made in the ten events; not a mishap of consequence marred the pleasure of the day and good management and good weather combined to make the sport enjoyable to a crowd of well over 10,000 persons.

The hill is called Johnson's Drive, but it never could have figured much as a pleasure speedway, for it is steeper than the Dead Horse hill at Worcester, and more tortuous than Giant's Despair at Wilkes-Barre. Just short of 4,000 feet in length, there is not a stretch of 100 yards without its wrenching turn or heart-breaking grade. The total rise is only 300 feet, but it certainly seems much greater. The starting point is on level ground and the course is practically flat for 75 yards, then swinging around at right angles it mounts a stiff grade to a letter S curve that is so sudden that it makes the ordinary hairpin turn look like a straight line. Then comes almost a circle of heavy grade, followed by another rectangular turn, and the finishing stretch is a little less than 100 yards of comparatively straight going.

The turns of the letter S curve were banked, which explains the fast time made on the general average. De Palma in the free-for-all did not keep his throttle open for longer than 10 seconds at any one time in making the record-breaking ascent. His huge motor, roaring like a lion, was opened and closed a dozen times during his trial and finished with a rattle of explosions that sounded like a machine gun in action.

The day was perfect and long before the scheduled hour for starting crowds assembled along the course. Practically every person in the big crowd had a program and, remarkable to relate, the running of the events was precisely in accordance with the terms of the program.

Five Hupmobiles and a Schact competed in the first event, all finishing the course in creditable shape, with the honors going to the Hupmobile owned, entered and driven by A. C. Dan, in 2:04. On account of the size of the Hup, it was able to negotiate the sharp turns in commendable style. The Schact, which appeared during the morning for final practice stripped to the running gear, was required to replace the ordinary body on the car. The sudden change in rig probably did the car no good in the running of the event.

Event 2 was taken rather easily by a Mitchell, but the running of the race was marked by a bit of hard luck for the Oakland entrant. This car came whooping up the hill and was finishing about 10 seconds better than the time of the winner, when the clutch began to slip and the motive power died out, [illegible] thing Driver [illegible] could do,

1—Dean Rankin's Chalmers "30" which won the 301-450 race

2—Houpt-Rockwell, victor in the 451-600 event

3—The big Fiat, which De Palma drove to the course record

4—The Krit, which captured the place in the 160-230 race

within thirty feet of the winning line. Buick 22 also participated in the tough luck of the hill-climbing game in this event. The car suffered two blow-outs on the first turn and could not finish.

As the Oakland certainly had a margin of 10 seconds when the clutch went wrong and as the Buick later in the afternoon won in its piston displacement class in 21 seconds better than the winner of this event, some of the elements of racing luck were particularly emphasized.

Event 3 was captured by the Correja in easy fashion. During final practice this car suffered a broken front axle and the substitute piece was only installed a few minutes before the car was called to go upon the line. In its piston displacement class the new front axle of the Correja snapped when the car was making the big circle, and Driver Joe Taylor had all he could do to keep the car from diving over the precipice. No one was hurt, however.

Event 4 was won by the Buick driven by veteran Phil Hines, who remarked after the race that in his ten years of driving experience he had never encountered anything like the Johnson's Drive.

The classes for the more costly touring cars did not fill and the next event was No. 8, the free-for-all. E. W. C. Arnold's Fiat, driven by De Palma, broke the record for the hill by 8 seconds, finishing in 1:20. He had to make the big special car go at a record clip because two stock cars that finished behind him came so close that they also broke the former mark. These were the Chalmers, driven by Rankin, which made 1:22 1-5, and the Houpt-Rockwell, Stanley Martin, which made 1:22 3-5.

Event 9 produced a pretty fight. The Maxwell was the only entry up to a few minutes before post time, when two K-R-I-Ts made post entry, and just a few minutes before the race the little Buick that suffered the blow-outs in its price classification race was thrown in. The result was that the Buick won by nearly 21 seconds, while the K-R-I-Ts fought it out for second place. Through a misconception of the rules for stock chassis classes, which do not require the same load to be carried as those applying to the touring car divisions, a protest was about to be filed against the winner on behalf of the K-R-I-Ts, which carried the full complement of passengers; but the matter was eventually explained to the satisfaction of all.

Event 10 was taken by the S. P. O. after the Gorreja broke its axle, and event 11 was won in astonishing style by the Chalmers entrant. This car had finished second in the free-for-all and was generally looked upon as a sure winner, but in making the first turn Rankin suffered a blow-out of the right rear shoe, despite which, however, he continued and managed to get across the line in 1:27 2-5, leaving him a winning margin of over 2 seconds.

Event 12 for cars with piston displacement of from 451 to 600 cubic inches found three contestants, a Houpt-Rockwell and two Stearns cars. The Houpt-Rockwell proved an easy winner in the same time it made in the free-for-all. The final number, an amateur event, brought out only the two Stearns cars that competed in the preceding number. The machine owned, entered and driven by C. W. Winslow got home in 1:28 3-5.

Cups were awarded the winners in each of the classes and cash purses were given the first and second in the free-for-all.

The officials who handled the affair were as follows: Referee, J. H. Wood; starter, Arthur Smith; timers, Dr. F. C. Ard, A. L. C. Marsh, G. J. Tobin, C. E. Verian, E. A. Lowe and E. Rushmore.

Contest Committee, Hugh A. Todd, Alexander Milne, Allen B. Laing, F. L. C. Martin, C. B. Brokaw, A. C. Thompson, Kent Bender, Gus Barfuss and Hiram A. Woodruff; Technical Committee, A. F. Camaclo, R. D. Williams, F. O. Ball and H. A. Todd.

The officers of the Plainfield Automobile Club are: H. W. Marshall, president; Hugh A. Todd, vice-president; W. R. Townsend, secretary, and F. O. Bell, treasurer. Following the race program the club entertained the entrants at dinner in the club rooms at the Brass Kettle Inn. The summaries:

No. Car	Entrant	Driver	Time
Class A, Div. 1A—Cars selling $800 and under.			
12—Hupmobile	A. C. Dan	A. C. Dan	2:04
4—Hupmobile	E. B. Libbey	E. B. Libbey	2:09
14—Hupmobile	F. L. C. Martin	R. D. Martin	2:19 4-5
5—Schact	Gray Motor C. Co.	J. S. Gray	2:21 2-5
16—Hupmobile	F. L. C. Martin	E. D. Cutting	2:22 3-5
15—Hupmobile	F. L. C. Martin	R. E. Gillam	2:28 1-5
Cars selling from $801 to $1200—			
18—Mitchell	F. L. C. Martin	W. Kattering	2:03 4-5
21—Maxwell	W. F. Hobbie, Jr.	Hobbie	2:10 4-5
3—Oakland	Oakland M. C. Co.	Howard Bauer	did not fin.
22—Buick	Buick M. C. Co.	Chas. Jones	did not fin.
Cars selling from $1201 to $1600—			
10—Correja	Correja M. C. Co.	Joe Taylor	1:40 3-5
17—Mitchell	F. L. C. Martin	F. McCarthy	1:57 3-5
Cars selling from $1601 to $2000—			
6—Buick	Buick M. C. Co.	Phil Hines	1:32
3—Oakland	Oakland M. C. Co.	Howard Bauer	1:35
Free-for-all—			
7—Fiat	E. W. C. Arnold	Ralph DePalma	1:20
19—Chalmers	A. C. Thompson A. Co.	E. Rankin	1:22 1-5
23—Houpt-Rockw'll	H. S. Houpt Co.	Stanley Martin	1:22 3-5
1—Buick	R. E. Beardsley	Beardsley	1:33 2-5
160-230 cubic inches piston displacement—			
22—Buick	Buick M. C. Co.	Charles Jones	1:40
24—Krit	R. T. Wissn	Owen	2:01 4-5
25—Krit	E. W. Huntley	Roddon	2:03 1-5
21—Maxwell	W. F. Hobbie, Jr.	Hobbie	2:10 2-5
Cars of 231-300 cubic inches—			
20—S. P. O.	H. S. Lake	J. Juharz	1:31 2-5
10—Correja	Correja M. C. Co.	Joe Taylor	did not fin.
Cars of 301-450 cubic inches—			
19—Chalmers	A. C. Thompson	E. Rankin	1:27 2-5
2—Berkshire	S. H. Clapp	Clapp	1:29 4-5
6—Buick	Buick M. C. Co.	Phil Hines	1:31 2-5
1—Buick	R. E. Beardsley	Beardsley	1:35
Cars of 451-600 cubic inches—			
23—Houpt-Rockw'll	H. S. Houpt Co.	Stanley Martin	1:22 3-5
8—Stearns	J. A. Rutherford	Rutherford	1:29 3-5
11—Stearns	C. W. Winslow	Winslow	1:30
Amateur Event—			
11—Stearns	C. W. Winslow	Winslow	1:28 3-5
8—Stearns	J. A. Rutherford	Rutherford	1:29 1-5

Sweepstakes Announced for Parkway

W. K. Vanderbilt, Jr., president of the Long Island Motor Parkway makes announcement that on Saturday, July 30, the "Motor Parkway Inaugural Sweepstakes" will be held on Long Island. There will be a sweepstakes amateur event at 10 miles, a free-for-all event and a Class C event for cars ranging from 301 to 600 cubic inches piston displacement, without weight limitation.

Valuable cups will be given in the amateur and the Class C events, with first and second cash prizes of $100 and $50 in the free-for-all event.

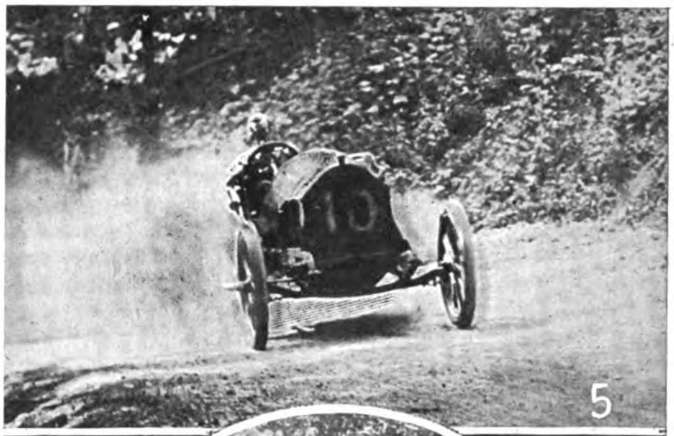
The conditions for these two are practically identical with those that will prevail in the Vanderbilt Cup race to be held on the Parkway on October 1, and the Grand Prize race on October 15, this fall.

It is expected that the amateur event will bring a large field of entries from the Amateur Contest Association.

The timing will be done by the Warner electrical timing device. The start will be near Great Neck Lodge and the finish at the grand stand on Hempstead Plains. The greater portion of the course will be on the newly completed section of the Parkway which has a surface of tar-treated sand and gravel, laid on cement. The curves are all scientifically worked for sustained high speed—sliding, slipping and skidding are eliminated and there is absolutely no dust. Phenomenal time, undoubtedly, will be made.

Drivers of motor cars can approach the stand from Great Neck, Roslyn, Jericho and Meadow Brook lodges up to 11:30 o'clock a. m., when the Parkway will be temporarily closed for the start, which will be at 12 o'clock noon.

All events will be run in heats of two cars, with finals and semi-finals affording an afternoon of high-class sport. Entry blanks may be obtained from A. R. Pardington, second vice-president, at Mineola, L. I. Entries will be received up to the last mail on July 28.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5—Joe Taylor's Co[illegible] No. 10, winner of $1201-$1600 class

6—The [illegible] ed the $800-and-under honors

[illegible] inner in the $801-$1200 event

[illegible] al, performed creditably

New Automobile Law Under Hamper of Political Expediency

Chauffeurs' Qualities to Be Shucked in Seven Seconds

State of New York Appended to a Touring Club Enterprise

THESE are lively days for the chauffeur. He is being examined as to his qualifications touching on and appertaining to the propulsion of the automobile and his knowledge thereof. The great and sovereign State of New York is propounding the questions, through the instrumentality of Frederick H. Elliott, erstwhile secretary of the A. A. A., and more recently secretary of the Touring Club of America. In fact, Mr. Elliott is still secretary of the latter organization, and despite his new job as chief examiner of chauffeurs he is to be found in the offices of the club at Seventy-sixth street and Broadway.

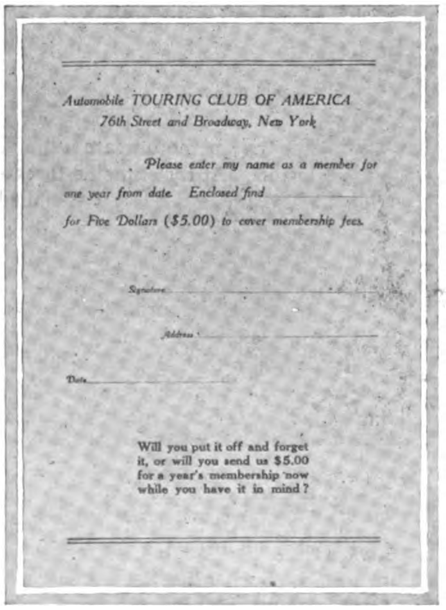
But, as was said, these are the days when the 35,000 chauffeurs of New York City are as industrious as a boy with his first Waterbury. If they intend to obey the law, they must pass Mr. Elliott's examination, whereupon a certificate of character and ability will issue to them from the fountain head of the State. The Callan law provides for registration of chauffeurs, but does not outline the procedure. It delegates that power to the Secretary of State, and that official, in his discretion, passed the "buck" to Frederick H. Elliott, as chief examiner in this district.

Mr. Elliott was instructed to frame a series of questions that would test the knowledge of the applicants for certificates, so that if they were answered satisfactorily, the great American public might employ the holder of a certificate with full assurance that the aforesaid holder would not make it a practice to do miles in :47 before dawn on Riverside Drive; that they have distinct knowledge of the difference between the transmission and the magneto and they have only such criminal records as they have confessed to in their applications.

All these things are important and greatly to be desired, and in the wisdom of the Callan law the delegation of powers under it to the Secretary of State and the subsequent passing of the "buck" to Mr. Elliott, the officials certainly have made a showing of activity.

The procedure is simplicity itself. All the applicant has to do is to go to the offices of the Touring Club of America and ask for blank application papers. Any of the half-dozen obliging clerks of the Touring Club will be pleased to supply the blanks, or if the applicant wishes to get them in other ways, such a thing may be done. Mr. Elliott himself sometimes stands behind the counter, upon which is piled literature and prospectuses of the club and insistent little blank applications for membership, at $5 the year.

Of course, the applicants for State licenses as chauffeurs do not have anything to do with these applications for membership in the club, but many of them wonder whether such membership might not have its advantages.



Automobile TOURING CLUB OF AMERICA
76th Street and Broadway, New York

Please enter my name as a member for one year from date. Enclosed find ______________ for Five Dollars ($5.00) to cover membership fees.

Signature ______________________

Address ______________________

Date ______________________

Will you put it off and forget it, or will you send us $5.00 for a year's membership now while you have it in mind?

At any rate, they have the chance to look at the applications for membership while they are waiting for the obliging clerks to furnish them with applications for license. In fact, they may examine the maps and pretty signs of the Touring Club of America, while leisurely polishing up their spelling or syntax or sharpening their descriptive faculties for the ordeal of examination.

The application blank, when it has been sifted out from among the other literature and application blanks for membership in the club, is found to be a beautiful pink affair containing 19 queries of an intimate and personal nature.

Counting to-day, there are exactly 16 working days during which applicants may be examined before the law goes into effect. Woe betide any luckless chauffeur who fails to have an "engrossed" certificate on the morning of August 1, 1910! Preparations are being made to cause the careless ones and the unfortunates who fail to take the examination to rue the day they overlooked their chance.

A room has been secured for the work of examining the applicants. It contains desks for chauffeurs, and Mr. Elliott says it will be operated hard as soon as things get to going smoothly.

When seen at the rooms of the Touring Club of America Tuesday, Mr. Elliott seemed quite certain that all would be accomplished according to the seven-second schedule. But in discussing the matter, one little jarring note pervaded the harmony of the conversation. Said Mr. Elliott:

"Nobody knows exactly how many applicants we will have to examine, but I believe we shall be able to get through all right. I am not stuck on the job, but everybody seemed to think I ought to take it and keep it, and so I am working at it. But it is tough for the State officials to set a man to do a certain thing in a certain time and then hamper him with dull tools. Of course, some of the men who have been selected for the board of examiners may be all right, they do not shape up with my ideas as to what board members should be. In selecting a board under political auspices, the best of material is not always available, and I suppose we shall have to do the best we can with the material furnished. I can say that if I was selecting the board it would have had a far different complexion."

The names and addresses of the board that Mr. Elliott referred to are as follows:

George Abrams, 66 Orchard street; A. Asen, 121 Broome street; James Bennett, 286 Degraw street, Brooklyn; Frederick Beyer, 548 West Fifty-first street; John E. Carney, 325 President street; Nicholas D. Collins, 377 Atlantic street; Robert H. Cowden, Jr., 33 Ross street; David C. Decker, Port Richmond; Samuel Ginsburg, 222 Rivington street; Abraham Gold, 713 Seventh avenue; Samuel Hoffman, Confidential Clerk, 272 East Houston street; George M. Janvrin, Examiner of Publicity, 302 Westminster road; Fred Kuser, 441 East Fifty-seventh street; Walter R. Lee, 554 Ninth street; Jesse F. Madden, 241 Powers street, Brooklyn; James R. Murray, 116 West Seventy-first street; George H. Nason, 57 Greenpoint avenue, Brooklyn; Mark Natkiel, 612 Sixth street; Millard C. Perkins, 319 West Fifty-fourth street; A. E. Preyer, 170 West 136th street; Charles Reich, 233 Tenth avenue; M. J. Rogan, 330 West Forty-seventh street; John A. Saam, 478 West 146th street; Harry Safir, 341 Sixth street; Robert Spitzer, 236 Linden avenue, Brooklyn; Emil Stecher, 745 Sixth street; Seymour Taft, 259 Mott avenue, Long Island City; William K. Tattersall, 81 Enfield street, Woodhaven, L. I.

The examination, in order to accomplish the intention of the law, must be severe and searching. When it is all over and the official O. K. of the State is placed upon the papers, it is supposed to prove the competence, honesty and industry of the chauffeurs. Only one thing stands in the way, and that is the matter of time.

It has been figured that working union hours every day from now until the law goes into effect, the examining board can devote a little less than seven seconds to each applicant for examination. If the board works four full shifts each day, including Saturdays, which is an unbelievably liberal estimate, they will be working 230,400 seconds, and as there are somewhere around 35,000 chauffeurs who must be examined by August 1 in order to avoid various dire penalties, an example in long division will show that seven seconds per applicant is a reasonable estimate of the amount of time that can be devoted to each.

As an expert writer is able to sign his name in about that time, the problem that confronts the chauffeur is by no means as simple as it might appear.

A conservative estimate of the number of chauffeurs engaged in New York City and vicinity, known as District No. 1, is put at something like 35,000. The sovereign State of New York, in its wisdom, places 35,000 citizens and their chances of making a living at the mercy of the Chief Examiner, who admits that he is engaged in another business, and whose name appears as Secretary of the Touring Club of America; he is bound by his oath of office to examine every chauffeur as to character and competence, and if he expends all his time in the interest of the office which has been handed to him by the Secretary of State he will have apparently less than 7 seconds of time in which to keep from being a perjurer. But he is engaged in other business, and if he spends any time at all in the conduct of his private affairs during the working hours as figured out herein, he will make more or less heavy inroads upon the few seconds of time which already stand between him and perjury.

Granting that the Chief Examiner is a diligent servant, the fact remains that the chauffeurs to be examined, if they while away any of the fleeting seconds to which they can possibly lay claim, reading the literature of the Touring Club of America, will further reduce Mr. Elliott's ability to place at the disposal of the owners of automobiles 35,000 capable chauffeurs in 230,400 seconds, and if, as the Secretary of State proclaims, the citizens are to be given the administrative advantages of a particularly wise law, the wonder is what became of the wisdom that made it possible for the chauffeur to spend any part of his precious seven seconds amid the distractions afforded by the literature of the Touring Club of America, its officers, or any other literature or persons not directly connected with the administration of the law.

At the American Automobile Association's office, when the peculiar way in which the new law is to be enforced was discussed, it was stated that the matter had been called to the attention of the Association of Automobile Clubs of the Empire State, and the opinion was expressed in forcible language that the mixing of the new automobile law with the private affairs of individuals was a gross injustice to the autoists, who will be discommoded to whatever extent the law becomes abortive.

It is confidently anticipated that the projectors of this law will feel the pressure of the indignation which is being aroused, not only in the ranks of autoists, but in the community at large, over the totally inadequate way in which the matter is being handled, and it looks as if political expediency, rather than the promise of efficient work, is the normal expectation.

Wisdom, tempered with experience, demands that chauffeurs be regulated, but by no power of the imagination can it be shown that they should be exploited. The law distinctly states that a man is to be deemed innocent until he is proven guilty, and under the law a chauffeur is entitled to the distinction of being considered a good citizen until it can be shown, by legal means, that he is not. Political expediency may have the telescopic eye which will permit it to single out a goat from the sheep in seven seconds of time, but the average citizen will scarcely be convinced of the efficacy of the plan. Thirty-five thousand chauffeurs are entitled to the exclusive service of a Chief Examiner and a corps of inspectors who are free to devote their entire time to the examining effort, and it is not believed that the State of New York can afford to put a straw in the way of a man who is entitled to the right to earn an honest living, even if he is a chauffeur.

Leading British Aviator Meets Death

BOURNEMOUTH, ENGLAND, July 12—Falling about 100 feet when the tail piece of his Wright bi-plane snapped off, the Hon. Charles Stuart Rolls, third son of Lord Llangattock, and one of the leading automobilists, aviators and balloonists of the United Kingdom, was dashed to death this morning in the presence of a large crowd composed in part of personal friends and acquaintances of the aviator.

Mr. Rolls was engaged in an accuracy contest at the time of the accident and was about to make a descent, when his aeroplane crumpled directly in front of the grandstand. He was dead before assistance could reach him. In addition to the fame he recently gained on account of of his non-stop flight across the English Channel to Calais and return, Mr. Rolls had been identified with advanced ideas in motoring and was connected with the Rolls-Royce Company, which manufactures the car of that name and which bears an excellent reputation for mechanical perfection.

He was only 33 years old and had been educated for the diplomatic service, but owing to the mechanical trend of his mind, a career in that direction was abandoned. As a balloonist he made over 150 ascents and crossed the Channel several times before the day of the aeroplane.

In the field of aviation he stood in the front rank of the world. At the time of his death he was contemplating a trip to the United States to take part in various aviation meets and transcontinental competitions scheduled for the coming fall.

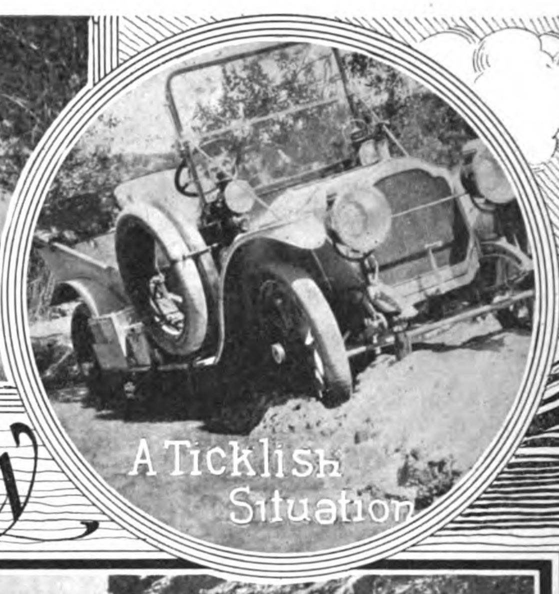
Boston Parkways Closed to Automobiles

BOSTON, July 11—Boston motorists were very much disturbed to-day when they read in the papers that the Boston Park Commission had made a ruling that several roads heretofore opened to motor cars had been ordered closed at the request of Mayor Fitzgerald. If the ruling is upheld by the State Highway Commission, it means that motorists will have to go out of their way in many instances coming into Boston and going out, for some of the parkways lead directly to other near-by cities and towns.

This is the outcome of the agitation last spring by Mayor Fitzgerald to get 25 per cent. of the fees from motor cars for the maintenance of the park roads in Boston. At that time he threatened to order all parkways closed if his request was not complied with by the Legislature. This was refused and he sent out requests to both the Boston and Metropolitan Park Commissions asking that they close all parkways to the motor cars.

The Metropolitan Park Commission replied promptly that it would not do so. The Boston Commission did nothing until today, and its action is based upon the fact that already the State has collected more than $300,000 from motorists, with more to come, which, with the regular State fund, makes more than will be needed for the State highways. The Legislature will have to act before any sum can be set aside, however. The matter is now placed squarely up to the State Highway Commission, for the rules cannot be enforced until the Commission approves of them. A hearing has therefore been set for July 27. By [illegible] time th motorists will be organized strongly against th

Good Roads Needed



A Ticklish Situation

Through Death Valley

TOWARD the Southern end of the Mojave desert, where the shadows at dawn and twilight lie purple and rose-color in the swales and arroyos that depress the yellow-gray sand, there is a territory that gives little promise for a colorless automobile trip, and the negative promise is more than fulfilled when the venturesome automobilist essays to solve its eternal problem.

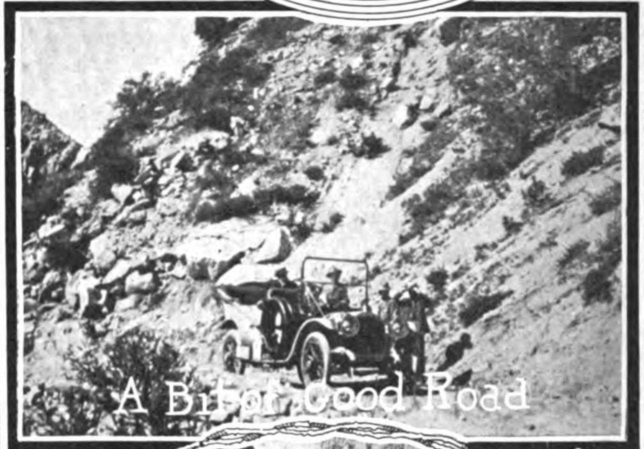
J. M. Murdoch, of Johnstown, Pa., and Pasadena, Cal., who has driven a Packard car from ocean to ocean for the fun of the thing, is one of the motorists who has had the nerve to traverse the Mojave wastes clear to the portals of Death Valley. So far this year he has made two intensely interesting trips. The first was early this Spring, when he and a party of adventurous spirits tested the possibilities of a run through Daggett and around Coyote Lake to the gateway that leads into Death Valley. This trip was accompanied by a world of incident and enjoyment, and some of the roads traversed were among the most picturesque in the world.

The second tour was through the desert, skirting Owens Lake and circling through the wild waste at the base of Mount Whitney, the stateliest spire of the lower Sierras, whose head is crested eternally with a crown of snow and ice.

Over passes that seem fit only for sure-footed burros; through narrow cañons whose walls rise so high that they shut out the sunlight at noon; passing by vast stretches of waterless desert where the land is so rich that anything that grows anywhere on earth can be made to flourish mightily with the aid of water, the party explored a dozen trails that have never before been part of the itinerary of an automobile party.

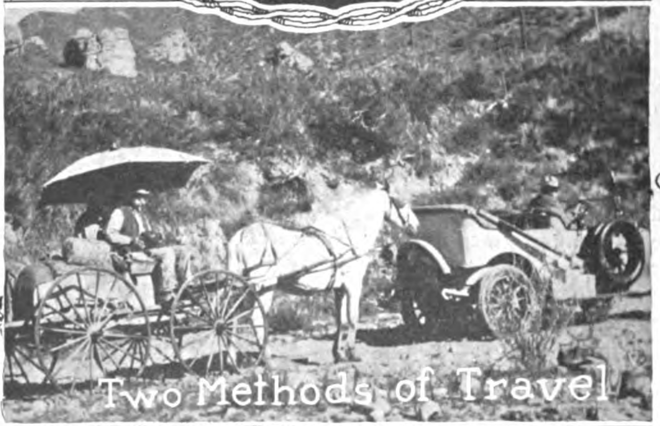
They passed over great tracts of heavily mineralized country where in times past pioneer prospectors staked and lost their labor, property and lives, and they also whirled by the section in which the Spanish friars of the dead centuries labored to unearth the surface treasure of chrome silver and the marvelously rich pockets of metallic gold that served to check settlement in California until the tidal wave of 1849 swept their conservatism away.

The first part of each of the tours of Mr. Murdoch was through a delightful road setting, but before he had reached his

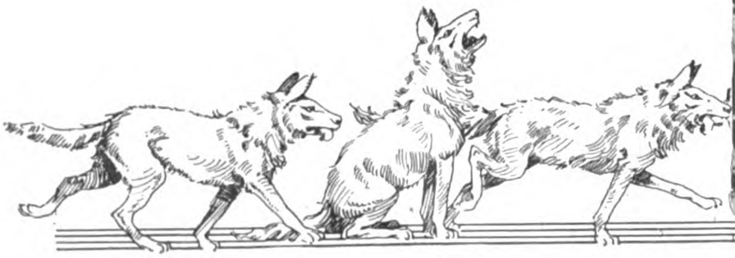


A Bit of Good Road

Newhall Grade



Two Methods of Travel



Fording Cottonwood Creek

In Mojave Desert

In An Automobile

Under a Yucca Tree

Cajon Pass

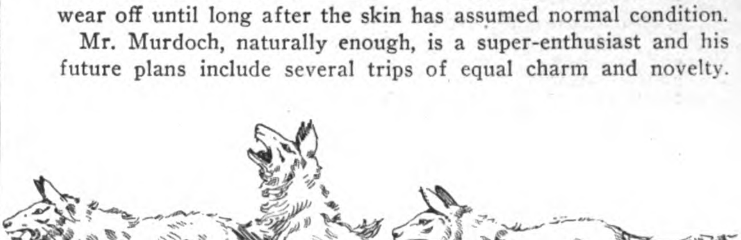
40-Horse and 4-Horse

destination in each case he had figured in the rôle of pathfinder for humanity. There were a dozen spots over which his automobile was pushed where the foot of white man, the hoof of domestic animal or the wheel of the automobile had never passed before. Among the more spectacular scenes which figure in these tours are the passage of Cajon Pass, high in the Sierras; the San Francisquite cañon, a rift in the dry hills; the unspeakably rocky trails of Red Rock cañon; the silence and mystery of the Soledad and the depressing stillness of Death Valley itself. The valley is from five to ten miles wide, the higher ground being a formation of immense sand drifts. During heavy wind storms these drifts are shifted and blown in every direction. The Murdoch party was frequently compelled to put up top and curtains to keep off the sand the wind blew so fiercely about them. The Newhall grades, that once afforded a certain kind of freight thoroughfare and which in their time have carried untold millions of treasure packed on mule-back or dragged along by great strings of sturdy little horses, were used by Mr. Murdoch's party. The Newhall trail is considered to be about the stiffest pull in the United States—at least the steepest long grade in the country that is used for hauling. In places the grade is fully 27 per cent., thus affording a rigorous hill-climbing test. In the course of a short time the Newhall trail will be abandoned permanently, as a road tunnel is in course of construction that will allow hauling at a much more gentle grade than the old landmark trail over which Mr. Murdoch and his party passed.

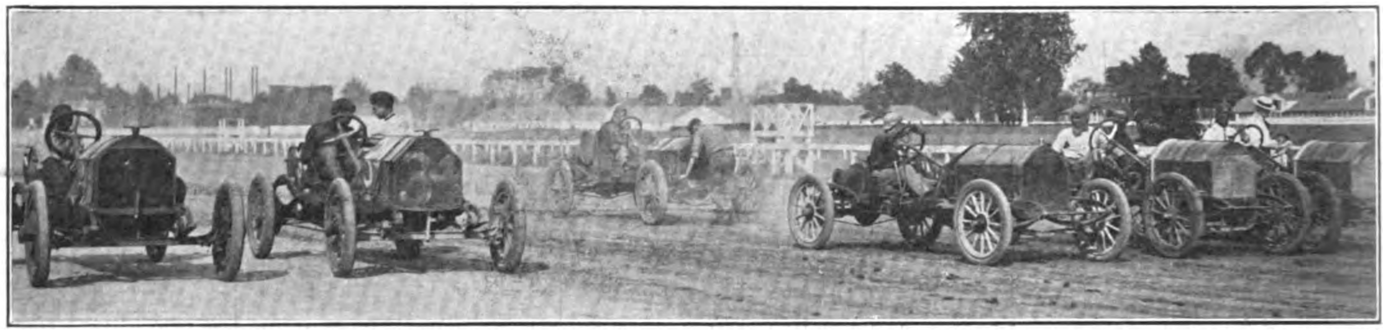
The party took a spin on the floor of Death Valley, which is as level as the floor of a ballroom. The sand is glistening white and in the full glare of the California sunshine the reflection of the light is dazzling in its intensity and glory.

When tourists return from such trips as those enjoyed by this party, faces are tanned to a temporary hue of russet leather or broiled to a shade that matches that of a Nova Scotia lobster, but the time spent in the free, wild atmosphere of the desert and mountains is said to act as a tonic, the effect of which does not wear off until long after the skin has assumed normal condition.

Mr. Murdoch, naturally enough, is a super-enthusiast and his future plans include several trips of equal charm and novelty.



Marmon Team Starred at Churchill Downs



Line-up for the five-mile free-for-all handicap at Churchill Downs, won by Hughes' Parry

LOUISVILLE, KY., July 11.—The motoring fans of this city witnessed a program of automobile races last Friday at Churchill Downs that never before has been surpassed in Kentucky. Nine well-contested events were run, and, best of all, there was but one accident, and that not serious. Harry Endicott, the E-M-F driver, was the sufferer in this, but was not dangerously injured. In the second race, before the first mile had been negotiated, the car was hood to hood with the Cole entries when a heavy cloud of dust made it impossible for Endicott to see. Speeding along at a lightning rate the machine left the track and dashed through the fence, crashing into the west wall of a stable.

The Marmon team starred on the opening day of the speed carnival and captured the biggest events of the day. The dirt track was slow because of recent rains and no records were smashed. Ray Harroun made an attempt to lower the world's record for a mile on a dirt track, but was unsuccessful. His time was 59 seconds. The most spectacular event of the afternoon was the twenty-five mile race. In Class B Ray Harroun was the first to flash past the judges' stand in 28:33, while Bill Endicott in a Cole carried off honors in Class A. His time was 31:42. Behind Endicott came No. 11, also a Cole, driven by the skilled hands of Edmunds.

Emmons (Herreshoff) won the trophy in the fifth race, which was a well balanced handicap event of five miles. Every foot of the way was bitterly fought in the free-for-all handicap event. There were seven starters. Hughes (Parry) carried off the first prize, when he negotiated the five miles in 6:05.

A remarkable feature of the day's races was that throughout the nine events there was no tire trouble of any sort. None of the local contestants entered in the events could stand the pace set by the professionals and they carried off no honors.

Eugene Straus, president of the Louisville Automobile Club, was the official referee and representative of the Contest Board of the American Automobile Association. The starter was H. C. George; judges, Lee L. Miles, Walter Kohn, L. H. Wymond and Hubert Levy. All of the officials were selected from the membership of the Kentucky Automobile Association, the Louisville Automobile Club and the Louisville Automobile Dealers' Association. The summaries:

Pos. Car	Driver	Time
Five miles, under 160 class—		
1—Herreshoff	E. P. McCormick	6:45
2—Herreshoff	Walter Emmons	
3—Herreshoff	William Smith	
Five miles, 161 to 230 class—		
1—Cole	Bill Endicott	6:17
2—Cole	Lewis Edmunds	
Five miles, 231 to 300 class—		
1—Marmon	Ray Harroun	5:56
2—Parry	Hughie Hughes	
Five miles, 301 to 450 class—		
1—Marmon	Ray Harroun	6:05
2—Marmon	Joe Dawson	
3—Stoddard-Dayton	J. K. Gilchrist	
Five mile handicap, up to 300 class—		
1—Herreshoff	Walter Emmons	6:27
2—Parry	Hughie Hughes	
3—Cole	W. Endicott	
Five miles, free-for-all—		
1—Marmon	Ray Harroun	5:49
2—Marmon	Joe Dawson	
3—Parry	Hughie Hughes	
Five miles, free-for-all handicap—		
1—Parry	Hughie Hughes	6:05
2—Marmon	Joe Dawson	
3—Marmon	Ray Harroun	
Twenty-five miles, 161 to 230 class—		
1—Cole	W. Endicott	31:42
2—Cole	L. Edmunds	
Twenty-five miles, over 230 class—		
1—Marmon	Ray Harroun	28:33
2—Marmon	Joe Dawson	
3—Stoddard-Dayton	J. K. Gilchrist	

LOUISVILLE, KY., July 9—Heavy rain put a stop to the Grand Circuit auto races at Churchill Downs on the final day of the meet. Despite the weather conditions during the early part of the afternoon more than 1,000 motoring fans hied themselves to the famous course and for two hours sat in the grandstand waiting for the races to start. Their appetites had been whetted by the splendid card offered by Homer George and W. H. Wellman, the promoters, on the opening day, and they were anxious to witness more of the dare-devil driving of the speed kings on a one-mile dirt track.

At 3:30 o'clock the rain fell in torrents and owing to the dangerous condition of the track the management called the races off.

Marmonites Repeat at the Cincinnati Meet

CINCINNATI, O., Juy 10—The circuit-chasers came here to-day ftom Louisville for the track meet at the local course. As at Churchill Downs, the Marmon team swept the boards, although the Herreshoff and Cole also captured the class events. Summaries:

Pos. Car	Driver	Time
Five miles, stock chassis under 160 cu. in. piston displacement—		
1—Herreshoff	Emmons	6:14 1-5
2—Herreshoff	McCormick	
3—Herreshoff	Smith	
Five miles, 161 to 230 cubic inches piston displacement—		
1—Cole	Endicott	6:11 1-5
2—Cole	Edmunds	
3—E-M-F	H. Endicott	
Five miles, 231 to 300 cubic inches piston displacement—		
1—Marmon	Dawson	6:00 4-5
2—Cino	Donnelly	
3—Detroit-Dearborn	Ramey	
Five miles, handicap, up to 300 cubic inches piston displacement—		
1—Marmon, scr.	Dawson	6:23 3 5
2—Herreshoff, :30	Emmons	
3—Cole, :20	W. Endicott	
Five miles, free-for-all—		
1—Marmon	Harroun	5:23 2-5
2—Marmon	Dawson	
3—Matheson	Stevens	
Five miles, free-for-all handicap—		
1—Herreshoff, :40	Roberts	5:50 3-5
2—Marmon six, :05	Dawson	
3—Cole, :20	Endicott	
Ten miles, 161 to 230 cubic inches piston displacement—		
1—Cole	W. Endicott	12:50 3-5
2—E-M-F	H. Endicott	
Ten miles, exceeding 230 cubic inches piston displacement—		
1—Marmon	Harroun	12:06 4-5
2—Marmon	Dawson	

Gilchrist in Stoddard and Stevens in Matheson also started but quit on account of dust.

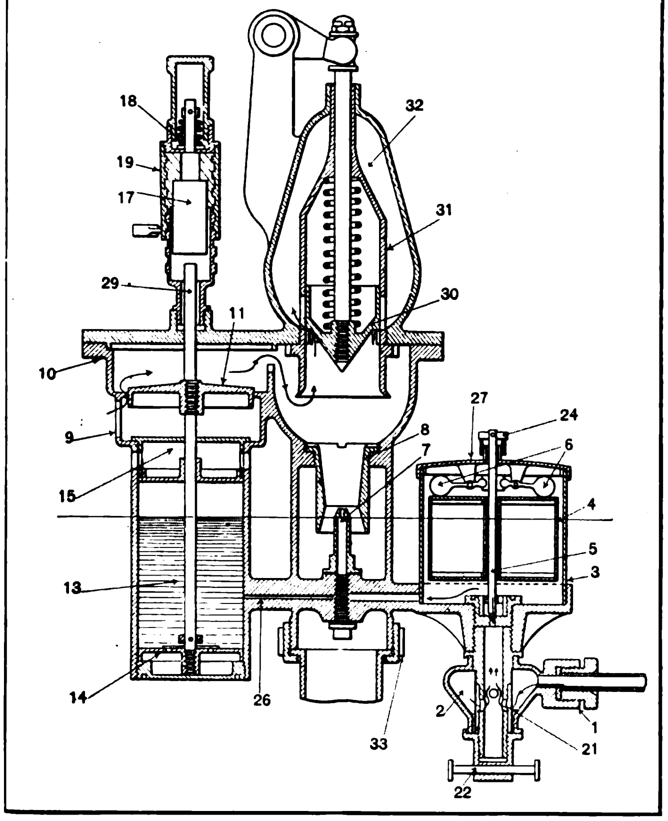
New Carbureter on 18-Horsepower Renault Car

As reported from abroad, the new Renault carbureter as used on the 18-horsepower car, has several new features: float is used as usual; supplementary air intake has some leading features; troubles of spring control systems are eliminated; dead weight methods obtain; fluid dashpot effect is taken advantage of.

FROM the "Foreign Correspondent" comes the report of a new carbureter differing in several important features from the present model, which has just been patented by the Renault Company and adopted on the firm's 18-horsepower, six-cylinder car; it will probably later be applied to all the firm's four-cylinder models. As will be seen from the sketch, the gasoline is brought to a cone-shaped chamber 2, from which it mounts, by reason of the difference of level, into the float chamber 3, the nozzle 7 and the cylinder 13. The choke tube 8 has its diameter calculated to allow the passage of the right quantity of air for the correct running of the motor at low speed. The primary air is heated by a by-pass from the exhaust, but the supply of warm air can be shut off, whenever required, by turning the collar 33.

Supplementary air is admitted through the valve 11, forming the base of the supplementary air chamber communicating freely with the mixing chamber above the choke tube. At the lower extremity of the stem of the air valve is a piston capable of an up and down movement in the cylindrical chamber containing gasoline and communicating with the float chamber by the passage 26. As the piston meets with a certain resistance by reason of having to move within a fluid, the rapid vibrations common to spring-controlled valves are abolished. The valve opens very gradually, and is equally slow in falling back to its seat. The gasoline within this cylinder having no other object than to steady the movement of the auxiliary air valve, it is prevented from overflowing or passing in with the air by the presence of the intermediary chamber 15.

About 1-8 inch above the upper extremity of the valve stem 29 is a counter weight 17. The initial opening of the valve is, therefore, made without any difficulty, the only resistance to overcome being that of the piston within the gasoline tube. As soon as the stem comes in contact with the balance weight, however, further opening can only be made by overcoming the weight of the balance and the spring 18 to which it is attached. The weight of the balance and the tension of the spring are calculated to give a correct lift and in consequence a correct amount of air for all engine speeds. The absence of violent movement of the air valve at all times by reason of the resistance of the piston in the gasoline tube assures a constant supply of correctly proportioned mixture and a wide range of flexibility.



Section of new carbureter on the 18-horsepower Renault

Throttling is now done in the upper portion of the mixing chamber and not in a separate chamber connected up to the intake manifold. The arrangement consists of a movable sleeve 30 on the lower portion of which are a number of elongated grooves corresponding with holes in the cylindrical vessel 31. The internal sleeve is mechanically operated by means of the foot accelerator, and in proportion as it is raised more of its grooves are brought into relation with the holes, allowing an increasingly free passage of the mixture to the chamber 32, and from there into the intake pipe. Control of this sleeve is by means of the foot accelerator from a position giving the slowest possible running on a level road to the maximum speed. Further throttling down is obtained by a small lever placed under the steering wheel, by means of which it is possible to cut off the supply of gas entirely, it being by this means that the motor is stopped. The only occasions on which it is necessary to use the lever is for stopping the motor or for throttling down lower than the minimum given by the foot accelerator.

For ease in starting, a small dashboard lever is fitted by means of which the counterweight 17 can be lowered until it comes in contact with the stem of the supplementary air inlet valve, thus shutting off the supply of additional air and giving a very rich mixture. As soon as the motor has been started the lever is carried over to its original position, allowing the counterweight and spring to operate normally.

Economy in Commercial Vehicle Work

Experience as it gains force in commercial vehicle pursuits offers food for serious reflection in view of the high rate of depreciation when the speed of going is high. As an illustration of the tendency to excessive speed and its ills, it is only necessary to point out that a day or two ago a five-ton commercial car, in New York City, was stopped by a policeman, and the driver was arrested for speeding. This shows that trucks running light speed up to a point which is too high, and the question which is uppermost is how will it be possible to regulate the motor so that it will be unhampered when loaded, and at the same time regulate the speed of the car when it is running light. This is a carbureter problem, and one way is to employ an automatic throttle; but this device is prone to limit the power of the motor just when power is most required. On the other hand, if the gear ratio is increased, the car will run too slow under load, or the motor will race when the load is removed. When the standardization problem is taken up in earnest, the scale of proper speeds for loaded trucks of the various sizes will have to be constructed, but it is believed that a five-ton truck should be geared so that it will not travel faster than 10 miles per hour loaded, and a means should be provided for limiting speed to, say, 12 miles per hour [illegible] the truck is running [illegible]

An Unlooked-For Reason for Overheating Motors

By THOS. J. FAY.

Discusses over-heating problems of motors, calling attention to the ills of internal incrustation. Gives list of the recognized causes of power losses and heating troubles. Spheroidal condition of the water represents the special point and is introduced as new matter; this condition is described and enlarged upon.

ACCUMULATIONS within the combustion chambers of motor cylinders may be the foundation of many of the heating troubles that are experienced, but there is a class of trouble that is not to be explained away so readily. When motors go into service, and the mark of time is placed upon them, the things that the owner will have to cope with are usually stated as follows:

(A) Loss of compression due to leaky piston rings;

(B) Leakage which comes when the bore of the cylinders becomes out of round;

(C) Defective ignition following, (a) spark-plug trouble, (b) battery failure, (c) magneto imperfections, (d) spark-coil deterioration, (e) wiring deterioration, (f) lost motion in the spark manipulating mechanism, (g) poor timing, due to wear of the valve mechanism, or for other kindred reasons.

(D) Defective carburetion following, (a) poor fuel, (b) improperly adjusted carbureter, (c) lack of fuel due to low or variable pressure in the gasoline tank, as when the piping is defective, or if the pressure valve is out of order.

Fuel trouble may also be extended to include leakage of air into the system between the carbureter and the combustion chamber, due to poor joints in the intake-manifold.

(E) Pre-ignition following, (a) accumulations of carbon, silicon and ash from the lubricating oil, (b) when the temperature increases beyond the working level, due to lack of efficiency of the cooling system.

(F) The usual reasons why the cooling system fails to work satisfactorily are given as follows: (a) leakage in the pump, (b) incrustation in the radiator, (c) plugged-up piping or passageways.

Spheroidal Conditions of the Water Not Included

It is well understood that incrustation is difficult to prevent; it comes when solid matter suspended in water is precipitated as it will be if the water is heated up to a certain temperature, and even in the most perfect cooling system the temperature of the water is high enough to precipitate certain portions of the solid matter which abounds in the average water of the "potable" classification.

This condition leads to the formation of scale all over the water surfaces of the cooling system, and to some extent, on this account, all the cooling surfaces reduce in value as the crust accumulates. To discount this growing condition it is necessary to afford a liberal area of cooling surface, which is the custom among designers of skill.

But if this part of the problem is handled with skill, and judgment is given vent the fact remains that the "spheroidal" question is ignored.

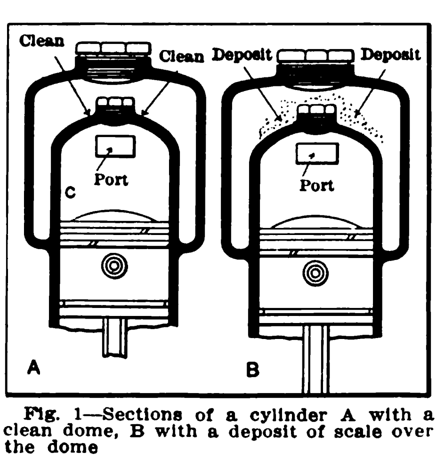


Fig. 1—Sections of a cylinder A with a clean dome, B with a deposit of scale over the dome

Referring to Fig. 1, of the exterior dome of a cylinder, just at the zone of greatest heat, (A) shows the condition as it exists in a new motor, and (B) is the condition which follows considerable service. When the motor is first put into service the exterior surfaces are clean, and the transfer of heat is at such a good rate that the spheroidal phenomenon is not manifested. In time, and as the extra heat at this point causes heavy precipitations of the solids in the cooling water, as shown in (B), Fig. 1, the exchange of heat is so much retarded that the walls of the cylinders, over the hottest part, reach a higher temperature than when the motor is new, with the consequent result that spheroidal action does take place, after which heating trouble is difficult if not impossible to avoid, and the power of the motor reduces materially, even if preignition does not take place.

What Is Meant by Spheroidal Action

When a plate is highly heated and water is then spilled upon it instead of the water contacting with the plate and absorbing the heat, the water is repelled and the plate is isolated by spheroidal fluid. The bombardment of the sheet of water by radiant heat is sufficiently fierce to prevent the water from wetting the plate, and the water, under the force of the bombardment, is broken into spheroidal particles, in which shape it floats in the space above the plate, creating a turmoil along the compacted globules, and the observer, noting this turmoil, generally satisfies his own curiosity when he reaches the conclusion that "the water sputters off of the heated surface."

That the water does not reach the plate at all, is not taken into account, but such is the case; what does transpire is that the spheroids of water float on a layer of vapor which forms between the plate and the water. The temperature of the spheroidal group is below the boiling point of water, although the plate, not being cooled by the water, but being heated continuously on the opposite side, continues to heat up, and the spheroidal phenomenon is aggravated. Grease, if it coats over the surface, will excite this condition, but scale is also a prime cause.

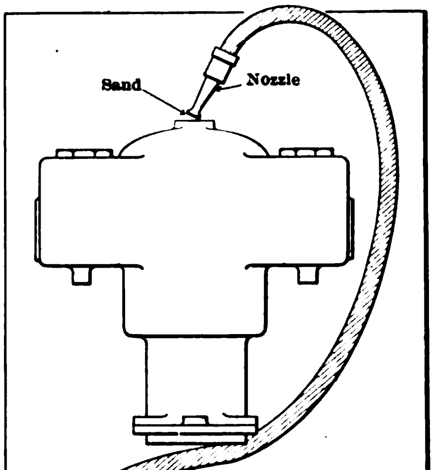


Fig. 2—Cylinder with the cap off showing the nozzle of a sandblast directed against the dome to remove scale

It has been found that when a plate is overheated a spheroidal layer of water, even several inches thick, may be repelled and supported by the vapor layer which intervenes. Under such conditions the temperature of the plate may be over 1,000 degrees Fahrenheit, notwithstanding which fact the spheroidal formation of the water will be below the boiling point of water.

Remembering that solid matter is precipitated more readily at the higher temperatures than it is when water is maintained at a low temperature, it is readily explained how incrustation will be in a thicker layer on the exterior surfaces of the combustion chamber, and, since this scale will induce the spheroidal phenomenon, it is a plain deduction that, no matter how much water there may be in the cooling system, or how fast it is circulated, it will do almost no cooling work at all after the spheriodal condition, with its consequent defects, creeps in. In view of the premises it is possible to see how a cooling system can exist in which the water will be quite cool and at the same time the motor will be overheated.

Loss of Power Is Bound to Follow

When the cooling water assumes the spheroidal formation over the dome of the combustion chamber of the cylinders, the condition of overheating which will then be present will be manifested in loss of power; the motor will lose its ability to quick response, and its torque will fall below the proper level. The weight of fuel which may be taken into the cylinders under these conditions will be lower than when the temperature is properly adjusted, due to the increasing volume of the mixture as it contacts with the overheated surfaces, and, to whatever extent liquid fuel reaches these overheated surfaces, it will "crack" and a further deposit (in this instance, on the inner surfaces) will be accumulated. This way of reasoning leads to a very important conclusion, i. e., combustion chamber trouble, due to carbon deposits, may follow spheroidal trouble in the water circulation.

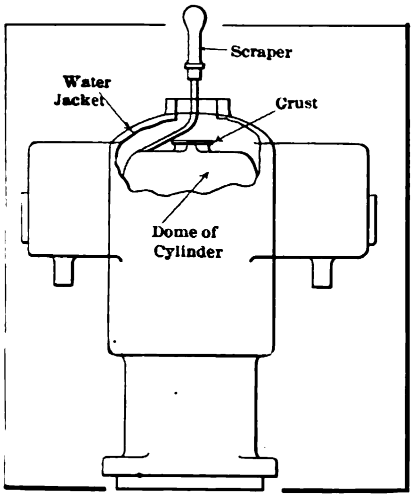


Fig. 3—Cylinder in part section with the cover off showing a scraper in position to remove scale

The remedy to apply is, of course, very simple; scrape the scale off of the exterior surfaces of the cylinder all over the portion that has flame in contact with the inner walls.

This will be possible of accomplishment if the surfaces to be scraped are accessible, as they are in one way or another in substantially every motor made. In some cases it is easier to apply the "sand blast;" in others the covers are large enough so that when they are removed a scraper may be used directly; in other designs a curved scraper may be inserted through the holes that are used for the water piping. Fig. 2 shows the application of the sand blast. Fig. 3 depicts the use of the curved scraper and Fig. 4 is a design which affords a large opening which permits of using a scraper directly and allows of inspecting the surfaces to be cared for.

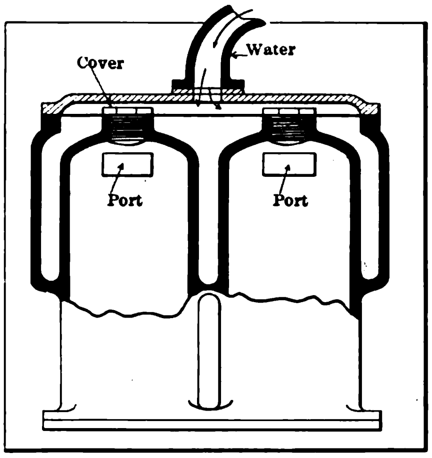


Fig. 4—Section of a twin-cylinder designed with an open jacket fitted with a cover which may be readily removed for scraping purposes

Foundry Advantage Connected with Open Designs

Disregarding the question of spheroidal action, due to accumulations over the dome of a cylinder, there is another point that is well worth taking into account; it relates to the production of cylinders in the foundry. The gases which form during the moulding process must either be permitted to escape or the metal will be defective, due to the migration of the gases through the freezing mass, after teeming. This difficulty is entirely overcome in the class of cylinders which are designed with plenty of opening such as is brought about by having covers as shown in Fig. 4. In some cylinders the openings are on the side, but in view of the possibility of trouble from spheroidal action, it would seem as if the openings might best be just where they will permit of inspecting and teeming the exterior surfaces of the dome. The cost of cylinder production is decreased if "wasters" are reduced to a minimum. This advantage is more nearly assured when the design is such as to permit of the escape of the gases.

Conditions at the French Capital Reviewed

PARIS, July 7—Automobile road races having ceased to interest, and the Grand Prix of the Automobile Club of France having come to an untimely end, the club announces the creation of a Grand Prix to be competed for in the air. In reality, there are two Grand Prix, one for aeroplanes and the other for dirigible balloons. The heavier-than-air machines must start from Issy-les-Moulineaux, at the gates of Paris, fly to the plain of Eterberck, in the suburbs of Brussels, and return to the starting point at Paris. The journey must be made with a passenger on board the machine, the two persons weighing together not less than 330 pounds, part of which can be made up by non-consumable ballast. Attempts to win the prize can be made on any day up to January 1, 1911, the winner to be the pilot who has covered the distance in the shortest time. He will receive in cash $20,000, the second fastest taking $6,000, and the third $4,000.

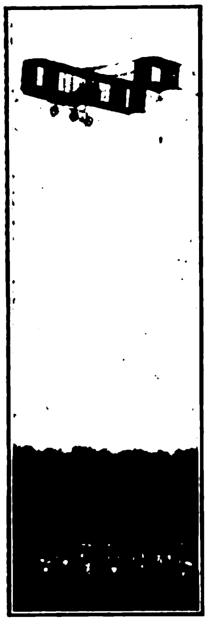
There is only one fixed landing place on the journey, namely, at the extreme outward point, where three hours will be allowed to fill up fuel tanks and get away again. If this time is exceeded, it will be counted in the elapsed time in the air. Landings can be made at any desired spot on the route, but as no time allowance will be made for them aviators have an interest to make them as few and as brief as possible. In a straight line Brussels is 165 miles from Paris, thus giving a total distance of 330 miles, which must be covered in not less than 36 hours. All pilots qualified by the International Aeronautical Federation are entitled to take part in the race.

The airship Grand Prix is less difficult than the task set the aeroplanes. Starting from the plain of Vincennes, on the eastern suburbs of Paris, a trip must be made to Rheims, 93 miles away, a passenger landed and taken on board again, and a return made to the starting point at Paris. No time limit is fixed for the 186-mile journey. There is only one prize, of $10,000, to be awarded to the pilot of the airship making the fastest trip from the present date to January 1, 1911. It is evident from the conditions for the two races that the Automobile Club of France has more faith in the rapid development of the aeroplane than in that of the dirigible balloon.

In England the *Daily Mail* has announced a similar competition, to be held during the month of July, 1911. A prize of $50,000 is offered to the pilot of the aeroplane making the fastest round trip of nearly 1,000 miles, starting from London and passing over the following towns: Harrowgate, Newcastle, Edinborough, Stirling, Glasgow, Carlisle, Manchester, Bristol, Exeter, Newport, Brighton, Tunbridge Wells, and London. A landing will have to be made within a certain distance of [illegible] of the towns.

Studies in Aviation Theory and Practice

By MARIUS C. KRARUP



WHEN the power has given out and the wind and gravitation are playing with the aeroplane, it is the property of fundamental stability—independent of speed and control-action—which must be depended upon for placing the machine in the proper position for a safe descent by gliding, while it is altitude—which is only another word, in this connection, for stored gravitation power—which will give choice of landing place. It is true that, if momentum is left when the power gives out and no unfortuniate gust throws the machine around to a position where the momentum becomes useless as a basis for control, and if the aviator is quick enough of decision to make use of this momentum, then he can utilize it by means of his tilt-rudders so as to assume the tilt at which gravitation will take the machine down in safety, even if its stability has not been nicely calculated, but in practice a number of aeroplanes have been known to go over backward, helplessly, under conditions which were reported to be by no means unfavorable, so far as the force and regularity of the wind were concerned. Probably the art of instilling stability in aerial craft will long remain subject to judgment and skill, rather than to definite and scientific rules, because all exact data are as yet lacking with regard to the degree of stability that is desirable and also with regard to the effects of wind action which attacks the surfaces of the machine at irregular angles, but it seems to be established, in accordance with the foregoing, that the natural stability should be of such nature that the machine suspended in a calm atmosphere, without motion in any direction—if this may be imagined—would have its planes pointed for a glide or perhaps a little more downward. This also seems to be acknowledged in the more advanced position given to motor and propeller in recent European machines, which were previously especially liable to the backward tumble.

With a control apparatus permitting changes in the tilt of the main plane or planes, with relation to the bulk and load of the machine, the central or rest poise of stability could probably be more nearly horizontal, as it would be in the aviator's power to give the planes the gliding tilt by control action, whether rudder action had ceased to be effective or not.

In designing stability into an aeroplane of the common types, the first thing to be thought of would now be to see that the center of air pressures under the planes during flight, at various speeds, came so far in front of the center of gravity of the machine, as a whole, as to lift the latter from the gliding to the flying poise. (It is very fortunate that speed does advance the center of sustentation.) The next consideration would perhaps be to determine how low the center of gravity might be placed without giving too much work for the rudders in effecting or maintaining a change of direction, and, as data are missing and rudder efficiency depends largely upon speed, the designing would needs be entirely empiric.

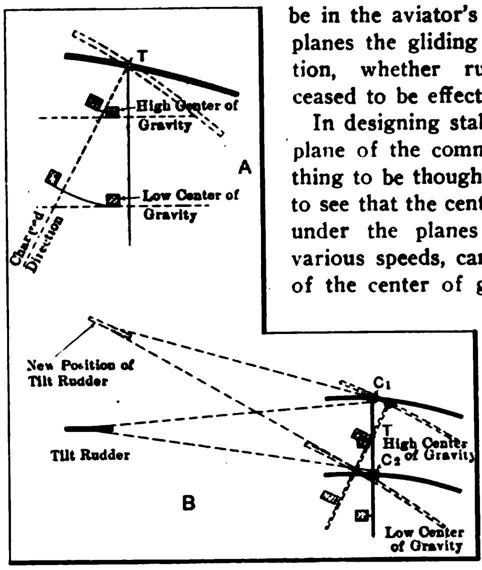


Fig. 1, A and B—Illustrating difficulty of control with low center of gravity, A in monoplane, B in biplane

In Fig. 1, *A* is indicated the action of changing direction with a monoplane. *T* is supposed to represent the transverse axis of air pressure under the plane, and the motion practically takes place around this axis, as the whole machine is suspended from it. It is readily seen that, for a given deviation, as indicated by the dotted line, the low center of gravity must be moved and raised more than the high center of gravity. And the condition would not be different, so far as the effort of the control movement is concerned, if the new direction were downward instead of upward, as in the sketch. Fig. 1 B indicates the condition with a biplane. Here there are two axes of air-pressures and support, C_1 and C_2, and the machine is turned around *T* midway between them. The action is practically determined by the tilt rudder moving upward, and the difference in the sensitiveness of a given control apparatus, accordingly as the center of gravity is high or low, is even more pronounced than in the case of the monoplane.

The weak control resources in the customary machines, both biplanes and monoplanes, seem to leave small chance for increasing stability much by lowering the center of gravity without interfering strongly with the efficiency of the control apparatus, but in practice it has become desirable to carry two or three persons occasionally, and this involves a considerable lowering of the center of gravity, in nearly all instances, and consequently, there has been witnessed a steady increase in the sizes of the control areas, particularly those of the tilt rudders, which bear the brunt of the work of shifting a low center of gravity into a new position. Preferably a load which is not always carried should be placed so as to leave the height of the center of gravity unchanged, as in this manner the efficiency of the control movements will be least affected.

The most difficult problems with regard to the stability enter in the consideration of the surfaces. To place these so that they normally afford sustentation and at the same time so that a disturbing wind action, which changes their positions, will get a poorer rather than a better purchase upon these surfaces the more they are turned from their normal angles, is a practical problem which it does not seem possible to illustrate in any other way than by analogies and examples. But it seems clear, to start with, that a good stability is not consistent with any arrangement by which a disturbing influence which causes the machine to be tipped to one side, by this very tipping gains a stronger disturbing influence; and it seems equally certain that the location of the center of gravity in relation to the various surfaces must be so low that no tipping will cause gravitation to work against the resumption of the normal poise.

The supposition in this article is constantly that only the fundamental stability which acts independently of speed and control action is referred to. Fig. 2 illustrates the basic ideas with which the designer has to do his thinking. *A* is a hollow sphere of light weight. Falling in the atmosphere, it eventually reaches a speed at which the air resistance equals its weight. It can fall no faster. *B* is another hollow sphere of the same diameter and surface as *A*, but heavier, say four times heavier. Falling, it can reach twice as high a speed as *A* before the air resistance will stop further increase of its speed, because doubled speed creates a four times higher air resistance. The relations are indicated approximately by the arrows and dotted horizontal lines. Both these spheres may fall without turning around. *C* is a hollow sphere, heavier on one side than on the other. The heavy side *w* will tend to fall faster than the light side *a*, the air resistances, which depend on the surfaces, being equal, and *C* will therefore reach its constant falling-speed in the position of *C2*. Its equilibrium is upset, compared with the position of *C*. In reality its true equilibrium has been found. *C2* has natural stability, while *C* has not. Yet *C* may be propelled through the atmosphere in the direction of *a-w* and remain in equilibrium so long as the horizontal speed is maintained, but no longer. *D* is like *C*, except that an area *a2* which creates air resistance has been added on the heavy side *w*. In what direction this body will fall, and how far it will fall before its speed reaches its maximum, and in what position it will then be, depends upon the air resistance created by *a2* in the various positions which this area member may assume under the influence of the gravitation of *w*. A curvature or concavity in *a2* may considerably affect the position which *D* will finally take.

With the aeroplane, whose relations between weighty and surface portions is much more complicated than those of *D*, it is necessary, however, to know in advance that the poise of the machine in the air will remain one in which the aviator can keep his seat and also to know the maximum vertical speed at which the machine can fall in any position which it may assume. Perfect stability should probably involve a choice of going down vertically as an unfolded parachute, save for such deviation from the vertical as the wind may cause, or obliquely by adding a control movement of the surfaces.

Colonel Renard found many years ago by experiment that a hollow hemisphere moved with its hollow squarely against the air at a certain speed met a resistance of 109 as compared with a resistance of 33 when moved with the convex surface foremost, and it has since been ascertained that the same body moved obliquely, as illustrated in Fig. 3, meets a total resistance which at some angles is higher than 109 with the hollow foremost, while it is always less than 33 with the convex side foremost.

Much more elaborate experiments with plane, concave and convex surfaces and bodies have furnished some data which further complicate the problem of automatic stability in the wind with fixed surfaces, while supplying the thought-material from which control surfaces must be designed.

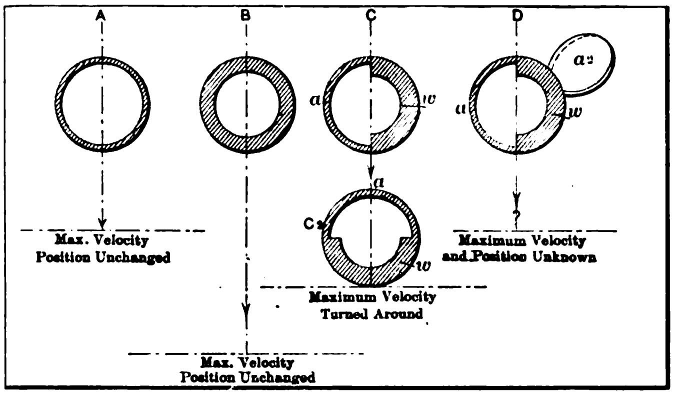


Fig. 2—Illustrating principle of automatic stability in the air

Comparing A and B in Fig. 4, in which A represents a monoplane in front view, edge view and with the lateral equilibrium disturbed, and B a biplane in front view and with the lateral equilibrium disturbed, it is seen at once that the heavy portion *w* in A has a better chance for returning to its normal position than *w* in B, the small circle representing the center of gravity.

In both cases it is a drawback that the gust, from the side and a little from below, which has caused the disturbance, gains in upsetting power when the plane's angle with the direction of the wind is increased, until a maximum effect is reached at an angle of about 25 degrees, which is not a comfortable lateral tilt for the aviator. And the lateral stability is under these circumstances the opposite of progressive. As the machine is normally advancing in space at the same time, the biplane will seldom get an advantage in this respect by having the lower plane taking the wind from the upper one, and altogether it seems difficult to find a remedy without having recourse to control or introducing elastic elements in the planes which will change their shape automatically under the influence of the surplus lift which causes the disturbance. In C the so-called dihedral angle is introduced in the biplane and, if the wings with this design were held normally at angles approaching that which gives maximum power to the disturbing side wind, the disturbance would at least not gain in severity by its own action.

(*To be continued.*)

Testing Steel—For Impact, Bending, Etc.

By BERTRAM BLOUNT, W. G. KIRKALDY and Capt. H. RIALL SANKEY

(*Third Installment*)

Detailing the arrangements for measuring the time-interval between the anvil and bottom contacts in subjecting specimens to breaking tests; also explaining the machine and the manner of carrying out the repeated-bending tests.

IN THE breaking of the specimen the energy absorbed is determined by the expression:

$$\text{Energy absorbed} = W \left\{ H - \frac{1}{29}\left(\frac{h}{t} - \frac{9t}{2}\right)^2 \right\}$$

where H is the height of free fall before striking anvil;

h is the height of free fall after striking the anvil, *i.e.* between the anvil contact and the bottom contact;

W is the weight of the tup; and

t is the time-interval between the anvil and bottom contacts.

The arrangements for measuring the time-interval are as follows:

Easily opened switches are placed at *a* and *b*, Fig. 2, and complete an electric circuit. As the front edge of the tup passes these switches they are momentarily opened and the circuit is broken for a very small fraction of a second. A recording pen, marking a continuous line in a paper band, Fig. 4, Plate 1, is thereby deflected, and the distance between these two "deflections" is a measure of the time-interval. The paper band is unrolled by means of an ordinary Morse telegraph "inker," altered so as to get a much more rapid unrolling of the paper; 5 inches a second has been found to be a suitable speed for the paper. A second recording pen, vibrating at about 40 per second, marks a "corrugated" line, but to calibrate these corrugations and to obtain an absolute standard, half-second marks are recorded by means of a half-second pendulum—which was compared by Mr. G. P. Mair with the pendulum of a clock whose rate is 2 seconds per month. A fac-simile of a record is given in Fig. 5, and it is computed from numerous observations of free fall that the error in the time interval measurement is less than 0.005 second.

The method of making a test with this impact testing-machine is as follows: The test-piece having been fixed into the grips, thus connecting the cross-arm and the tup together, the whole is hoisted up and fixed to the stretcher by means of the releasing catch. The paper band is then started and so soon as the speed of the paper is constant (which requires a few seconds) the catch is released, and at the moment of release the electric circuit of the recording pen is opened and the first time record is marked on the paper. Immediately after breaking the test-piece the second time record is marked by the opening of the

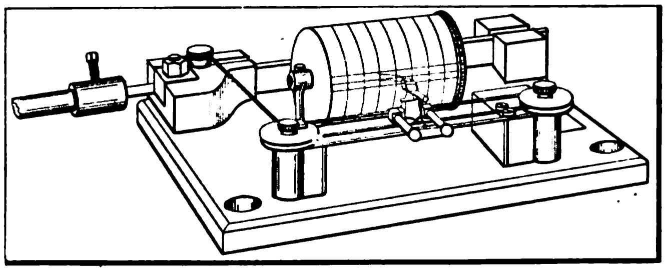


Fig. 6—Repeated-bending machine

anvil contact, and the third by means of the bottom contact after falling another 10 feet. In a similar manner the time required for the free fall from the point of release to the anvil can be determined and a check is thus obtained, as this interval of time should be equal to the time of free fall in air due to the action of gravity.

The degree of accuracy obtainable in the measurement of the energy absorbed by the specimen is mainly dependent on two things, namely, (*a*) on the ratio of the kinetic energy remaining in the tup after breaking the test-piece to that it possessed at the moment of striking, and (*b*) on the error in the measurement of the time-interval in falling the distance *h* (10 feet) beyond the point of rupture. The matter was investigated and an abstract of this investigation is given in the Appendix (page 30). It need only be mentioned here that the percentage error in the determination of the absorbed energy will be about half of the percentage error in the time measurement, if the remaining energy in the tup does not exceed two-thirds of the energy in the tup at the moment of striking the anvil. With an unknown specimen, however, a considerable margin must be allowed to ensure breaking the specimen with one blow, and it may be, therefore, that the proportion of energy remaining to initial energy may be considerable, and then the percentage error in the determination of the absorbed energy will be greater than the percentage error in the time-measurement. It should be noticed also that if the remaining energy is very considerable the percentage error in the absorbed energy would be excessive, but in practice a rough estimate of the strength of the specimen can be made so as to avoid such errors. If several similar specimens are to be broken, the weight of the tup or the height of fall (preferably the former) can be adjusted after breaking the first specimen. Based on general consideration and as the result of some preliminary trials, a height of drop of 30 feet was adopted for these tests.

Capacity of the Machine.—The machine has been so designed that a 40-foot drop with a 20-lb. tup can be used. The available striking energy is therefore 800 foot-lbs., and this energy is sufficient to rupture a steel test-piece ⅜ inch in diameter.

Repeated-Bending Tests

The repeated-bending machine used in these tests is shown in Fig. 6, Plate 1, and it automatically records the number of bends and the bending effort of each bend. The test-piece is 4 inches by ⅜ inch diameter, and one end is fixed in a grip carried by a flat, steel spring, the other end is inserted into a hole in a lever and is secured by a cup-ended screw. This lever is 3 feet long, and by its means the test-piece can be bent backwards and forwards. When a force is applied to the lever the first action is to deflect the flat spring, and this deflection will increase in amount until the test-piece begins to yield, after which there will be no further deflection of the spring and the test-piece will be bent. The bending is continued until the maximum angle of bend is reached, which has been chosen as 46 degrees after much preliminary work. The direction of bending is then reversed, and the flat spring is deflected in the opposite direction. The bending of the test-piece is continued beyond the original central position until an angle of 46 degrees on the opposite side is reached, then the direction of bending is again reversed. This process is continued until rupture occurs.

The grip at the end of the flat spring is connected by a wire and a multiplying arrangement to a recording pencil carriage working on guides. The wire attached to this carriage is kept taut by a spring placed in a circular box. The motion of the pencil is recorded on a paper placed around a drum and is proportional to the deflection of the flat spring, and therefore, obviously, to the bending effort. The drum is under the action of an internal spring and rotates a definite distance each time a bend is started from left to right, and in this manner the number of bends is automatically recorded as shown in Fig. 7, which is a fac-simile of a record. The papers are ruled with lines giving the bending effort expressed in lb.-feet. One bend is reckoned as bending from the extreme position on the right to the extreme position on the left, or vice versa. Hence, the first line of the record, namely, AB, Fig. 7, which is drawn whilst the test-piece is being bent the first time from the central straight condition to the extreme position on the left, represents only half bend. Since the distance between the lines representing the record of the bends is proportional to the distance travelled by the bending force, the energy required for one bend is obviously represented by the rectangle drawn to the left of each line, as AEDC, for example. For AB, however, the rectangle is only half the width, since this line represents only half a bend. The test-piece generally breaks before completing a bend, and a graduated quadrant is provided to measure the amount of the last bend expressed in tenths of a bend. Hence, the rectangle representing the energy of the last bend will have a width the same number of tenths of the full distance between the lines, as shown by rectangle GHKL. Finally, the total energy required to break the specimen is given by the area included within the dotted line, Fig. 7. In the original record one square inch represents 400 foot-lb. of energy, so that it is easy to calculate the energy, expressed in foot-lb., required to break the test-piece.

Fig. 8 shows nine records of Repeated-Bending Tests, reduced half-size.

Results of the Tests

The average of the principal observations are given in Table 1, and it will be noted that two sizes of tensile test-pieces are quoted for each type of steel—the dimensions of the small test-pieces are the same as those of the impact-tensile test-pieces. In the case of steel for tires (Item No. 12) there are three sizes of test-pieces—that having a diameter of 0.564 inch being the standard size. It will further be observed that in general the tensile results are higher for the small test-pieces than for the large, which is probably due to the metal in the smalled test-pieces being more worked, having been taken from a position nearer the skin.

In the impact-tensile tests the means of the observations on three test-pieces are given. As regards the energy absorbed by the rupture of the test-piece, which is the important measurement in this test, the readings agree fairly well, the average disparity from the mean being about 6 per cent., but in a few cases the disparity is as much as 12 per cent., possibly owing to the position in the material from which the test piece was taken.

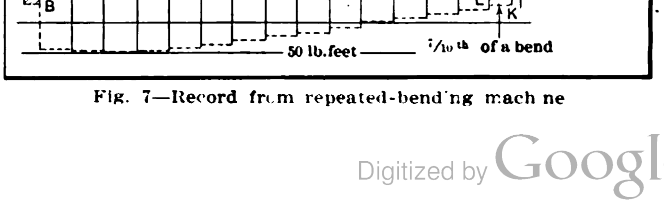


Fig. 7—Record from repeated-bending machine

Rejuvenating the Old Automobile

By G. J. MERCER

Illustrating a remodeled Buick, changing the old touring body to a new fore-door type, showing enough details to permit a body maker to do the work and specifying the character of the materials required, also the methods of procedure necessary to complete a first-class job, with some timely hints as to finishing.

THIS undertaking involves a Model 17 Buick, using the old body with just enough alteration to permit of the addition of the fore-door, changing the dash in order to make the front finish agreeable to the eye, and to give room for the wing of the door. Fig. 17 is a side elevation of the car, showing the flare of the mudguards and the manner of their installation for the purpose of protecting the body from picked-up mud, also the running board and the metal work between it and the body sill. Fig. 18 shows the new fore-door, and the dotted lines are for the purpose of telling the workman how to frame the same. Fig. 19 is a front elevation showing the shape of the radiator and dash, also the outline of the body back of the dash. The aluminum panel, the metal of which is No. 16 gauge. The moulding is continued around to the point *A* on the panel edge; it joins the moulding on the seat. In Fig. 19 the hooded dash is shown, and its relation to the hood or bonnet is indicated. The corners of the dash hood are slightly rounded at the front. This rounding ends at the front of the door, and the right side is framed in the same manner as the left, making allowance, however, for the cut of the door on the left side only. The change levers, as shown in Fig. 19, must be bent out slightly to give clearance at the top, but the bending should be done at a point near the quadrant, leaving the levers straight from the point of bending out to the handle. The door opens from the back, the side levers come to the outside of the body line, the quadrant being quite high up, and so far out from the face of the chassis frame that it becomes desirable to bring the levers to the outside. Fig. 20 is a plan of the front end of the body from the dash line to a point back of the fore-door.

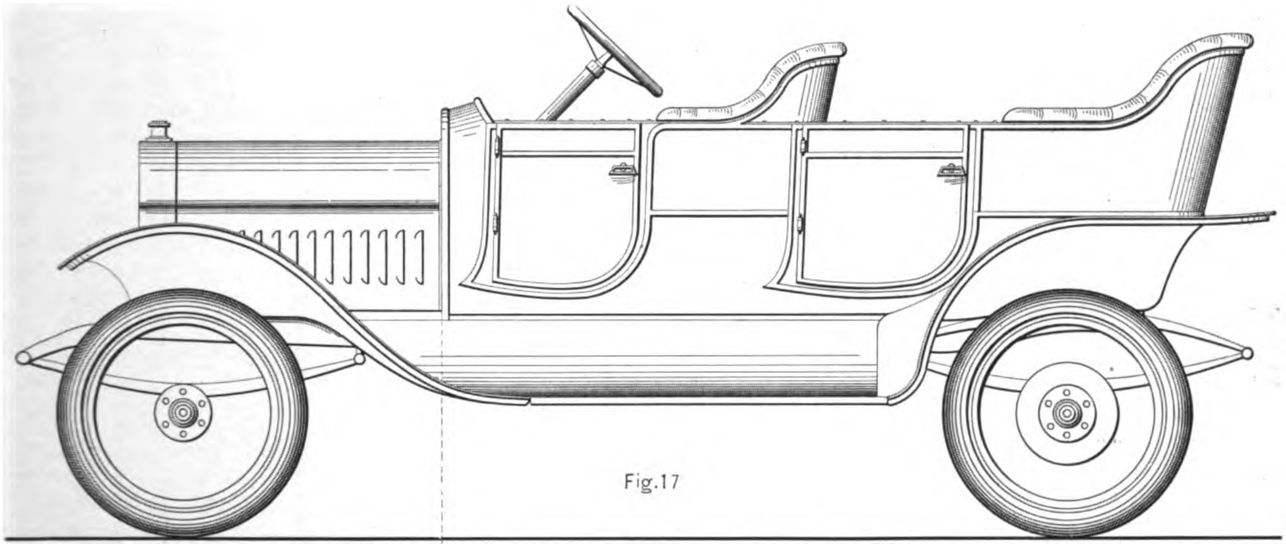


Fig.17

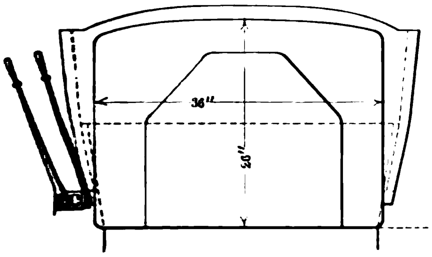


Fig.19

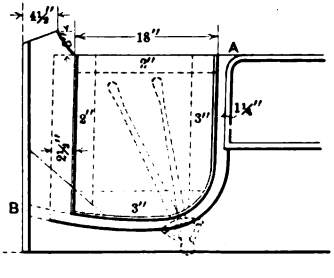


Fig.18

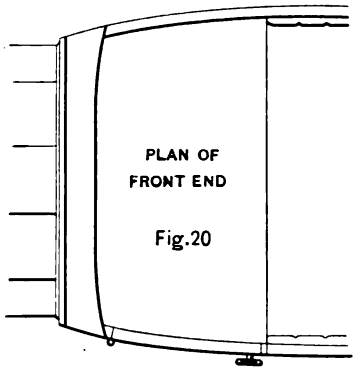


Fig.20

Fig. 17—Model 17 Buick, with new fore-door type body replacing old touring style. Fig. 18—Detail of new fore-door. Fig. 19—Front elevation. Fig. 20—Plan

The left fore-door corresponds in shape with the rear door on the side view, but the right side is merely provided with an imitation door; the levers being in the way would prevent a door from swinging out. It is optional with the owner to have the fore-door permanently hinged or to so swing it that it may be detached during periods of fine weather. The pillar effect at the front of the door is formed by moulding riveted to an swing being high enough up to prevent interference with the mudguards, and the hinges, as well as the handles, should be selected to conform with the style of fittings used on the old body.

The amount of work required to bring this body up to the new style as shown is very limited, and it is reasonable to expect that the alterations could be carried on in a repair shop of no great pretense. With the body work completed, it would be proper to have the same removed to a finishing shop, with a view to having the old part of the body prepared for painting, so that when the new finish is applied, the appearance would be uniform over all of the surfaces.

Superstructure Too Close—Damages Tires

Editor THE AUTOMOBILE:

[2,324]—I wish to complain about the careless manner in which bodies are put on to the chassis frame. In my car I found that in going over "Thank-you-marms" the body comes down onto the axle, but the clearance between the body and the axle is less than the clearance between the tires and the mudguard. I have since put rubber bumpers on the top of the spring perches to prevent the body from coming down so far, but I think this detail in automobile designing should be given some attention now that makers claim that they have put automobile designing upon a standard basis. READER.

Akron, Ohio.

We do not think that the tires were cut in the simple process of rubbing, which is all that would happen under the conditions you name, unless, as shown in Fig. 1, the mudguard bolts come just at a point where the tread contacts, and the protruding bolt tears the tread of the tire. In bringing out the point you make, it is the purpose here to add this additional information, which was taken from life.

Some Characteristics of Wipe-Spark Systems

Editor THE AUTOMOBILE:

[2,325]—I understand the performance of jump-spark systems of ignition, and how the voltage grows until it becomes sufficiently strong to leap across the contact points on the spark plug. I would like to know, however, the difference between this and the condition involved in wipe-spark work. M. A. E.

Chester, Pa.

The low-tension magneto, as used in the type of ignition to which you allude, is not designed to deliver a sufficient voltage to jump a gap. The spark is obtained by drawing an arc, and the method in vogue is illustrated in Fig. 2, which shows the arc light carbon pencils A, B, C and D, just as they are used in an ordinary arc lamp for street lighting. At A the two carbons are separated about 1-8 of an inch. When it is desired to light the lamp, the circuit is closed by a switch and the carbons come together, as shown at B. This operation closes the circuit, and the electrical current is set up, after which the carbons are pulled apart by an electro magnet, as shown at C, thus drawing the arc. As the carbon pencils waste away the arc increases in length and assumes the appearance as indicated at D. It is a fact that while the low voltage will not jump a gap, it will nevertheless draw out for quite a long distance, if the contacts are first made and then separated. The current, as it flows across the gap, as it is increased in length, casts off minute particles of the conducting material, forming a gas, the resistance of which is very much lower than the resistance of an air gap. In the wipe-spark system of ignition this principle is taken advantage of, with the result that the energy in the spark is very high, but the voltage of the magneto does not have to be more than probably 125 volts maximum. It is claimed as an advantage of the low-tension wipe-spark system that it affords a high-energy spark, and a low voltage with which to cope from the insulation point of view. It will be understood, of course, that if the insulation of the system breaks down, the service will be interrupted.

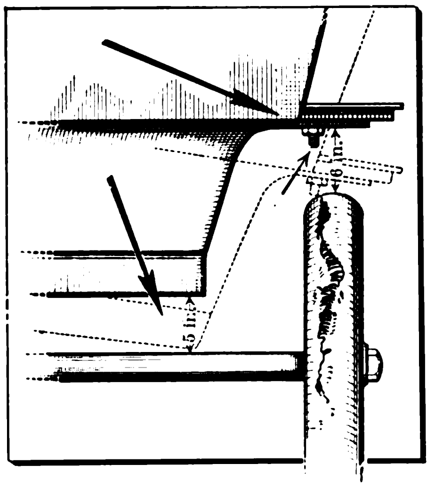


Fig. 1—Lack of harmony of the clearance relations, there being too little between wheel and mudguard

Looking Around for a New Type of Battery

Editor THE AUTOMOBILE:

[2,326]—In order to obviate the necessity of having to deal with troublesome acid solutions as they are used in certain types of batteries, it is my understanding that dry cells are given preference by many autoists. In counting the disadvantages of these types of batteries, it is not too much to say that it is quite an undertaking to carry them to some place for the purpose of having them charged when the occasion requires, and in view of their characteristics they seem to require charging at least once or twice during a season. The dry batteries offer their own character of trouble in that their capacities are relatively limited, and I have in mind the idea of building a primary battery of some kind, one that I can charge myself by simply emptying out the depleted solution and replenishing the cells by no more troublesome a process than adding chemicals and perhaps water. Will you please give me an inkling of the possible success attending an effort such as this? IMPROVER.

Little Rock, Ark.

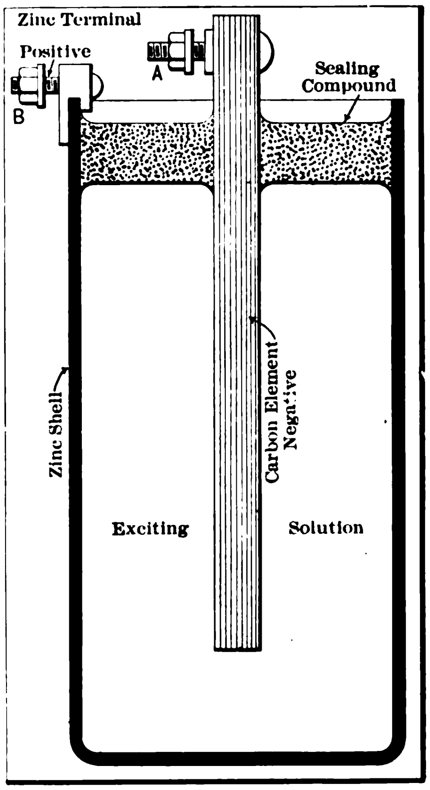


Fig. 3—Single solution gravity battery which is the principle of the dry cell

Local action stands in the way of success with almost every form of primary battery. Fig. 3 shows the dry-cell type of battery in section, with a zinc shell and a central carbon element immersed in the exciting solution. This excitant, instead of being in liquid form, as sal ammoniac and water, is in a semi-hard state. With this type of cell, considering the use of depolarizer, local action is reduced to a negligible quantity, which condition is influenced through the use of pure zinc. Any attempt to depart from this type of cell in the direction of primary batteries leads to local action sufficient to destroy the possibilities, excepting in the types of cell using double solutions and a porous cup between, as shown in Fig. 4. With two exciting solutions, using zinc and copper as the electrodes, if a porous cup intervenes, it is possible to obtain very good results, but it has not been shown thus far in ignition work that a mechanical structure can be improvised, the nature of which will make it fit to withstand the jolting it would receive on an automobile. In Fig. 4, if zinc and copper are used as electrodes, solution A would be sulphate of copper, and solution B sulphate of zinc.

Effect of Weight on Life of Motors

Editor THE AUTOMOBILE:

[2,327]—Will you please answer through your columns, the following inquiry, if possible, citing authorities on the subject. Does the weight of pistons or connecting rods bear any relation to the liveliness or lagging of a 4-cylinder motor of say, 4 1-2 x 4 1-2 cylinders? R. J. G.

Lansing, Mich.

It would seem to be a waste of time to look up authorities on the subject of the effect of weight on acceleration. If the piston and connecting rod in the cylinder of a motor are very heavy, since it is true that the mass will have to be accelerated, it stands to reason that more force will have to be exerted in the process, or with a given pressure, more time will have to be allowed.

Automobiles with Counterbores in Cylinder

Editor THE AUTOMOBILE:

[2,328]—Will you please advise me through the columns of "The Automobile" if there are any automobiles made which have counterbores in the cylinders. Why is it that all good automobiles do not have counterbore cylinders?

WILLARD S. REED,
Smyrna, Kent Co., Del.

Nearly every automobile motor is provided with a counterbore at the top of the stroke, so that when the piston reaches the dwell point, the top ring will rest partly on the relieved portion. In steam engine practice, the counterbore is very pronounced, but in automobile work it sometimes amounts to but a few thousandths of an inch, which difference is brought about in the grinding process. It is not necessary to have a considerable counterbore; the good effect will be present with a difference of a film of oil, but enough for one reboring should be present.

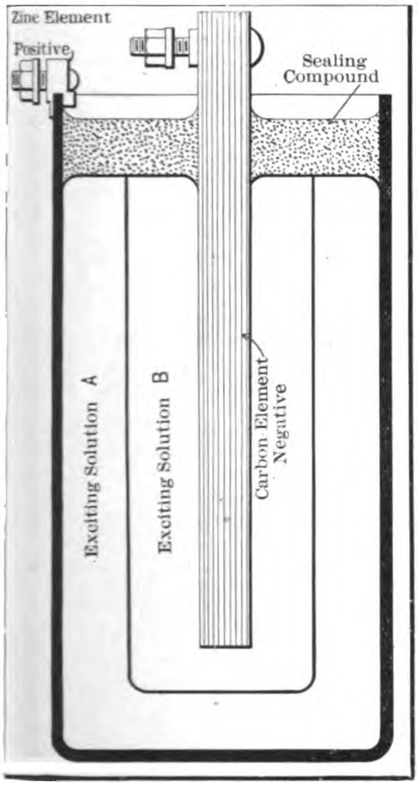


Fig. 4—Double solution cell of battery requiring use of a porous cup to limit local action

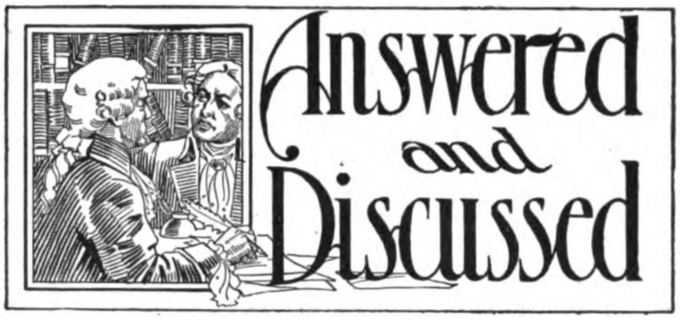
Oil Testing Fraught with Uncertainties

Editor THE AUTOMOBILE:

[2,329]—I am a subscriber to "The Automobile," and would like to ask you through "Letters Interesting" what tests good lubricating oils for water and air-cooled gasoline engine should show, and a simple, sure, and satisfactory method of how to test lubricating oil. All dealers in lubricating oils claim to have the best and only good lubricating oil, and it is so bewildering to the novice that he is at a loss to know what lubricating oil to purchase and use; he is in the dark as to what kind of lubricant to use for his car.

Buffalo Lake, Minn. F. G. NELLERMOE.

It is not believed that an autoist can make any headway testing lubricating oils with a view to proving which of the brands offered by oil merchants are best for automobile work. The plan which would seem to be free from difficulty is to purchase the oil from absolutely responsible distillers, in the original package.



Liquids Will Spill Out of a Receptacle

Editor THE AUTOMOBILE:

[2,330]—I have been reading your "Letters Interesting Answered and Discussed," and get a great deal out of them. I have an 1910 Overland, Model 38; it leaks oil around the brake band and I have tried every way to stop it. The oil comes from the differential. I have packed it several times with felt washers, which stops the leak temporarily. If you can tell me any way to fix it I will appreciate it. B. W. SELF.

Crowell, Texas.

If a half barrel is placed under the spigot and water is allowed to run until the same is filled, and then for a time, the excess of water will pour over the sides and wet everything that happens to be within contact distance. In the same way, if you put too much oil into the differential case the excess will spill out. Anyway, a small quantity of a good grade of semi-hard lubricant will give you less trouble and do the work.

No Sense in Comparing Unlike Things

Editor THE AUTOMOBILE:

[2,331]—I should like to know if the power of a 6-cylinder motor, of say 30 horsepower, is greater than that of a 2-cycle engine of the same power; also if a 4-cylinder motor of the 4-cycle type is superior or inferior in power to that of a 2-cycle, or are they equal? It is claimed for the 2-cycle motor that the continuous torque gives it the same advantage as that obtained from a 6-cylinder motor.

Buffalo, N. Y. E. L. L.

It is highly improbable that there is any way of satisfactorily comparing the performance of a 6-cylinder motor with that which might be expected from a 2-cycle motor which gives the same number of power strokes for a given number of revolutions. There is nothing to be said in favor of the statement that a 2-cycle motor giving 30 horsepower is any better or worse from the power point of view than a 4-cycle motor delivering 30 horsepower. There might be differences involving flexibility, ease of starting, and dependability, but these differences might also be charged to design features which do not have to be adhered to on an equal basis.

Gasoline Consumption Proportional to Power

Editor THE AUTOMOBILE:

[2,332]—Will you kindly advise me, giving reasons, whether a Buick No. 10 will consume more or less gasoline at 10 miles per hour for 10 miles than at 35 miles per hour for 10 miles. I suppose the same solution will apply to any automobile, but a Buick No. 10 is the model under discussion.

W. P. C.
Cincinnati, Ohio.

Since the power required to drive an automobile at 35 m.p.h. is greater than that for 10 m.p.h., the gasoline consumption will be greater when the car is driven 10 miles at a rate of speed of 35 miles per hour.

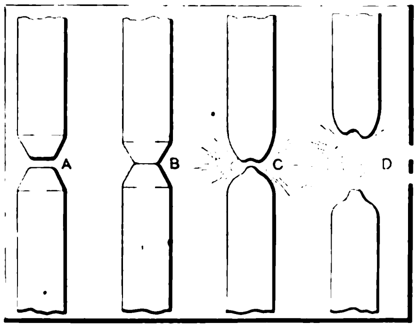


Fig. 2—Arc-light carbons, showing how the arc is drawn

Questions That Arise—General in Scope

Thermal efficiency is improved with high compression; too much fuel leads to indigestion; power is proportional to actual fuel burned to carbonic acid and water; carbonic oxide is representative of waste; limit of compression depends upon method of use of fuel; air must be increased as fuel burned is added to; mechanical equivalent of heat is given.

[165]—What are the advantages of high compression in a motor?

The rate of combustion is more rapid with increasing compression; this has the advantage of aiding in the accomplishment of the useful work within the shortest possible time, and, since the losses increase as the time taken, it follows that the thermal efficiency is better with the higher compression. Again, since the source of all the power of a motor is the fuel value of the mixture, it follows that the more fuel there is in the cylinder for each power stroke the more power the motor will be capable of delivering, provided the motor is not given a dose of "indigestion" by using too much fuel. Increasing compression results in an increased amount of fuel in the space each time, and, since the combustion conditions are bettered by this increase of compression, it is a fair inference that the superior compression does two things, i. e., it packs the space with a higher weight of fuel, and the conditions for burning the fuel are improved.

[164]—Why does increasing the compression add to the weight of fuel?

When earth is rammed around a fence-post to compact it, or when a road roller presses the top coat to a firmer state, the "tamping" process with the post, and the rolling process on the road, are precisely the same in principle as that which takes place when fuel mixture is compacted into a cylinder. There is no difference excepting that it is easier to compress a flexible medium as "mixture" than it is to compact the less amenable clay.

[165]—Are there not some differences to be noted in motors of different makes?

Yes; there are two principles involved in accounting for the good effect of compression. In the "idealized" Otto cycle (4-cycle principle) mixture is drawn in at the atmospheric (or slightly below) pressure, so that the weight of fuel is fixed by the suction stroke; if the suction is at a minimum depression, provided the cylinder fills with gas, the weight will be maximum at a given temperature; if the temperature is lowered the weight of gas will be increased. In the remaining method, instead of "inspiration" on the Otto basis, mixture is put in under separately generated pressure, and the amount of pressure utilized is independent of the suction ability of the piston of the motor.

[166]—What is the limit of compression, and is it the same in both types of motors?

The limiting considerations are not the same in both types of motors. In the Otto cycle, the weight of fuel (total) depends upon the suction ability, but the weight of fuel in the combustion chamber at the instant of ignition (neglecting leakage) depends upon the ratio of clearance space. In this class of motor it is pre-ignition that places a limit on compression, hence upon the weight of mixture in the combustion chamber at the time of ignition. When auxiliary compression is resorted to, provided the fuel is injected separately just before ignition, there is no such limit to place upon compression; it may be as high as mechanical considerations will admit of, unless it is found that lubricating considerations must receive earlier attention.

[167]—Is it necessary to allow more air in proportion to fuel as the compression is increased, or should the air allowance be maintained on a constant basis irrespective of the compression?

As compression increases, so must the air allowance be increased above the theoretically right measure; this is due to the fact that the fuel has less time in which to hunt around for an oxygen mate; it must have its mate if combustion is to take place; it is more likely to find its affinity if an excess of oxygen is present.

[168]—What is the underlying reasoning for this?

Energy resides in carbon, hydrogen and compounds of these elements, as in the hydro-carbon distillates of which automobile gasoline is composed. How to release this energy under advantageous conditions is the problem. This is accomplished by compressing the fuel with a quota of atmospheric air in which oxygen, which is wanted, is a content in the right proportion. The energy in the fuel is set free by combustion, and this condition (combustion) is brought about by mixing the carbon and hydrogen with oxygen, then setting fire to the new mixture.

[169]—What happens when carbon, hydrogen, and oxygen are thus mixed and burned?

The energy residing in the carbon and hydrogen is set free, and the products of combustion are carbon dioxide and carbon monoxide, also water. The carbon monoxide is not desired, but it is formed to some extent owing to the difficulty of supplying the oxygen in such form that it will be taken up by the fuel elements. For complete combustion, then, the final product will be carbon dioxide and water.

[170]—How much energy is there in this fuel?

Automobile gasoline, taking it as an average product, holds about 20,000 British thermal units of heat per pound.

[171]—What is a British thermal unit?

It is accepted as a definite measurement of heat, the latter being a form of energy.

[172]—What is the magnitude of a British thermal unit of heat?

It is that amount of heat which will raise the temperature of one pound of water one degree Fahrenheit, taking the water at its point of maximum density.

[173]—What other way is there for judging the magnitude of a British thermal unit of heat?

It has a mechanical equivalent.

[174]—What is the mechanical equivalent of a British thermal unit of heat?

778 foot-pounds.

[175]—How is this knowledge to be utilized to advantage?

One horsepower is said to equal 33,000 foot-pounds per minute: knowing this, also knowing the foot-pound equivalent of the British thermal unit of heat, it remains to compare one with the other.

[176]—Give an example.

If there is 20,000 British thermal units of heat in a pound of automobile gasoline, and 778 foot-pounds (mechanically) in a British thermal unit it follows that

$$\text{H.P.} = \frac{20{,}000 \times 778}{33{,}000} = 472;$$

this amount of power would be given for one minute; in one second 60 times this power would be the rate.

[177]—What is the specific heat of the fuel elements in gasoline, considering air separately and assuming that there will be a certain amount of carbon monoxide in the mixture?

SPECIFIC HEAT VALUES OF SPECIFIC HEAT OF GASES

	Specific Heat for Equal (Regnault)	
Elements	**Volume**	**Weight**
Air	0.2375	0.2375
Carbon monoxide	0.2370	0.2450
Carbon dioxide	0.2985	0.1952
Hydrogen	0.2359	3.4090
Nitrogen	0.2368	0.2438
Oxygen	0.2405	0.2175
Steam	0.2989	0.4805

The amount of steam present will be limited to the weight of water, (a) entering the cylinder as such, and (b) as represented by water combustion.

Automobiles Constitute Property—Subject to Taxation

By XENOPHON P. HUDDY, LL.B.

AUTOMOBILES constitute property and are therefore subject to taxation. Every person who owns an automobile may be compelled to contribute to the Government his pro rata of taxes based upon the value of the motor vehicle, but the owner of an automobile can be taxed only once for owning a motor vehicle.

The taxation of automobiles as property, and the imposition of license or occupation taxes should be clearly distinguished. License taxes may be imposed by the Government on automobile owners, and are imposed by the States of the United States and foreign governments in the form of registration requirements and fees. When an automobilist registers his car with the Secretary of State, or any other designated officer, and pays a registration fee of a fixed amount, or one based upon horsepower, he pays, not a property tax, but a license or occupation fee, imposed under the police power of the State. This fee is paid for the privilege of using the automobile, and has nothing whatever to do with the value of the machine. Its graduation, however, may be based upon a logical method of computation such as horsepower, which is as accurate as any other known means for the purpose of computing the fee.

Automobiles Taxed as Personal Property

Property taxation of automobiles has not been given any special attention in the United States. Automobiles have not been distinguished from horses, wagons, jewelry, pianos and other personal belongings, but would it not be more just to automobilists and to the Government to separate the class of personal property composed of automobiles from other personal belongings, and to tax it in a distinctive manner?

In law personal property is deemed to be located where the owner thereof is domiciled, even though the actual physical situation of the property may be in another State or jurisdiction. Most articles of personal property are capable of easy removal, yet until the automobile arrived seldom it was that personal property of large value, unless belonging to a common carrier, was in its very nature transitory and subject to travel from State to State. For the reason that an automobile usually possesses no situs outside of the place where the owner is domiciled, it should not be taxed elsewhere.

Obviously, it would be impossible to assess the owner of an automobile with a tax based upon the cost of the machine. Its fair assessable valuation is a matter which is not easy to determine, since a used car depreciates very fast.

In some jurisdictions the attempt has been made to impose a fairly high registration fee on automobile owners, and in consideration of the payment of this fee the owner is exempt from any other tax, either State or local, based upon valuation. A measure of this kind is in reality an ad valorem tax, since in exempting the owner of an automobile from a property tax in consideration of the high registration fee the law virtually takes care of property taxation in the fee paid for registration. It is very doubtful whether a provision of this kind is constitutional. Certainly, if a State charged a high registration fee, which covered also property taxation against the automobile, no municipality or other local authority could levy a tax based upon valuation.

Whether any State, other than the one the owner lives in, may tax an automobile based upon property valuation depends upon whether the automobile obtains a situs in the other State. If no situs is obtained, then no tax can be levied except by the State where the owner resides, since such a tax would violate the interstate commerce clause of the Federal Constitution. If, however, an automobile is used in a particular State for any considerable length of time it would acquire a situs, and, therefore, would become subject to local taxation as property.

In construing and enforcing the interstate commerce clause of the Federal Constitution the rule has been established by the United States Supreme Court that property actually in transit from one State to another is exempt from local taxation; but, if such propery be stored for an indefinite time during such transit for other than natural causes or lack of facilities for immediate transportation, it may be lawfully assessed by local authorities. In dealing with the power of the States to tax imported goods while in the original packages and in the possession of the importer, it must be borne in mind that the clause of Section 10 of Article I of the Federal Constitution, which provides, in part, that "no State shall, without the consent of Congress, lay any imposts or duties on imports or exports" creates a distinction between goods imported from foreign countries and those brought in from other States of our Union. The word "imports" in this section of the Federal Constitution applies only to articles imported from foreign countries, and is an absolute prohibition of State taxation. A different rule, however, obtains with respect to articles transported from one State to another. In such cases there is no positive prohibition like that against the taxation of imports from foreign countries, and the States have power to tax goods that are brought into this State from other States, if they are held for sale there or for other purposes, giving to the property a situs within this State.

How the Tax on Automobiles Is Computed

The methods adopted of computing a tax are more or less a matter for the discretion of the Legislature. Valuation, the method used in property taxation, is logical. Weight has been urged as a proper and logical method of arriving at the tax which different automobiles should contribute. Under this system an automobile which weighs twice as much as another should pay a tax twice in size. Many logical arguments may be urged in its favor, since the heavier a car is the more it will wear out the public highway.

Horsepower has been the method most generally adopted. The lighter a car is the more power it may have. It must be admitted that horsepower is more or less an arbitrary scale selected for the computing of license fees. Arbitrary legislative action is apt to be tainted with illegality. Whether the Legislature possesses the power to tax automobiles according to horsepower has not been squarely determined. It might be said that there is just as much reason to tax automobiles according to color, which would unquestionably be unlawful.

Again, automobiles may be taxable under what is called a wheel tax. This method has been adopted heretofore in respect to horse-drawn carriages, and little objection can be made to it.

Power of Taxation Is the Power to Destroy

Before leaving the subject of taxation it should be mentioned that the power to tax is the power to destroy. If the Government possesses the power to tax a particular object it can tax that object out of existence. The United States Supreme Court has held that the States cannot tax national banks because if the power exists in the States to do this the States can destroy national banks and can tax them out of existence.

On the question of the power of the States to tax travel or transit the same principle applies. The State Government cannot tax a citizen for the privilege to travel from State to State. In other words, transit cannot be taxed in this country.

Following out the principle that transit cannot be taxed, for if it could be taxed it could be destroyed, a tax levied by the State for the privilege of using an automobile, which is excessive, and which amounts to more than a mere license fee, constitutes a tax on transit and to the extent that the tax is on transit, it is unconstitutional.

Abstracts from the 50 Best Foreign Papers

Digest Along Technical Lines for the Engineer

Economy in great increase of speed of high-speed tools——Automatic pressure regulation for brakes and drives——Same utilized for automatic gear changes——Synthetic rubber still in the distance——Formula for brakes——New incombustible celluloids——Types of motor buses.

Peculiarities of high-speed steel, bearing on shop economics, form the subject of a richly illustrated article drawn largely from the reports published by E. G. Herbert in *Proceedings of the Iron and Steel Institute* for May 5, *The Engineer* (London) for May 6 and 13 and *Engineering* for May 27. The principal practical conclusion relates to the much increased durability of high-speed steels which is obtained by raising the speed of its work far above the normal for light cuts, the economy being not merely relative as compared with using a lower speed and a deeper cut, but absolute, inasmuch as the tool's edge lasts longer than for the same light cut made at lower speed. The output is increased at reduced tool cost, and the explanation seems to lie in part in the different action of the heat on the tool and on the work. After an analysis of the endurance curves plotted for a tungsten and vanadium steel hardened at 1,200° C. in air, and thereafter completely quenched in a salt bath at 668° C., for the same steel heated to 1,275° C.—which carried its maximum cutting speed from 60 to 70 feet—and a simple tungsten HS steel, the article concludes, referring also to a plain high carbon tool steel previously plotted: Summarizing, these three varieties of steel give, according to the rapidity of the tempering, feed curves or endurance curves with one or two maximums. The second of these maximums is strongly developed in the carbon steel as well as in the high-speed steels by the rapidity of the quenching. The first work maximum obtained at low cutting speed is developed in the high-speed steels by slowness in quenching or in cooling, and in carbon steel by high temperature for quenching. The act of drawing temper of high-speed steel has not yet been determined. A moderate cooling rate, or, with carbon steels, a moderate drawing of temper, gives a curve with two maximums and a very feeble endurance of the steel in the depressions between these points—for cuts at intermediate speeds—and the curves of tungsten-vanadium steel differ essentially from those of simple tungsten steel. No explanation of these depressions is known, and, on the other hand, in order to decide with exactness the practical bearings of the results of these tests, it would be necessary to take analogous curves for tools operated at normal rates in factories, with turret lathes for example. This has never been done and would require special apparatus.—*Bulletin de la Société d'Encouragement,* May. Previous articles on related subject in the *Bulletin* for July, 1909.

Worm gears with automatic regulation of pressures are reviewed by Dr. Wilhelm Rehfus in five issues of *Dingler's Polytechnisches Journal,* ending May 28. The author presents the automatic brakes of this order which are used in the industries, and suggests modified devices with improvements. The pressures obtained by different constructions are developed mathematically. The combination of a worm-actuated end-pressure brake with a band brake, on the principle of limiting the pressure of each by the excess pressure of the other, is given fully. Many mechanical suggestions are offered which seem applicable in solving the problem of automatic regulation of the speed of automobiles—of commercial trucks, for example—though the author does not enter upon these possibilities, but limits himself to description of mechanical elements with numerous illustrations. There follows a description of a proposed worm-gear brake-mechanism without automatic stop, which is calculated with such dimensions of parts that light hand or foot pressures are sufficient to absorb enormous brake moments without complicated levers and rods. The same construction is developed with centrifugal action taking the place of hand or foot, and a type of coupling or clutch is shown with a helical clutch spring, as used in automobile clutches, taking the place of centrifugal action. The application intended is mainly for belt and pulley transmission in factories, and is meant to produce a gradual engagement. The author then proceeds to apply automatic regulation of pressures to friction drives of various sorts, indicating means for always having just as much friction between driving and driven cones as is necessary for the work in hand and to avoid slippage. Finally, the same principle is employed in connection with an expansible pulley wheel to produce automatic gear change, the pressure upon the belt acting to push the sliding half of an expansible V-pulley to one side, whereby the belt sinks to a smaller circle; that is, a lower gear. An illustration is presented of a motorcycle made on this principle by Vierordt & Co., of Kehl am Rhein, in which a tension pulley or idler operated by hand is made to increase or decrease the pressure of the belt upon one of the belt sheaves, which may be either the driving or the driven, thereby changing its radius and the gear ratio, while the tension pulley at the same time takes care of adjusting the length of the belt to the changed condition.—*D. P. J.,* April 30 and May numbers.

A statement to the effect that the "Farbenfabriken" at Elberfeld was ready to enter upon the manufacture of synthetic rubber is contradicted in *Chemiker Zeitung.* The directors of the concern confirm, however, the claim to having accomplished a successful scientific synthesis of caoutchouc at its laboratories. The stockholders and directors in their decision are said to have taken note of the fact that the scientific synthesis of indigo which was accomplished in 1880 by Prof. Fred Bayer—who is also the discoverer of the new synthetic rubber-making process—was not realized industrially until 1896, nearly 16 years later. It was also considered that a sharp decline in market prices followed the discovery of synthetic methods of production in the cases of both indigo and camphor. It would be a reduced price for rubber which the synthetic product would have to meet.—*Le Génie Civil,* June 11.

A general formula for the calculation of brake bands is given by Engineer Siebeck, and he shows how the pressures applied vary with different constructions. With brakes of automatic application, especially, the maximum pressures may become much higher than the general formula would indicate, and the author gives a supplementary formula which enables one to determine them.—*Zeitschrift des Vereines Deutscher Ingenieure,* April 16.

Automobile buses adopted by the City of Paris are of two types. One carries 30 "fares" without "imperial" or roof seats. There are eight first-class seats, while 22 places are second-class, and of these 13 are seats and nine are standing room. The other type has a capacity of 34, with 13 first-class seats and 18 second-class places. With a different division, this type has 12 first-class and 22 second-class places, and of the latter 17 are seats. —*Mém. et Trav. Ing. Civils,* May 20.

In addition to the non-inflammable new form of celluloid called cellite, which is made by treating the cellulose with acetic ether instead of nitric ether, another cellulose product appears upon the market which is also incombustible or nearly so. It is produced by means of formic acid by the Nitritfabrik Stock Company, of Koepenick near Berlin. The formiates of cellulose, besides being cheaper than the acetylates, possess the advantage of being soluble in an excess of formic acid.—*Le Génie Civil,* June 4.

Laboratory Investigation of Holley Carbureter

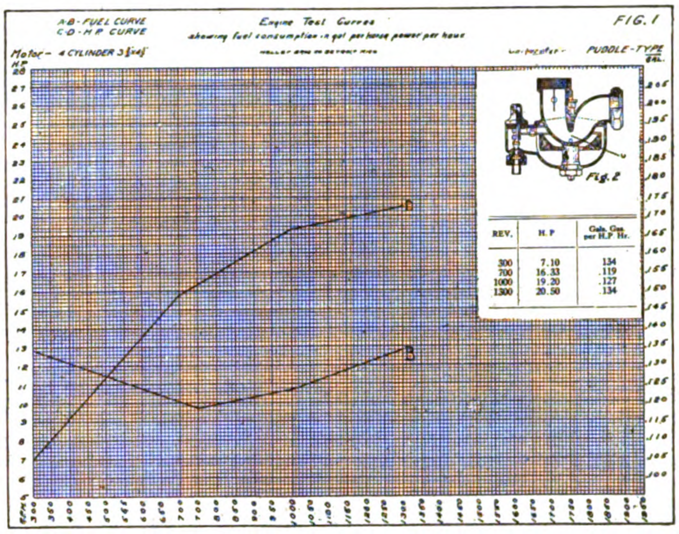
DOUBLE Jet Carbureters are contrived with a view to overcoming the difficulties involved in furnishing uniform mixtures to motors, it being understood that the single jet carbureter has its limitations. In the laboratory of Holley Brothers Company, Detroit, Mich., the facilities available for investigating carbureters, fuel, and motors, from the mixture point of view, are sufficiently complete to enable a physicist to arrive at excellent conclusions, and it is believed that the information here afforded is worthy of close scanning because it is presented in "dead line" form so that the interested reader is given an opportunity to obtain a bird's-eye view of the situation in general.

Referring to Fig. 1, which is a chart giving the curve of performance of the puddle type of carbureter shown in Fig. 2, it will be seen how the fuel consumption changes per horsepower, and with the speed of the motor. A summary of the results obtained is given in the tabulation under Fig. 2, and briefly stated, the gasoline consumption dropped to its lowest point as shown on the curve A B when the motor was running at 700 revolutions per minute. The highest consumption was at 1300 and 300 revolutions per minute. The line C D on the chart represents horsepower and shows how the power increased with the speed up to 1300 revolutions per minute.

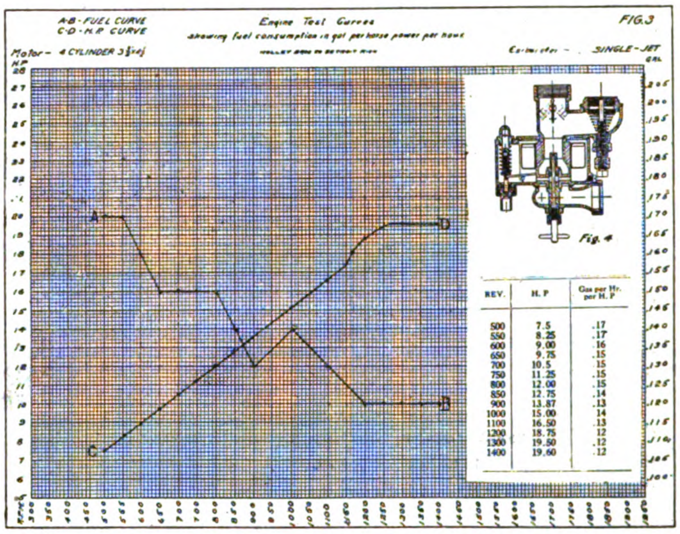
The chart Fig. 3 shows the performance of the single jet carbureter, and Fig. 4 is a section of the particular carbureter used. Under Fig. 4 is a tabulation of the results obtained from which the curves were plotted. In this case, the test spread over a range from 500 to 1400 revolutions per minute inclusive, and the best gasoline consumption was at the highest speed, gradually increasing with increasing speed, reaching a maximum at 550 revolutions per minute. The horsepower developed resulting in the line C D on the chart, produced a straight line up to 1150 revolutions per minute, and an upward curve thereafter to 1270 revolutions per minutes, beyond this speed there was no increase in power. The gasoline consumption is represented by the line A B and it shows quite a few irregularities, thus bringing out the characteristics of the single jet idea in carbureter designs.

The chart Fig. 5 was plotted from data obtained in the test of the double jet carbureter; a section of this carbureter is shown in Fig. 6, and the data of the test is given in the tabulation under Fig. 6. The curve A B is of the gasoline consumption; it was maximum at 500 revolutions per minute, dropped to its lowest point at 750 revolutions per minute, but with slight variation maintained this low level beyond 600 revolutions per minute. The power obtained is represented by the straight line C D up to 1300 revolutions per minute, was horizontal from 1300 to 1400 revolutions, and took an upward sweep from 1400 revolutions to the end of the test. This chart is representative of the splendid performance of the double jet in carbureter designs, and it shows that the gasoline consumption can be maintained at substantially a constant level over the entire range of working speeds.

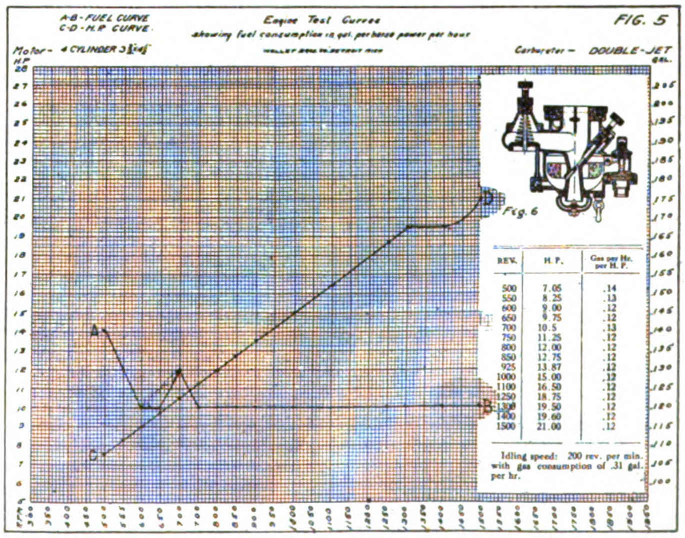
It is of course true that the thermal efficiency of a motor will decrease with decreasing speed if the gasoline consumption does not hold to a constant rate per horsepower. The double jet carbureter when it performs as shown in the curve Fig. 5, affords nearly a constant thermal efficiency, notwithstanding speed and power variations for almost the entire practical range of the motor. The charts give the horsepower scale in the left vertical column, the speed scale at the bottom, and the gasoline scale in the right vertical column. For any speed within the range given it is only necessary to trace along the vertical line (ordinate) of that speed to the point of intersection of the horsepower curve, and following the horizontal line (abscissa) from the point of intersection to the left for horsepower, but to the right for gasoline consumption.



REV.	H. P	Gals. Gas per H.P. Hr.
300	7.10	.134
700	16.33	.119
1000	19.20	.127
1300	20.50	.134



REV.	H. P	Gas per Hr. per H. P
500	7.5	.17
550	8.25	.17
600	9.00	.16
650	9.75	.15
700	10.5	.15
750	11.25	.15
800	12.00	.15
850	12.75	.14
900	13.87	.13
1000	15.00	14
1100	16.50	.13
1200	18.75	12
1300	19.50	.12
1400	19.60	.12



REV.	H. P.	Gas per Hr. per H. P.
500	7.05	.14
550	8.25	.13
600	9.00	.12
650	9.75	.12
700	10.5	.13
750	11.25	.12
800	12.00	.12
850	12.75	.12
925	13.87	.12
1000	15.00	.12
1100	16.50	.12
1250	18.75	.12
1300	19.50	.12
1400	19.60	.12
1500	21.00	.12

Idling speed: 200 rev. per min. with gas consumption of .31 gal. per hr.

THREE TYPES OF CARBURETERS TESTED AND COMPARED

Public Service Taxameters

PATRONS of taxicabs find it a rather difficult matter to ride for any length of time and feel perfectly comfortable about the pending charge. They eye the taxameter, shift about in the seat, and in every way show evidences of some strong emotion. Experience has shown that this intuition of evil is but the reflection of experience, although it is a great mistake to go on fretting about things after the evils have been eradicated and the reasons for fearing no longer exist.

With the new taxicab regulations in force in New York City, and equally good regulations in force in practically every city having taxicabs, coupled with the fact that taxameters are available within limits of error so close that there can be no question as to the fairness of the charge, if it is based upon the readings, it only remains for patrons to make themselves acquainted with the workings of the taxameter, and avoid using the chauffeur as a private secretary—allotting to him the duty of deciphering the taxameter instead of acting for themselves. If any mistake is made it is not fair to the taxicab to say that its functions are improperly performed if the trouble is confined to a mere oversight on the part of the private secretary, or if the "fare" elects to do his own reading, and, in the absence of skill, overcharges himself.

A tamper-proof taxameter is the first requisite from the point of view of good business; the operator of taxicabs cannot afford to place such an expensive piece of property in the keeping of a chauffeur and allow him to rove without having some way of keeping track of the length of his migration, even though it is not very easy to tell of the number of "pick-up" fares the chauffeur may "entertain" during the trip.

It follows, under the circumstances, that the interests of the operating company and the "fare" are identical; both parties are vitally interested in the distance that the taxicab may travel, and the only way that they can be sure of this is to employ tamper-proof taxameters.

Fig. 3—Rear View of Taxameter showing half-mile travel

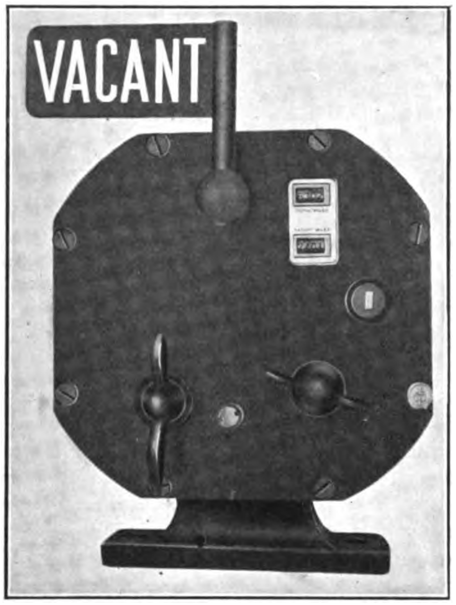


Fig. 2—Rear view of Taxameter with fare register out of service

Fig. 1—Front view of Taxameter with fare register out of service

The instrument, in view of its vital importance, should be·

(a) Automatic, (b) accurate, (c) with individual totalizers and (d) tamper-proof. That vibration and the other usages due to service will, in some measure, influence the situation, is to be expected, taking taxameters in general, but the trend is toward the character of instruments that are capable of coping with the exigencies of service with little chance of becoming deranged. This depends upon its exact construction and to the care with which it is maintained. Since it is expensive to keep up an inspection system and to make extra repairs to instruments, even not counting the inconveniences which will come if the government "inspector" fails to appreciate the good qualities of the type of instruments employed, it follows that the interests of the operating company and its patrons are on the same basis, and the best possible type of instrument is the one which will come nearest to satisfying the patron and the server.

The single fare instrument offers advantages; with it there is no opportunity for the chauffeur to juggle with the tariff.

"Fare" Should Know Taxameter

In order to afford the requisite amount of information to the patrons of taxicabs, photographs of the International Taxameter are here reproduced, which, if studied, will permit the interested reader to familiarize himself with the details of the instrument sufficiently to enable him to enjoy his ride and foot up his own tally. Fig. 1 shows the face of the instrument with the flag up, also with the fare blinds down, and the extra charge dial at zero. The initial tour totalizer, the extra totalizer, and the fractional totalizer are in full view. The aperture on the right hand side shows in bold face letters "For Hire." This sign is only in view when the flag is up.

Looking at the rear of the instrument as shown in Fig. 2 when the flag is up and the taxicab is "For Hire," the aperture shows total number of miles at the top, and dead mileage at the bottom. The latter registers only when the taxicab is vacant. Below this aperture is a spur with which the extras are registered; then comes the key to wind the clock mechanism, and in the lower corner is a little spur which is the flag locking device. At the lower left-hand corner is the flag operating key, and in the left-hand side of the base is the hole for sealing.

Fig. 3 shows the back of the taxameter when the flag is down, and Fig. 4 is of the front. The initial charge is 40 cents for the first 1-2 mile, and it shows in the right aperture below "Fare." In the "Extras" aperture there is a 20-cent charge, and in the right-hand aperture the bold-faced letters spell "Hired." The initial totalizer shows 0213, which is one number greater than before the flag dropped. The extra totalizer shows 0266, and is also one number greater than before the flag dropped. The fractional totalizer registers the same as before the flag dropped, because there were no fractions of a mile or waiting time to be registered.

Referring again to Fig. 3, the numerals of the total miles indicator show that the vehicle traveled 5-10 of a mile, and on the fractional totalizer in the lower right-hand corner on the front dial as shown in Fig. 5 there is an increase of one unit from 8465 to 8466, so that the total fare as registered on the dial of Fig. 5 is 50 cents, which is an increase of 10 cents over the fare registered in

Fig. 4—Front view of Taxameter showing fare and extra register in service

Fig. 5—Front view of Taxameter after travel of one-half mile

Fig. 6—Front view of Taxameter at instant of discharging fare

Fig. 4. In the extra aperture of Fig. 4 there is a charge of 20 cents for baggage, and this, with the fare, makes a total of 70 cents. When the passenger arrives at his destination, alights and wishes to discharge the vehicle, the driver gives one turn of the flag crank, which sets the taxameter at "Non-recording." This gives the driver time to collect his fare, but as soon as the passenger settles his account, the driver gives one more turn to the flag crank, which sets the flag in the upright position as shown in Fig. 1. The settlement must be on a basis of the amount registered in the fare aperture, plus the amount registered in the extras aperture. The total in this case, as shown in Fig. 6, being 50 and 20, equals 70 cents.

Baedekerizing the Automobile Blue Book

By HENRY MacNAIR

SO long has the name of Baedeker been associated in the public mind with guide books that from a Teuton patronymic it has come to be a substantive of general use, applying particularly to the best in the hand-book line, for a Baedeker is now deemed an indispensable adjunct to rail or boat touring.

The preface to the most recent edition of Baedeker's United States sets forth that the book is "intended to help the traveller in planning his tour and enable him the more thoroughly to enjoy and appreciate the objects of interest he meets with." To which, as a concrete expression of the mission of a guide book, the editors of the new Blue Book, with a mental reservation as to the placing of the final pronoun, most heartily subscribe, though very much, perhaps, in the spirit of the sinner who tacks the Lord's Prayer at the head of his bed, and exclaims "Lord, them's my sentiments!"

But while Baedeker undertakes to supply mental pabulum to the traveler by rail and boat, there is another constantly and rapidly increasing class which follows the highways in their own cars, often as luxuriously appointed as the most palatial railway carriage, and which heretofore has not been recognized as being in the ranks of seekers after such information. Manifestly a guide book designed for other classes will but partially supply the need of the autoist, in that it does not direct his motor to the points described. Then, too, there are other things of beauty and interest, which are as a "sealed book" to him who travels other than by motor.

It has not been thought necessary to dispute the occupation of the field pre-empted by Baedeker, for, outside, the uncultivated acres are many and expansive.

It is the avowed purpose of the Blue Book to lay before its readers not only the completest information as to all the motoring roads in a given section, but to supply in advance accurate data and reliable information as to the historic, the unusual, the quaint and the beautiful features of each and every trip. In order to attain this result, the essential road directions have been pruned of all exuberant verbosity to make room for a descriptive outline which appears in a separate paragraph at the beginning of each route. Of a surety, then, no mere plagiarization will suffice, for each "descriptive outline" must be written from actual car-observation, after consulting all the dispensers of hand-book lore and digesting the facts of local history gleaned from various sources. Indubitably no better way of sight-seeing exists than from an open motor car, the speed controlled at will, now flashing by the prosaic and unlovely, now dallying at those spots made attractive by the lavish hand of nature, or the cunning of man's art.

Then the viewpoint! It is subversive of the spirit of '76 to meekly allow a Britisher to tell us what we may see in our own country, for all of the English editions of Baedeker are edited by Dr. Muirhead; himself a worthy and erudite scholar, he is yet not free from the imputation of prejudice who dismisses our own Schuylerville and the Battlefield of Saratoga with a scant four lines in the tiniest of type. One can imagine the burst of indignation which he would bring about his ears did he give no more extended mention to the battlefield of Waterloo, and yet both are recorded among "Crecy's Fifteen Decisive Battles" of the world's history. It is, perhaps, of sufficient interest to the patriotic to reproduce the exact text of Baedeker and that of the Blue Book covering this particular point:

Baedeker—"A branch of the B. & M. Railroad runs to (12M.) Schuylerville (Hot. Schuyler $2), whence the Battlefield of Saratoga, with its monument, may be visited. Memorial tablets mark the chief points of the battleground, and there is a collection of relics in the Schuyler Mansion Museum."

Blue Book—"Leaving Saratoga on Lake Ave., a direct macadam road is followed to **Schuylerville**, a point of great historic interest, near which place the battle of Saratoga was fought. On the corner of Spring and Broad Sts. (10.9 m) a tablet indicates the camp ground of the British army (1777). To the left a short distance is the Marshall House, in the cellar of which Baroness Riedesel took refuge. To the right on Broad St. is the spot, marked by tablet, where Burgoyne surrendered, thus securing American independence. Just beyond, by turning right on Burgoyne St., we reach the Battle Monument, commemorating Burgoyne's surrender, and the close of one of the "fifteen decisive battles of the world" The monument is 154 ft. high and was completed in 1883. Among the other points of interest is the site of Ft. Hardy (1755), Fish Creek Bridge, near Schuyler Mansion, the battlefield of Saratoga and Freeman's farmhouse at Bemis Heights (22,000 soldiers engaged), and the Dovegat House near Coveville, 2 miles south."

The Blue Book, then, has a field of its own in applying an amplified Baedeker feature to its publications which, prior to 1910, only attempted to point out the road. With facts collected from all sources, and especially arranged for the convenience of the tourist, this feature will prove a boon to the sightseer.

"Senator" Callan Plays Both Ends Against the Middle

"SENATOR" ALBERT S. CALLAN, father of the New York State Motor Vehicle Law, which goes into force and effect August 1, 1910, is a confirmed bachelor. "Senator" Callan, who, by the way, is not Senator at all, but a member of the Lower House of the New York State Legislature from Columbia County, only twenty-five years old and does not look it, is authority for the statement that he is not susceptible to the wiles of Cupid.

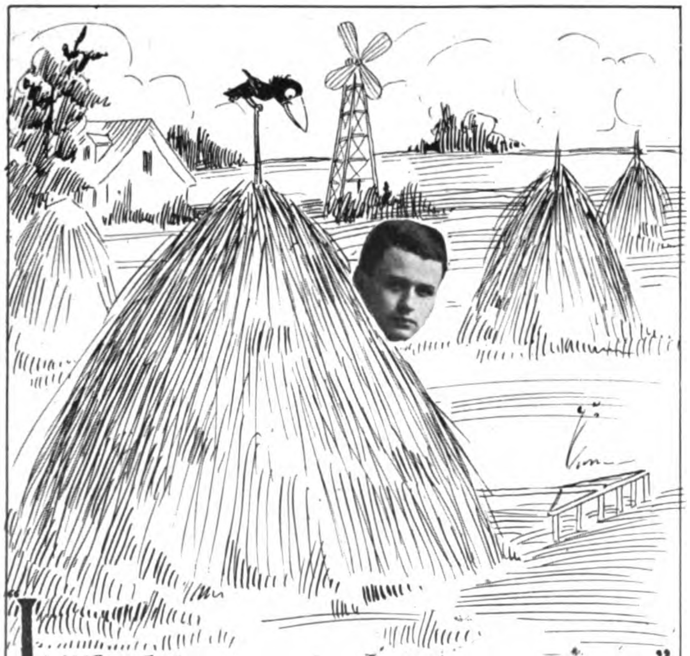
He is a charming fellow, nevertheless—a boyish, intense youth, who does not seem to realize fully that "his" law will make the official ownership of an automobile in New York State about four times as costly as it was heretofore.

In some sections of the State the automobile is not yet sufficiently popular to prove a political asset to an aspiring young legislator, and Columbia County, the constituency of the young "Senator," is said to be one of these sections. It has been whispered that opposition to motoring in the attitude of "Senator" Callan has proved acceptable to a good many of his constituents. However that may be, the legislator freely admitted to the representative of The Automobile that prior to the last campaign one of his neighbors remarked to him: "Callan, I will vote for you, and I want you to pass a law so that I can stand out in my front yard and shoot every d—d motorist that passes my place."

Mr. Callan does not take that extreme view. In fact, he does not believe that the owner and operator of an automobile ought to go to jail simply because he owns a machine, unless he breaks the law. He recognizes the fact that the importance of the automobile is growing and that really radical words or acts might have the effect of striking at some neighbor whose vote and influence at the polls would be more than a negligible factor.

But his effort at lawmaking will afford excellent chances for many a motorist to break into jail.

The man responsible for this law is a smooth-cheeked, athletic youth. He is slender and graceful in his carriage and wears his dark hair slicked back from his rather low brow. He is the possessor of an astonishing personality—this man, whose law will cost motordom $2,000,000 a year, according to the estimate of Governor Charles E. Hughes in his tentative budget figures. But let him tell his own story, just as he recounted it for the exclusive use of The Automobile:



I HAVE NEVER HAD HOLD OF A STEERING GEAR"

"I was born at Albany in 1885 and moved to Valatie, Columbia County, when I was about ten years old. I attended primary and grammar schools, and when I had received my preliminary education I matriculated at Hobart. I never was graduated from anywhere. I was a kind of special student—did not go in for the classics or even the scientific courses. I did not take a degree. As far as the sciences are concerned, I am free to admit that they never attracted me. There is so little of the love of mechanics about me that the purr of a motor car means nothing more to me than the burning of so much gasoline.

"But at college I did take an interest in athletics. I was a football and a baseball man, and was manager of the dramatic club. No, I never did anything in the line of dramatic acting. I left Hobart in 1907, having been chosen an officer in the National Guard.

"In the directory my name appears as a law student, but I have no definite idea as to when I shall be admitted to the bar. My studies along that line are far from complete. I am a politician, and my ambition is to serve the people in just as high capacity as I can reach. Some of my friends have sought to have me make the race for Lieutenant-Governor, but on account of my years that will be impossible under the law this year.

"I am a Republican, and am proud to say that I believe in the organization, first, last and all the time. I voted against the direct primary measure which was recently defeated and I am perfectly satisfied with my action.

"My political history commenced as soon as I was out of college, when I ran for the Legislature and was defeated by a plurality of 600 votes. I am a persistent man, and next year I made the race again, winning by a margin of 99. Last fall my plurality was about 1,500.

"I hope to be a member of Congress, Governor or United States Senator in time, and even in a higher office if the people call upon me to take it. The State Senator from my district is a fine man and wants to succeed himself in the Upper House. I believe he will—this time. I have heard that he does not look with enthusiasm on all the flattering publicity that I have attracted. *However, he has nothing to fear from me.*

"In each of my campaigns the automobile has been an important feature. Personally I have no use for the motor car. *I never had hold of a steering gear in my life,* although my father owns a car and I have ridden in it hundreds of time. The press has called me a 'non-motorist.'

"I have a fine little mare that I ride a great deal, and I love to walk, but the automobile and its alleged exhilaration do not appeal to me.

"The feeling against automobiles may be described under two heads—in the first place, jealousy of motorists by those who do not possess cars, and, second, hostility to motor cars by frightening horses and killing chickens. When Bill Smith buys a car and goes whizzing along the roads, cutting deep gashes in the surface and scaring Farmer Brown's team to death, the feelings of Farmer Brown for Bill Smith, and through Bill Smith for all automobilists, is potent and peppery. Just before the last election I had a talk with one of those 'Farmer Browns,' and he said: 'Mr. Callan, we know you do not like automobiles, and we want you to pass a law so that we can stand in our front gates and shoot down every d—d motorist who tries to pass.'

"I told this man that I would pass a law to check the speeding and make the motorists pay more for the privilege of cutting up the roads. This I did, and I am proud of it. Just as soon as the law had been signed by the Governor I got him to give me the pen he used, just the same as Congressmen sometimes secure the pens with which Presidents sign important bills. Then I had a little certificate drawn up, showing my authorship of the Callan Act, and I had the certificate and the pen framed. They hang in my home, and I frequently look at them with a certain element of wonder that so young a man as I should have played such an important part in legislation upon such an important subject.

"I have no regular occupation outside of politics and as an officer of the National Guard, but in the course of time I think I shall be a lawyer.

"I am a confirmed bachelor, and have no idea of marrying at present and no future intention of doing so. In fact, I am wedded already to politics."

The representative of THE AUTOMOBILE called attention to the fact that Mr. Callan's hostility to the motor car seemed to include a similar feeling toward women, business and studies, but Mr. Callan only smiled and said that in future there might be some amendments introduced.

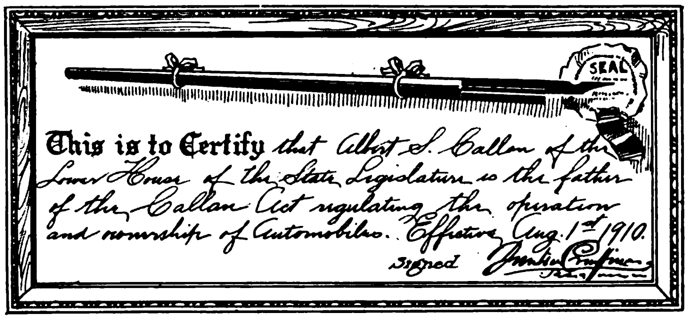
What a Lawyer Sees Amiss in the Bill

BY XENOPHON P. HUDDY, LL.B.

This law in some respects is a good one, but it also contains defects and vitiating measures which are apt to cause trouble in its practical administration, particularly referring to the great and arbitrary powers given to the Secretary of State. He is the officer designated to carry out the provisions of the act and see to it that the requirements are complied with by manufacturers, dealers, owners and chauffeurs.

It is a well-settled principle of political law that the legislative power and the duties of the Legislature cannot be delegated. It means that the Legislature of the State of New York, for example, cannot legally shift its duties to some other person or body of persons to perform since the constitutional form of government recognizes no body other than the Legislature in carrying out any form of regulatory control for the State.

Under the Callan Act chauffeurs must be licensed by the Secretary of State, but the method and details of licensing this class are not prescribed in the law itself, but the Secretary of State is empowered to prescribe an examination as to the qualifications of automobile drivers, and it is discretionary with him as to what qualifications shall be required. It is provided that no license shall be issued until the Secretary of State or his authorized agents are satisfied that the person applying for a license is a proper one to receive it. This last sentence confers immeasurable powers upon the Secretary of State and his agents in granting or refusing licenses to chauffeurs. Inasmuch as chauffeurs are depended upon to drive the greater percentage of the cars manufactured, the number of licensed chauffeurs in the State of New York may in a great measure depend upon the discretion of the official who licenses them. Instead of conferring this power upon the Secretary of State, the law itself should have prescribed the qualifications. By delegating the duty and power to the Secretary of State the Legislature has undoubtedly delegated its legislative authority, which is contrary to our fundamental law.



This is to Certify that Albert S. Callan of the Lower House of the State Legislature is the father of the Callan Act regulating the operation and ownership of Automobiles. Effective Aug. 1st 1910.

Signed

The "Senator's" Most Prized Possession—The Governor's Pen

In the attempt to place in the control of the Secretary of State the chauffeur class, and in omitting to prescribe in the law the qualifications for chauffeurs, it is very doubtful whether the law is of any validity.

For the conviction of certain offenses the Secretary of State has the power to suspend or revoke the registration of an automobile or a chauffeur's license. It is also provided that no new license shall be granted where one has been suspended or revoked, unless the discretion of the Secretary of State so authorizes it. Here again we have the discretion of the Secretary of State controlling to a certain extent the automobile industry in the State of New York. Arbitrary action on his part is possible and can work great damage, but a person who has been arbitrarily treated could bring a writ of mandamus to make the Secretary of State grant him the privilege to use his automobile on the public ways of the State.

It has been announced in the press that the Secretary of State will not issue licenses to drivers of known recklessness. The elimination of drivers of this character should be accomplished, but the discretion of the Secretary of State alone should not constitute the sole judge of whether a citizen is a reckless automobile operator. The fact that chauffeurs are compelled to state in their application blanks, under oath, whether they have been convicted of violating any automobile law is in itself a vitiating requirement. Whether a chauffeur has, or has not, been convicted of violating any automobile regulation in the past has nothing to do with obtaining a license under the new act.

The administration of this law necessarily demands quite a large force of persons as examiners. These examiners have been appointed. It cannot be denied that the patronage is large which has been placed at the disposal of the Secretary of State and for this reason alone the law should have prescribed, not only the qualifications of chauffeurs and drivers, but of examiners.

The law does not require any examination of an owner of an automobile who drives his own car. Only chauffeurs must be licensed. Sons and daughters may drive their fathers' cars without obtaining a license, provided they are 18 years of age. Any non-owner may borrow a car and drive it without a license.

In regard to the fees charged, the graduated fees according to horsepower are in lieu of all taxation. This provision is unconstitutional since it amounts to a special exemption of motor vehicles from taxation while other vehicles used on the public highways are subjected to being taxed.

Coming Events in the Automobiling World

July, Middle of...	Richfield Springs, N. Y., Hill Climb.
July, Middle of...	Grand Rapids, Mich., Road Race of Grand Rapids Automobile Club.
July 16-18........	Motor Contest Association Tour to Catskill and Hill Climb Up Kaaterskill Clove.
July 18-23........	Milwaukee, Wis., Tour of Wisconsin State Automobile Association for Milwaukee Sentinel Trophy.
July 28-30........	Detroit, Mich., Summer Meeting Society of Automobile Engineers.
July 30...........	Wildwood, N. J., North Wildwood Automobile Club. Speedway Races and Club Run.
Aug. 1............	Minneapolis, Minn., Reliability Run of Minneapolis Automobile Club.
Aug. 3-5.........	Galveston, Tex., Beach Races, Galveston Automobile Club.
Jan. 7-14, 1911...	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 16-21, 1911..	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11.	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Pleasure Cars and Accessories Exclusively.
Feb. 6-Feb. 11, '11.	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

THE AUTOMOBILE

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THE news value of the automobile industry is sufficient without drawing upon the views of Wall street. The reasons why money is being locked up in the vaults of savings banks will have to be explained on some basis which does not impugn the economic stability of the automobile industry. The Chicago *Inter Ocean* of July 7, in quoting extracts from an editorial which appeared in THE AUTOMOBILE, concludes by shedding light which clinches the contention that small investors have good reasons up their sleeves for not risking their hard-earned cash in Wall street. When the champions of "high finance" show as clean a pair of heels to dishonesty as the automobile is able to present, they may then be in a position to finger hard-earned money, the lack of which the automobile industry has never felt. The arguments presented in the *Inter Ocean* were as follows:

> The automobile industry is indignant over the effort of Joseph T. Talbert, vice-president of the National City Bank of New York, to blame our present financial worries upon the large outlay which the people of the United States are making in automobiles. Mr. Talbert, in a speech before the Texas Bankers' Association some time ago, declared that this "economic waste" approximates $500,000,000 a year—one-half for new machines and one-half for the maintenance of those in use.
>
> The automobilists have taken issue with Mr. Talbert by demonstrating that the larger part of this outlay is for machines used for business purposes and that the actual expenditure for pleasure automobiles for 1910 will be just about $104,000,00, to which must be added the cost of maintenance.
>
> Moreover, the automobilists point out that the expenditure of even this sum for pleasure automobiles is merely taking the place of other kinds of pleasure payments. If it were not the automobile, it would be something else that would cost money, whether it be horses and carriages, or going to the theatre, or books.
>
> But why worry over these figures or over the other possibilities for the purchase of luxuries? Mr. Talbert's attempt to unload our financial anxieties upon the automobile will never explain the worries of our financiers. It will not explain why the small investors are locking their money up in savings accounts instead of using it in the purchase of stocks and bonds, or why the railroads are curtailing expenses and improvements.
>
> A dozen years or so ago half of America—masculine and feminine alike—was astride of bicycles, but the investment in that luxury did not cause the pillars of the stock exchange to tremble. In a dozen years from now we may all be drawing on our savings bank accounts to buy airships, but the fact of itself will have no more bearing on the status of the financial world than a matinée girl's extravagant investments in chewing gum and ice cream.
>
> The financial worry which is giving our New York bankers some uneasy nights has far more important causes than the purchase and use of automobiles. And if Mr. Talbert spoke his full mind he would admit it.

* * *

MOTOR trouble, due to the accumulation of carbon in the combustion chambers and over the piston heads, is looked upon by the average autoist as a regular thing. Every time a motor shows a tendency to overheat, or when a back kick is too readily realized, the autoist runs for his can of carbon remover and makes haste to dump it into the motor's cylinders. The right time to apply a remedy is when the disease is such as to demand it. Physicians claim that a patient's system is fortified against poisonous nostrums only when the nostrums are indicated and the patient is really suffering from the malady that demands them. Take mercury, for instance; but a slight amount of this poisonous substance will prove fatal to a well man, whereas when this medicine is indicated the amount of it that the patient is able to absorb with impunity is remarkable. In the same way, carbon remover in a combustion chamber will be absorbed with impunity if there is carbon present, but if a cylinder is in good health, then the carbon remover as a medicine will be free to attack the cylinder, instead of doing useful work.

* * *

FREQUENTLY when a diagnosis of cylinder trouble is being made, the conclusion is on a snapshot basis. Instead of incrustation within the cylinder walls being at the bottom of heating troubles, it will more likely be found that the accumulation is over the exterior surfaces of the dome. Such formations produce spheroidal action in the water. No matter how vigorous the water circulation is, there will be no transfer of heat worth taking into account after the temperature rises beyond a certain point, as it will when the conductivity of the dome is stilled by incrustation, so that spheroidal action is what takes place and cooling action dies. When a motor is being examined, a diagnosis of the malady to be complete must include an examination of the exterior dome surfaces as well as the internal walls of the cylinders.

* * *

COOLING, if it is regarded as a necessary evil, is seen in the right light, but the reasons for cooling are rarely ever properly considered. Every heat unit "sponged" off of the cylinder walls by the circulating water is a dead loss. Any plan which makes it unnecessary to rob the cylinder of its heat is a clear gain. When we consider that substantially 50 per cent. of every gallon of gasoline put into the tank leaks out of the radiator in the form of heat, we have a basis for pondering that should convey its own reward.

EFFICIENT cooling is only to be realized when the heat escape from the combustion chamber is retarded to the greatest possible extent, to do which demands that the "gate" be restricted. Since all the heat must go through the cylinder walls to get to the cooling water, it follows that limiting area of surface puts a stop on the heat transfer. This limitation, to be efficacious, must be applied in conjunction with the flame-swept surfaces; in other words, it is the inner wall which must be limited in area.

* * *

WHEN the transfer of heat is snubbed to the greatest possible extent by reducing the flame-swept surface to the minimum, the remaining problem is to maintain the cylinder walls at a working temperature. This is done by directing a sheet of water over the exterior surfaces and counting upon the same to absorb heat from the material of the cylinder walls at a rate which will prevent the material of which they are made from increasing in temperature above the safe working temperature of the lubricating oil used within the cylinders. When this task is performed, any further cooling effort detracts from the thermal efficiency of the motor.

* * *

PREPARATIONS for a war with Japan are now going on in this country. The training camps in the several States are filled with militia which is being trained by Federal officers, perhaps for the purpose of whipping it into shape in time to say "How-do-you-do" to the little brown man when he comes. The chances are that the Panama Canal will be a blind ditch when war drums beat. Japan probably knows that the only chance it will ever have will be before the completion of the water connection referred to. In the meantime, the public must look on and assume an attitude of stolid indifference, while the resources of the country are being dissipated to some extent, at any rate, in the training of men who may elect not to respond to the call when it comes, all of which, to the high disregard of the progress which has been made in aeronautical work.

* * *

BATTLESHIPS are limited in their radius of action to the distance that a shell may be projected from the mouth of the most powerful guns employed, after the ships reach an enemy's shores. Aeroplanes do not have to be protected from the gun play of the enemy's battleships, nor are they limited in their radius of travel by shore lines. The only object in going to war is to make the enemy pay a war indemnity. A half-dozen well-directed shells dropped from a perch in the clouds would bring money out of a miser's coffers, let alone the treasure box of a community.

* * *

ADMITTING that the deliberations of the Supreme Court are bound down by precedent, even taking it for granted that they should be, the fact remains that the General Staff is in poor business looking to precedent as a safe guide and a proper rule. The little brown man, when he comes, will pay high disregard to the precedents and rulings of the Supreme Court. If he brings with him a pack of aeroplanes, and the kind of men who are accustomed to staring death in the face with a bland smile, the little brown men will have fun with the militia, and the General Staff will then have to do but poorly and in a hurry the things it may now accomplish efficiently with ample time.

* * *

ABROAD an international touring law is being fashioned, which will permit of touring all over Great Britain and the Continent with no greater inconvenience than the autoist will encounter on a trip from London to Coventry. In New York State a law is about to be put into force which puts it up to the autoist to decide whether he will get rid of his automobile or the lawmaker who is responsible for his trouble. If the Callan Bill is a good one, every autoist in the Empire State should exert his influence for, work for, and vote for the "Senator" who says he is responsible for the bill; but should the bill prove to be a crown of thorns, it should be remembered that the "Senator" professes to be serving a certain class of citizens who have never been over friendly to the automobile.

* * *

PUBLIC service, from the cab point of view, has always had its sore spot, due to the fact that patrons unfamiliar with city streets were compelled to rely upon the word of the jehu for the distance traversed. The occupant of the driver's seat, with an eye to business, always seems to have seen double when it came to the settlement of the account based upon the miles traveled, and when taxameters came into vogue, the "fares" drew a long breath. There were yet a few details to be mastered; with the coming of the mechanical tell-tale came the driver with a mechanical bent, who manipulated the machine, and, frequently, offset the advantage that was to be derived from it. The time has arrived in the advance of the art when the "fare" is no longer concerned about the crooked wiles of the jehu. Taxameters are tamper-proof, and public inspection should debar them from traveling faster than the cab.

* * *

TOURING time is here and the autoist with his car is to be seen wherever the roads are fit to be traveled upon. But a change is coming over the personality of the autoist who tours on pleasure bent; it is no longer a question of how fast will the automobile go, or how far is it from one place to another, as much as it is a question of where the tour leads, and what of interest will be encountered along the way. This phase of touring is handled by the Automobile Blue Book as a Baedeker feature. Points of historic interest are sufficiently described to permit the autoist to decide as to the expediency of including them in the itinerary of the tour. In the old way of mapping out a tour, it sometimes happened that the autoist traveled a thousand miles to inspect some historic scene that he happened to know about, passing possibly a dozen of more interesting spots along the wayside, because he did not know about them. It is possible to profitably spend a week on a single route within a hundred miles from home, and the cost is enormously reduced. This Baedeker feature is the best remedy for a large tire bill that has ever been devised.

Official Program for the Convention for S. A. E.

HOTEL TULLER, DETROIT, MICH., JULY 28, 29 AND 30

THURSDAY

9 a.m.—Business Session.

2 p.m.—Professional Session.

7 p.m.—Society Dinner and Professional Session.

FRIDAY

9 a.m.—Visit to Manufacturing Plants.

1 p.m.—Boat Trip and Discussion of Papers.

Evening—Dinner at Light House Inn.

SATURDAY

9 a.m.—Professional Session—Commercial Vehicles.

1 p.m.—Professional Session.

THURSDAY, 9 A. M.—BUSINESS SESSION

1. Opening Address by the President: "The Future Aims of the Society and the Work Already in Hand." H. E. Coffin.
2. Report of Tellers of Election of Members.
3. Treasurer's Report.
4. Reports of Committees.

Subjects for General Discussion

1. The Society of Automobile Engineers, the Lines Along which the Organization May be Made of the Greatest Value to its Members Individually and to the Motor Car Industry.
2. The Society Constitution and its Limitations.
3. Suggested Amendments to the Constitution which May Facilitate the Practical Work of the Society.
4. The Publication of a Digest of Technical Literature.
5. The Conduct of a Reference Library.

THURSDAY, 2 P. M.—PROFESSIONAL SESSION

1. The Specification and Heat Treatment of Automobile Materials. Address by Mr. Henry Souther.
2. The Test of a 20 H. P. Franklin Air-Cooled Motor. By Prof. R. C. Carpenter.
3. Variation of Current Practice in Anti-Friction Bearings. Paper by D. F. Graham.
4. The Pyrometer—Its Development and Use. Paper by W. H. Bristol.
5. Testing the Hardness of Metals. A. F. Shore and H. G. McComb.

Subjects for General Discussion

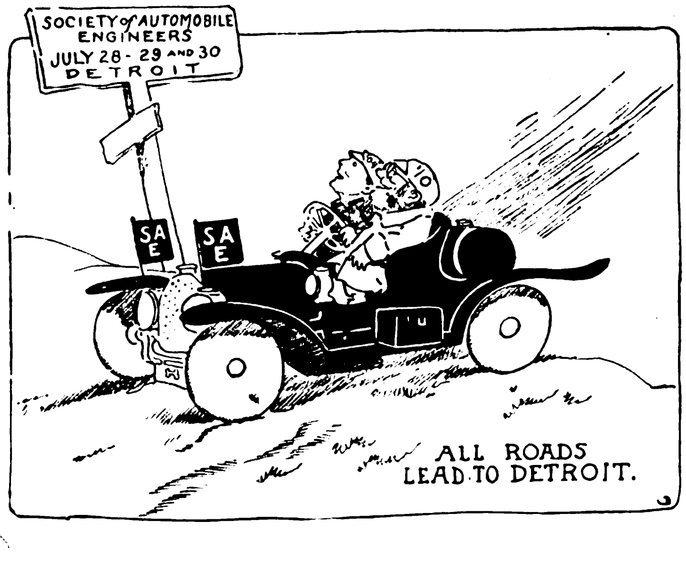
1. The Engineering Lessons to be Learned from the Motor Car Contest.
2. Drive Shaft versus Rear Wheel Brakes.
3. Three-Point versus Four-Point Suspension.

THURSDAY, 7 P. M.—SOCIETY DINNER

followed by

Professional Session

1. Report of Committee on Tire Efficiency. By F. J. Newman, Chairman.
2. Report of Committee on Gear Steels. Dr. G. W. Sargent, Chairman.
3. The Basis for Motor Car Taxation. Charles Thaddeus Terry, Legal Adviser of the American Automobile Association.
4. The Establishment of a Court of Patent Appeals. By E. J. Stoddard.
5. How to Make Gears Quiet by Grinding. Frederick A. Ward.



Subject for General Discussion

1. The Responsibility of the Motor Car Engineer to His Company and to the Public.

FRIDAY, 9 A. M.—VISITS TO MANUFACTURING PLANTS

Aluminum Castings Company,
Burroughs Adding Machine Company,
Cadillac Motor Car Company,
Chalmers Motor Company,
Detroit Steel Products Company,
E-M-F Co.,
Gear Grinding Machine Company,
Packard Motor Car Company,
Timken-Detroit Axle Company.

(Members to elect three of above plants which they individually wish to visit; visiting parties to be grouped accordingly.)

FRIDAY, 1 P. M.

Members will meet at the offices of the Timken-Detroit Axle Company for luncheon on shipboard and for an afternoon boat trip as the guests of the Timken-Detroit Axle Company.

Professional Session on Shipboard

1. Seamless Steel Tubes and the Necessity for Standardization in Their Specifications. By H. S. White.
2. Slide, Rotary and Piston Valves versus Poppet Valves for Gas Engine Service. Paper by Eugene P. Batzell.
3. Ill-Smelling and Smoky Exhausts. Paper by F. D. Howe.

Subjects for General Discussion

1. Wheel Alignments; Camber and Foregather.
2. Hot Rolled Gears (Teeth Rolled in) for Transmission and Differential Purposes.
3. Best Tooth Form for Quiet Gears, Both Spur and Bevel.
4. Valve Seat Angles.

FRIDAY EVENING

Social Session. Dinner at Light House Inn for those attending convention and for the ladies accompanying them.

SATURDAY, 9 A. M.—PROFESSIONAL SESSION
COMMERCIAL VEHICLES

1. Motor Trucks for Railroad Service. Paper by T. V. Buckwalter.
2. Test Data Upon Sheet Metal Frame Sections. By L. R. Smith.

Subjects for General Discussion

1. Proper Power and Speed for Gasoline Motors for Truck Purposes, and Proper Road Speeds for Vehicles of Different Capacities.
2. Location of Motor for Commercial Vehicle Work—in Front Under Bonnet or Under Seat.
3. Long Stroke versus Short Stroke Motor—Advantages and Disadvantages of Each.
4. Driver's Seat on Left versus Driver's Seat on Right for Commercial Car Purposes.
5. The Edison Battery in Practical Vehicle Service.
6. Electric Vehicle Mileage.
7. Fool-proofing the Commercial Car Mechanism and Its Control.
8. Standardization Possibilities Within the Commercial Car Field.

9. A Proper Nomenclature in the Distinction of Freight and Passenger Vehicles.

10. Tire Mileage and Costs.

SATURDAY, 1 P. M.—PROFESSIONAL SESSION.

1. Nomenclature of Motor Car Parts. Paper by F. E. Watts.

Subjects for General Discussion

1. Driver's Seat on Left versus Driver's Seat on Right for Pleasure Car Purposes.

2. Leaf Springs, Methods of Mounting and the Treatment of Springs by the Manufacturer and in the Hands of the Motor Car Owner.

3. Magneto Efficiency.

4. Current Practices in Lubrication and the Practical Results Obtained.

5. Standardization Problems. Those Matters which Deserve the United Attention of the Motor Car Engineers in an Effort to Simplify the Purchasing Department and Deliveries Problem.

Papers

1. Cork Insert Pulleys as Applied to Motor Vehicle Manufacturing Machinery. Lawrence Whitcomb.

2. Carrying Appliances for Tools, Tires, etc. By H. H. Brown.

ADDITIONAL SUBJECTS

For Discussion if the Opportunity Affords

1. Single versus Dual versus En Bloc Cylinder Constructions—the Advantages and Disadvantages of Each.

2. Two versus Three versus Five Bearing Crank Shaft Construction.

3. Die Cast versus Sand Blast Bearings.

4. T Head versus L Head versus Valve in Head Cylinder Construction.

5. Cast Iron Valves.

6. Piston Ring Fitting and Piston Ring Friction.

7. Proper Portioning of Cooling Systems.

8. Foreign Matter in Commercial Gasoline Obtainable Upon the Market at the Present Time.

9. Motor Noises and Their Remedy.

10. Brake Materials.

11. Influence of Case Form and Bearing Style Upon Gear and Gear Box Noises.

12. Six Cylinder versus Four Cylinder Motors of Equal Rating.

13. Practical Experience with Fixed Ignition Timing.

14. Single versus Multiple Ignition Points.

15. The Gear Ratios of Three and Four Speed Transmissions.

16. The Relation of Transmission and Rear Axle Noises.

17. The Preparation of a Stock Car for Racing Work.

18. Worm Drive.

19. Motor Power Required to Drive a Motor Car on Various Road Surfaces at Various Speeds.

All automobile engineers are invited to attend the convention, whether members of the Society or not.

British Supplies Manufacturers to Organize

Patterned after the A. L. A. M., the British manufacturers of automobile and automobile accessories and supplies is in process of formation. In addition to the makers, the organization will include agents and the main purpose of the body will be to prevent concessions from the list prices of the trade.

During the past two years, the tendency of fierce competition has been to force agents to divide commissions in order to get business and as a result, the selling end of the game has acquired an unhealthful tinge.

Already a number of the most important makers located in the Birmingham district have joined. Representatives of foreign automobile makers have been invited to take part in the new organization.

The Automobile Becoming Popular in Jamaica

Consular reports from Jamaica show that the use of the automobile in that tropical land is increasing sharply. Consul Frederick Van Dyne, stationed at Kingston, says that while last year the number of motor cars owned in the city was six but that now there are over 25, besides those used by the Jamaica Motor Company, which operates a passenger, mail and freight line. There are 2,000 miles of excellent roads in Jamaica, and according to the consul, a car that can climb hills will find its use in that delightful island.

Midsummer "Regal Plugger" Is Out

Full to the covers of interesting matter, the midsummer number of the *Regal Plugger* has made its appearance. The neat little booklet, edited by Norman I. Taylor, contains several technical reviews, touring stories of a descriptive nature and a mass of miscellaneous reading all aimed to interest readers in the automobile line.

Kaaterskill Clove Climb Postponed

Owing to scarcity of material available at this time, the reliability run and hill climb that was being promoted by the Motor Contest Association to take place July 16-18 from New York to Catskill, with the climb up Kaaterskill Clove, has been postponed until September 10-12.

Flanders "20" Under Mexican Flag

With two-thirds of its big tour from Quebec to Mexico City accomplished, the Flanders "20" car now en route is steadily plugging southward through the Mexican republic. So far the trip has proved eventful in that road conditions in Canada and in the Ozark section of Missouri were unprecedentedly bad. But those who ought to be in position to know declare that the Three Flags car has only started on its real trial. The Mexican roads are in a class by themselves.

"When they are good they are very, very good, and when they are bad they really deserve very little mention." At least that is the sentiment of several of those who have essayed the trip from Laredo to the capital.

There are numerous bandits of a peculiarly insistent character in the northern part of the country and while it is always pleasant, high on the central plateau if one can reconcile himself to a diet of frijoles and tortillas, superheated with a small red pepper that makes a Harlem gas stove seem like a January morning in Winnipeg.

The crew has expressed itself as "being game for the frijoles," and at latest advices the Flanders is down south of Monterey, working along toward the National road.

Regal Company Establishes Branches

For the last six months the Regal Motor Car Company has been engaged in the establishment of branch houses. For over two years the Regal Company has owned and operated a branch house in Detroit, and it was decided to open direct factory branches in the largest distributing centers in the United States and Canada.

The branches that have already been established are located in Detroit, Buffalo, Boston, New York, Philadelphia, Kansas City, Wichita, Oklahoma City, Chicago, Denver, Minneapolis, Indianapolis, San Francisco, Toledo, Lincoln, Neb., and Toronto, Ont.

New Club Formed at Macon, Ga.

MACON, GA., July 11—The Macon Automobile Association has been organized with the following officers: F. B. West, president; S. R. Jaques, Jr., vice-president: J. C. Wheeler, secretary, and L. O. Stevens, treasurer.

Detroit Prepares to Give Elks Notable Time

DETROIT, MICH., July 11—It is going to be a great week in Detroit; great for the Elks, who will be here 100,000 strong, counting wives and sweethearts, and great for the motor car interests of the city, for at no gathering since the auto came into vogue has it been such an important contributing factor as it will be in the 1910 reunion of the country's antlered tribe. The selling of cars this week will be a secondary consideration, except as the cars may sell themselves, so to speak, for the dealers, in common with Detroit citizens generally, will be too busy showing the visiting Elks a good time to think of business to any great extent, but they will reap their reward later on. The auto parade scheduled for Friday will likely prove an eye-opener to the visitors, and if they do not go back to their homes convinced that Detroit is the hub of the universe as far as the manufacture of motor cars is concerned, it will not be the fault of the local makers.

Robert K. Davis, of the Maxwell-Briscoe Detroit agency, is chairman of the auto committee, and he has been working for weeks on the details of the parade in the hope of making as fine a showing as possible. At first he figured on about 2000 cars, but the present outlook is that there will be nearly 3000 in line. As arranged, the parade will be about 20 miles long and will easily outdo anything of the kind ever attempted before. For Mr. Davis' use during the convention the Maxwell-Briscoe folks have provided a Maxwell roadster finished in white and purple, the Elks' colors. It made its first appearance on the streets yesterday and attracted much attention.

Conspicuous in the parade will be the Buick flyers which gave such a good account of themselves in the Indianapolis speedway races. Team Manager Wadsworth Warren arrived in the city last Tuesday with his crew, including the Chevrolet brothers and Burman.

The visiting Elks may have an opportunity to see just what the speed marvels can do before the week is over. Plans are under way for a series of exhibition matches at the Grosse Pointe race track, as an added feature of the week's program. In this event some lively brushes may be looked for. The entire complement of machines used at Indianapolis will be on exhibition here during the week and in the parade, including the Buick Special "60," the Buick Model 10, the Marquette-Buick 10 A and the Marquette-Buick 16-b.

The extensive grounds of the Detroit Athletic Club on Woodward avenue have been taken over entire by the General Motors Company, and a whole city of tents has been erected to take care of cars manufactured in General Motors plants and owned by visiting Elks. No charge will be made for this accommodation, and there is ample room.

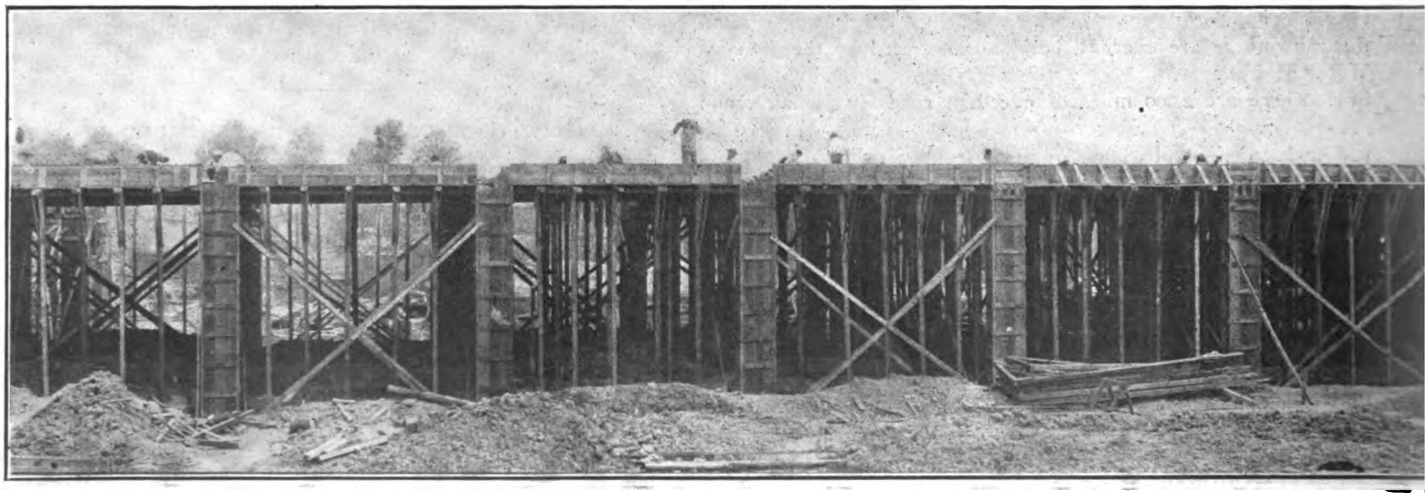
The Grabowsky Power Wagon Company has tendered the Elks the use of a special Palace sight-seeing car during the reunion, together with the services of a competent driver. The car was given a try-out last week with a party of prominent local Elks along as guests of the Grabowsky company, and it proved a big success. The car is finished in deep purple with white running gear.

For the relief work of the ambulance corps that will be on duty during the convention the Hudson Motor Car Company has tendered 12 machines and will supply more if they are needed, it is announced. A Hudson touring car has been donated as the first prize to the ladies making the finest showing in the grand parade next Thursday. It will be up to the ladies to decide which of their number shall have the use of the car.

The Brush car is getting its full share of publicity out of the reunion. The Abernathy "kids," Louis and Temple, aged 6 and 9 years, respectively, who rode 2,000 miles across the continent on horseback to greet Col. Roosevelt on his return trip, are headed this way in a Brush runabout purchased for them by their father in New York. They are due to arrive here Wednesday night and will be one of the big features in the auto parade Friday. A Maxwell car is acting as pathfinder on the trip from New York. A big dinner has been arranged for the "kids" on their arrival and Mayor Breitmeyer will extend a formal welcome.

W. K. Hadley, manager of the United States Motor Company's branch in Albany, N. Y., reached here yesterday afternoon after a 1,000-mile drive from Hartford, Conn., in a Columbia four-passenger roadster. The first leg of 135 miles to Albany was made in five hours flat. The roadster is the official car of the Albany lodge of Elks, and Mr. Hadley carried letters from the Albany lodge to the Grand Exalted Ruler of the order and from Gov. Hughes and the Mayor of Albany to Mayor Breitmeyer. Two punctures were the only mishaps on the trip. The actual running time was a trifle less than 33 hours.

Such is the demand for space in the new auto building at the State fair that it has been necessary to draw lots for it. The drawing took place in the Griswold House Friday evening and the Michigan Motor Sales Company secured the choicest position. The other firms in the order of the drawing are as follows: Cadillac Motor Sales Company, Overland Motor Car Com-



The giant factory plant of the Hudson Motor Car Company at Detroit is rapidly taking shape. The main building, which, when completed, will be one of the model automobile manufacturing plants in the country, is now well above ground and its outlines in reinforced concrete give a good idea of the immensity of the structure. The building as projected will cost in the neighborhood of $500,000 and at the present rate of construction, it will be finished this summer. The building, which is the last word in structural method, will be compact and economical of space, despite its vast size. In addition to the merely utilitarian factors of scientific pany, W. F. V. Neuman, Keeler-Hupp Company, Detroit Motor Sales Company, J. P. Schneider, Brush Motor Car Company, Buick Motor Company, Van Dyke Auto Company, J. H. Brady Auto Company, Grant Bros., Rapid Motor Vehicle Company, Maxwell-Briscoe Auto Company, Harper-Aldrich Auto Company, Cartercar Company, Winton Motor Carriage Company, Regal Motor Company, Olds Motor Company, Security Auto Company, Lyon Motor Sales Company, Anderson Carriage Company, O. B. Fear, Montgomery Motor Sales Company, Ford Motor Company, Empire Tire Company, Atlantic Repair Company, Grace Motor Products Company, Emil-Grossman Company, Auto Equipment Company, Standard Oil Company and the Vesta Accumulator Company.

The answer of the Carhartt Automobile Corporation in the suit of the Columbia Motor Car Company and George B. Selden was filed in the circuit court last week by Henry C. Walters, the attorney of the independent manufacturers' organization. It differs from most of the others filed in that the company claims to have had a definite promise of a license as soon as any more are to be issued. Several new licenses have been issued since, but none to the Carhartt corporation. The answer also sets up that no cars had been manufactured at the time the suit was filed.

Sales Manager Craven, of the Sibley Motor Car Company, brought out the first new Sibley "20" 1911 model which will leave the factory Friday. The car has a 100-inch wheel base, 32-inch wheels, a roomy body with long hood, metal shroud around the dash and an oval gasoline tank in the rear. The steering wheel is laid well back. The Renault type of motor is used and the cylinders are cast in pairs. The engine is cooled by the thermosyphon system and the Bosch ignition is used. The clutch is of the internal cone type; sliding transmission, with the three speeds ahead and reverse. The motor, clutch and transmission are in one unit with one central support in front and at each side of the clutch. The company will begin active operations in its new factory in the west end about July 18.

Collins & Company, distributors of Marmon cars, have moved into their new quarters at No. 1235 Woodward avenue, and will hold open house all week. The Stewart Speedometer Company will be established in its new home in the North Woodward section in a few days.

Martin D. Pulcher, purchasing agent and secretary of the Oakland Motor Car Company since its organization three years ago, has resigned to become general manager of the Bailey Motor Truck Company, in Detroit.

Two new factories closely identified with the motor industry have recently started operation in Detroit. They are the Murphy-Potter Company, manufacturing brass castings, and the Smith-Matthews Foundry Company, iron and semi-steel castings.

The Brush-Chicago Motor Company, of Detroit, has increased its capital stock from $11,000 to $12,000.

Carl H. Page, of New York, has been in the city for several days arranging for the first allotment of 1911 Chalmers cars. He is accompanied by Sales Manager Montgomery. Other Chalmers dealers in town are: H. H. Peters, Minneapolis, and J. H. Valentine, of the Amos Pierce Auto Company, of Syracuse.

Nashville Wants Twenty-mile Speedway

NASHVILLE, July 11—A 20-mile auto speedway, estimated to cost about $100,000, is a probability for Nashville, as the Nashville Automobile Club has launched a movement looking to that end. The matter is to be taken up for final action at the next membership meeting of the club and if it appears that there is enough interest in the matter, a large and representative committee will be appointed and the project pushed through.

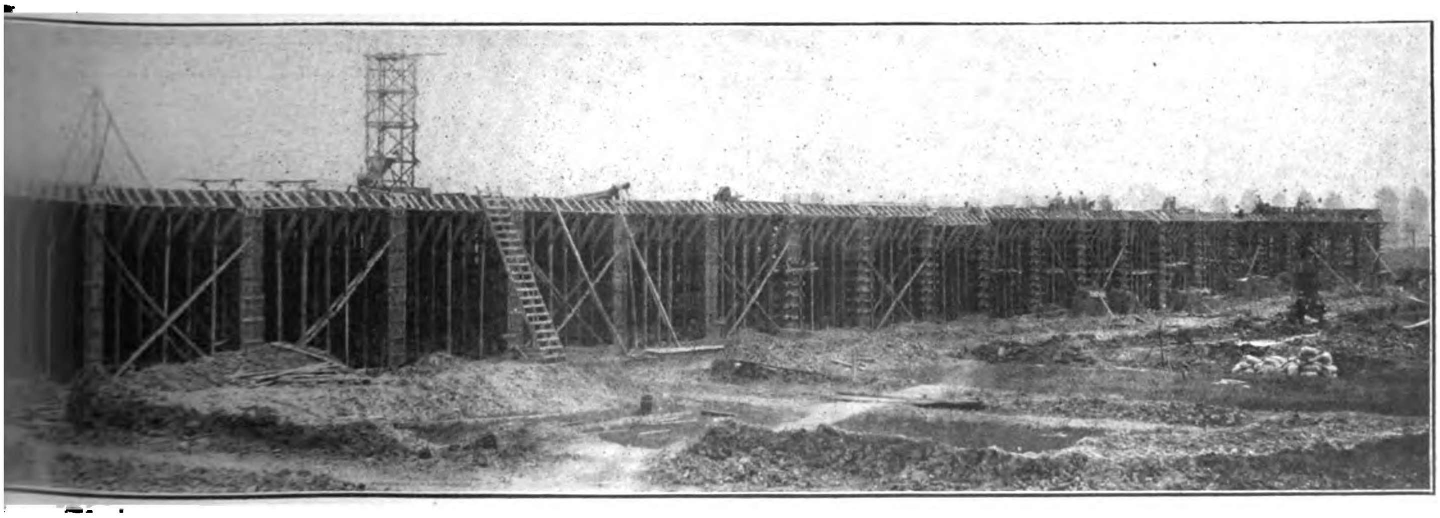
Secretary C. C. Gilbert says his idea of the route is to start in the extreme Western suburbs of the city, pass Bosley Springs, a noted picknicking place, and come in the Harding road and Broadway, the swell pike and street of the city; cross over several other pikes around the southwestern suburbs and pass by Glendale and Cumberland Park, a distance of about twenty miles. It is proposed to have the speedway 100 feet wide, with a 40-foot driveway on each side and a 20-foot parkway in the middle. This would really give forty miles through the prettiest section surrounding the city.

One suggestion is that the driveway be paved with processed wooden blocks, and if this is done it will be one of the best in the country.

A club house is part of the plan. This would be near Bosley Springs. This could be made to cost any amount that suited the members. The cost of the road is estimated at $5,000 per mile. It is not believed the right of way would cost anything, as it is understood this would be donated. Mr. Gilbert's idea is to have the county issue bonds for the speedway. If the plan goes through it is proposed later to extend it to cross the Cumberland river, which runs through the center of the city, and go out several miles to the National Cemetery, where several thousand Union soldiers are buried. It is believed the U. S. Government could be induced to build a portion of the road leading to the cemetery, that is, to widen and improve the present road.

The whole matter will come up at the next meeting of the Automobile Club.

It is probable that all pikes leading out of Nashville will be oiled for a distance of three to five miles from the city limits and that the streets leading into the city from the pikes will also be oiled.



arrangement, the building will contain numerous sanitary features of high excellence, including plenty of light for the operatives, the highest type of plumbing and bathing arrangements, besides other factors that make for more comfort for the employees.

The accompanying picture shows enough of the structural work to give an idea of the size of the main building. The concrete pillars are clearly outlined in the illustration and as they form the basis of the structure, the picture has a certain degree of significance for all those interested in the building of similar plants.

The Munsey Historic Tour Interests Patriots

AFTER an interesting trip of three weeks, the pathfinding party of the Munsey Historic Tour completed its labors last week, having mapped out a course of 1650 miles for the run that is scheduled to start from Philadelphia August 15.

The route roughly is across New Jersey to West Point, from thence to Massachusetts, trending southward as far as New London, Conn. Boston is the eastern limit of the tour, where the cars will swing backward, crossing New Hampshire and Vermont, entering New York State at Lake Champlain. A day will be spent amid the scenes of early military achievements of the American colonists and the battlegrounds of the Revolutionary War adjacent to Lake Champlain, and then the westward course will again be resumed to Binghamton. A circle through Wilkes-Barre and thence to Washington will complete the run, which is intended to be the feature of the year from a touring viewpoint.

The entry list will undoubtedly be large and representative, and already a big list is assured. The tour itself will require ten days and will combine in an extraordinary degree the business features of testing the cars and the pleasure of touring amid scenes of intense interest to patriots and scenery that is unexcelled on this side of the Cascade Mountains.

Items of Interest from Quaker City

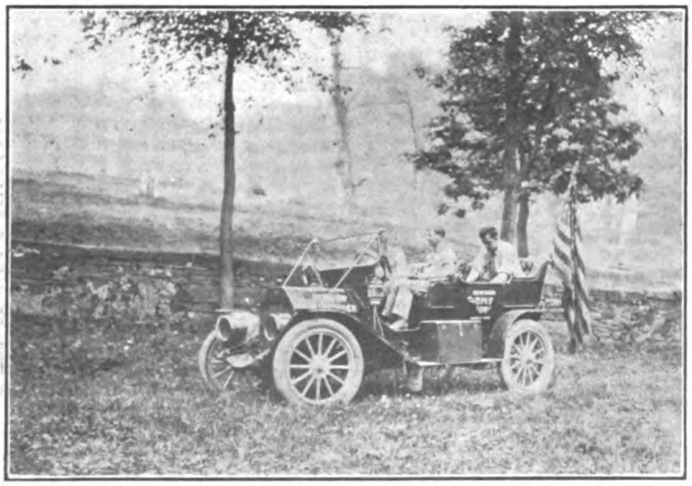
PHILADELPHIA, July 11—Announcement was made to-day by the Quaker City Motor Club that it will on Saturday, August 6, conduct a six-hour endurance contest at the Point Breeze track. The event will be open to stripped cars of Class C, Divisions 1 to 6 inclusive, for which the entrance fee will be $100. Two prizes will be awarded, the winning car to receive $750 and the second car $250.

William C. Longstreth, head of the Longstreth Motor Car Company, Philadelphia agents for the Alco and Pullman cars, sailed for Europe on Tuesday and is expected to be abroad for several weeks.

Announcement was made Saturday that the B. C. K. Motor Car Company, of Philadelphia, local representatives of the Kline-Kar, had been purchased by W. D. Shepherd and T. W. Pritchard, comprising the Krit Sales Company, 203-205 North Broad street, and that that company will be the distributing agency for both the Kline-Kar and the Krit.

Aroused to action by the tremendous success of the North Wildwood Automobile Club's Independence Day meet, other Jersey coast resorts are commencing to realize the advantages to be derived from holding automobile races. Nothing so attracts and enthuses the crowds that flock from the big cities as a series of races capably managed. The latest of the watering places to fall in line is Ocean City. A motor club was recently organized and held its initial run last Saturday to Cape May. Encouraged by the success attending the first effort, arrangements are now being made for an automobile race to take place shortly.

Clarence E. Purdy, formerly connected with the Bergdoll Motor Car Company, has been appointed superintendent of the Chalmers-Hipple Motor Car Company, 206 North Broad street, Philadelphia.



The Munseyites Stop at the Nicholas, Pa., Estate of Galusha Grow, Speaker of the House During War Times

Fourteen Enter Buffalo Tour to Date

BUFFALO, July 11—According to Orson E. Yeager, chairman of the contest and runs committee of the Automobile Club of Buffalo, the following are among the entries to the 300-mile reliability tour which will be run by the club September 7, 8, 9 and 10: The Poppenberg Automobile Company, Buffalo, two cars; Reo, touring class; Overland, runabout class; Meyer Carriage & Auto Company, of Buffalo, Pullman in the touring car trophy; Pullman Motor Car Company, of York, Pa., Pullman in the touring car trophy; Columbia Motor Car Company, of Hartford, at present undecided as to class entry; Regal Automobile Company, of Buffalo, Regal car in touring car class; Maxwell-Briscoe Buffalo Company, Maxwell car and an additional entry.

Meeting of Band of Gypsies Out of Bloomsburg, Pa.

Virginians Object to City Auto Tax

RICHMOND, VA., July 11—At a recent meeting of the Richmond Automobile Club unqualified endorsement was given by that organization to an ordinance now pending before the City Council which will prohibit persons under eighteen years of age from driving cars in the city.

The club entered earnest protest, however, against the proposed levying of a tax of $1 on all persons driving a car. The City Council is now preparing to pass an ordinance regulating the kind of horns to be used on all autos within the city limits.

William F. Gordon has arrived here after an automobile trip of 2,279 miles. In the party were Mr. Gordon, his wife, W. Douglas Gordon and Miss Mabel Walker. The trip was begun June 18 and was most delightful.

New York State had the muddiest roads encountered on the trip, while the roads between Wheeling, W. Va., and Pittsburg, Pa., were the roughest. Other States visited were delightful as far as roads were concerned.

Automobile News from the Boston Field

BOSTON, July 11—The Fisk Rubber Company, Chicopee, has closed a deal with a prominent Boston real estate man to erect a new building on Boylston street, in the heart of the motor colony. Work will be started at once. This will make four new buildings upon which work will be going on simultaneously for motor concerns, others being the Thomas, Fiat and Hartford Rubber Company.

The repair department completed for the Ford branch in Boston has been turned over to the company. It is a three-story concrete building, giving 17,000 square feet of space. The parts are on the first floor, repair department on the second and storage facilities for about 65 cars on the third. It is located in Cambridge, just over Harvard bridge. Manager Charles E. Fay has placed H. E. Partridge in charge of it.

Bay State A. A. members with their families, numbering more than 50, had their annual outing Saturday at Bedford, Mass., where the day was spent in athletic sports, followed by a dinner in the evening. It was a delightful outing.

The Rawles-Cobb Company, dealers in naval and mechanical supplies, has opened salesrooms for the Johnson cars, made in Milwaukee, at 741 Boylston street. The firm will sell both the pleasure and commercial vehicles, and expects to do well with this well-known make of automobile.

R. M. Daniels, manager of the Boston branch of the Studebaker Company, has resigned and the Studebaker interests will be looked after in future by the E-M-F officials, Charles A. Malley and B. N. Crockett. The E-M-F salesrooms will be enlarged and both lines will be handled from the one place, while the company will not have to build a garage as planned, but will use the new Studebaker one.

Plan to Offer $50,000 in Cash Prizes

LOWELL, MASS., July 11—While arrangements for holding a big race meeting on the Merrimack Valley course this fall are still in the tentative stage, plans are being projected that are aimed to bring about one of the most striking meets ever held in the United States. Last spring it was announced that no national championship races would be conducted at Lowell this year, and later preparations were made looking to the holding of a race meeting September 15-17, but at present John O. Heinze, president of the Lowell Automobile Club, and a number of progressive citizens of Lowell are contemplating a meeting at which $50,000 in cash prizes will be hung up and an entrance fee of $5,000 will be charged.

Hartford Valley, on the road to Wilkes-Barre

The plans are still in embryo, but it is said that active preparations to improve the course, bank and widen the famous letter "S" turn and the legal preliminaries are being made.

Rush Work on Marquette Buildings

SAGINAW, MICH., July 11—Foundations for the Washington avenue buildings of the Marquette Motor Company are being rushed and the structures probably will be completed within three months. All the mechanics who can be obtained are working on the erection of the factory. Property in the vicinity is enjoying a decided boom and prospects are that street car service will be extended to the vicinity. Manager Willett estimates the minimum number of employees for the plant at 1,000.

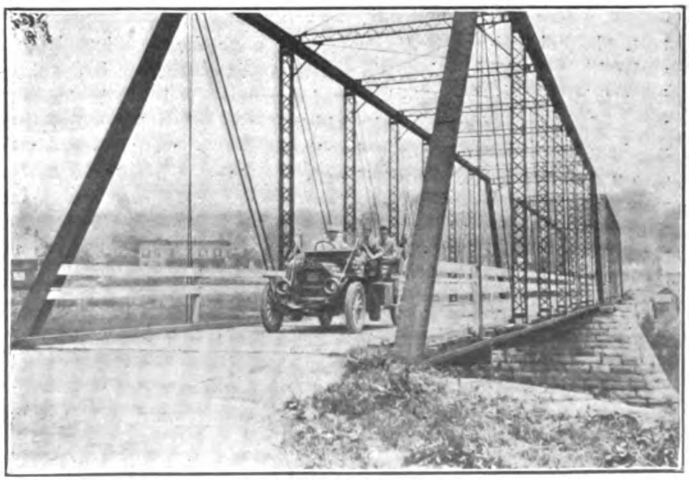
Race Meet for Atlanta Speedway

ATLANTA, GA., July 11—With a sanction granted for July 23 and with a tentative schedule of events drawn up, the Atlanta Speedway Association is soliciting entries for a local speedway meet to be held on the Speedway track. The program includes 15 events and offers a good variety. The races range in length from two miles to twenty and include offerings for all classes, from the smallest to the free-for-all.

Error in Hudson Output—Owen Plant at Detroit

Reports of the sale of cars this year have been so confusing, due to the large number of naughts employed, that mistakes are relatively easy to make, which is best illustrated by the following occurrence: In setting up an advertisement a comma was misplaced in a statement of the total of cars contracted for so that they read as follows: "46,00." A proofreader, noting that the comma was after the 6, figured out that there should be another naught, and he changed the copy to read "46,000." It never occurred to the proofreader that the comma was misplaced, but as a matter of fact the right expression is "4,600." The Hudson Motor Car Company, Detroit, Mich., wishes to let its patrons know that its cars contracted for hover around 4,600 automobiles, but it does not expect to reach the 46,000.

In the description of the Owen 1911 product, which appeared on pages 6 and 7 of THE AUTOMOBILE of July 7, it was erroneously stated that the plant is located in Indianapolis, whereas it is well known that the Owen factory is a Detroit landmark.



The Munsey pathfinders crossing the bridge over the Susquehanna at Otsego

A Row of Hangars on a French Aviation Field, Showing System of Storing the Machines

Aviation News of the Week

WITH his gasoline reservoir as dry as a New Yorker's throat is supposed to be on Sunday, Walter Brookins coasted down from an elevation of 6,275 feet in a Wright aeroplane and landed on the beach in safety after breaking the world's record for high flight in a heavier-than-air machine. The trial took place last Friday at Atlantic City in the presence of an assembly estimated to be fully 25,000. The first announcement made after the completion of the flight was that a height of 6,175 feet had been attained by the aviator, but subsequently the figures were amended, making them 100 feet greater.

Brookins' total time in the air was 1 hour, 3 minutes and 30 seconds. Starting on his official trial at 6:08, he pointed his machine upward at a moderate angle and for 55 minutes he swung back and forth in a spiral circle, mounting ever upward until the man in the big machine seemed no bigger than a pinpoint. After he had been in the air for 51 minutes, observations from the earth showed that the aeroplane was 5,680 feet in the air and was still rising steadily. At this point Brookins was seen to point the plane downward and then back again to the rising position. For five minutes more he continued to rise, and then poising gracefully, the airship swooped toward the beach on a long, gentle angle. Swifter and swifter the plane shot downward until those below held their breaths for fear that the daring youth and his machine would be dashed to bits. Then the plunge was halted and the aeroplane regained its horizontal position and seemed to float along parallel with the surface of the ocean about 500 feet above. Then in a series of short spiral plunges and swings Brookins brought his machine to the beach, landing in perfect form within 100 feet of the start.

He will be awarded a prize of $5,000 by the Atlantic City Aero Club in case his record is not excelled before the present meeting comes to a close.

After landing Mr. Brookins gave a summary of his experiences. Prior to the official trial he had taken a preliminary spin to test the barograph, an instrument to measure height, and also to tune up his motor and machine. Just before 6 o'clock the announcement was made that all was ready, and instantly a big crowd assembled, hampering the arrangements to a certain extent. But sharply at 6:08 the aviator gave the signal to let go, and with a rush the plane darted away from the station. Having attained a comfortable height, he remembered that he had not taken the precaution of replenishing his supply of gasoline, but as the guage showed plenty in the reservoir, he determined to go on and break the record if possible. At 1,800 feet he swung around in a wider circle and mounted rapidly into the high-flying clouds. At this point he was lost to sight of the crowds below and for a time he confessed he was out of his calculations and unable to estimate his position with any degree of accuracy. It grew very cold after passing above the clouds and even the brilliant summer sunshine did not seem to have much potency at the higher altitudes.

Mounting steadily to 6,100 feet, according to the barograph, Brookins again consulted his gasoline gauge and found that his supply was running very low. Then his motor began to miss from lack of fuel and the aviator was forced to the expedient of halting his rise and tipping the plane downward so that the gasoline in the bottom of the tank might feel the force of gravity and flow more freely into his carbureter. When the missing cylinders began again to exert their power Brookins tilted up his planes and renewed his ascent.

When the barograph showed 6,175 feet the motor again began to miss and the aviator shut down and prepared for his long, plunging dive back to earth.

Down the hill of air the machine coasted, gathering momentum from the power of gravity and slipping along at a dazzling rate of speed. The descent commenced at 7:04, and seven minutes later the aeroplane was at rest upon the beach, while the crowds gave vent to the biggest kind of an ovation to the chance-taking young man.

Clifford B. Harmon, the amateur aviator, has been making a series of interesting trials of his Farman biplane at Hempstead Plains during the past week. Mr. Harmon tried out his machine with a full equipment of pontoons before a big crowd Saturday in preparation for his flight across Long Island Sound. On Monday last Harmon made his attempt to fly across the Sound from the aviation grounds to the country home of his father-in-law, in Greenwich, Conn. In his first start he found that the pontoons he had added to his machine spoiled its equilibrium. He had been in the air but a very few minutes on his second attempt when his motor began to skip. With but three cylinders working he was forced to a hurried descent, from which he fortunately emerged with nothing worse than a shaking-up and a smashed machine. A race is being arranged between Mr. Harmon and Capt. Baldwin from Governor's Island up the East and North Rivers, circling Grant's Tomb, the contestants to go in opposite directions.

The new world's record marks for speed and distance which were set at Rheims last week were discussed widely in aero circles. The speed mark of nearly 70 miles an hour was ackuowledged to be the most important by aviators who have had wide experience. Their opinion is a unit that the high speed attained in France foreshadows much higher attainable speeds there and elsewhere. The significance, according to the students of this phase of the air-flying problem, lies in the fact that if the aeroplane can be developed so that a speed of 120 miles an hour is demonstrated, the aeroplane will have triumphed over the uncertainty and danger of sudden, high and uneven winds. When such development has been achieved they point out that travel via the air will take rank in safety with that of travel in express trains on the earth's surface.

In the same biplane with which he made his phenomenal Albany-New York trip, Glenn H. Curtiss, on Monday last, at Atlantic City, established a record for a 50-mile flight in America. His time was 1 hour, 14 minutes and 59 seconds, and the course was 2 1-2 miles in length, from Chelsea to the Steel Pier. He averaged about 40 miles an hour.

Charles K. Hamilton, hero of the first round-trip flight between big cities, has broken with Glenn H. Curtiss on account of some alleged affront to his dignity at Atlantic City. Hamilton's engine had been acting balkily for some time and there was some hitch about the renewal of his motor by Curtiss. Without warning, Hamilton stored his machine and notified Curtiss that he was no longer working. It is said that he will operate another type of biplane in the immediate future.

Auto Decked with 10,000 Roses

At the Portland (Ore.) Rose Festival, held early in June, one of the most striking exhibits was a Studebaker-Garford "40," which appeared in the parade. The automobile was covered with 10,000 roses and a quantity of green ferns and grasses. The form of the decorations of the Studebaker-Garford was that of a giant gondola.

Studebaker-Garford "40" Featured the Portland Festival

The exhibit attracted an immense amount of comment along the line of the parade. The Rose Festival is an institution peculiar to the Pacific coast, where it corresponds in large measure to the Mardi-Gras of New Orleans and other Southern cities.

Los Angeles Frames Contest Program

Los Angeles, July 11—The activity in motor racing circles this coming fall in California will more than make up for the dormant state of the sport this summer.

The first race on the coast will be the San Francisco road race over a course which will take the cars through Golden Gate Park and up the hill of the recent hill climb. Many cars will be entered, some of which will be sent to Los Angeles for the Santa Monica race, which follows on September 24. Los Angeles will be represented by good talent.

The annual Los Angeles-Mt. Baldy road race was originally set for September 18, but as the Santa Monica will follow the Saturday after, there is a conflict which will make a difference in one of the events. It is the belief that the run will be more welcome later on and promise of a better "test" is given.

In October the Motordrome will resume business with a national circuit meet. This will be followed by racing in November and again during the Christmas holidays. It is possible that the meet in October will be a 24-hour race.

November will see the third annual running of the Los Angeles-Phœnix race.

Ten cars were entered last year and fully that many are expected to compete this season.

The race really should start in Phœnix and finish in Los Angeles as the Arizona town failed to show the least enthusiasm. But, regardless of these matters, it is a grand race, which takes the cars over a course where they buck hub-deep sand for 100 miles.

Brooklyn Reliability Postponed

The reliability contest of the Brooklyn Motor Vehicle Dealers' Association, scheduled for July 19 and 20, has been postponed until August 9 and 10. Forty tentative entries have already been made.

Sentinel Trophy Run Looms Large

Milwaukee, July 11—The first annual tour of the Wisconsin State A. A. for the Milwaukee *Sentinel* Trophy promises to bring out a larger field of contestants than any State tour in America up to this time. There are already twenty entries in the hands of Chairman George A. West, who is confident that there will be thirty-five starters at the least. On July 16 all contesting cars will be brought to the Auditorium for inspection by the technical board, under David Beecroft, of Chicago.

The start will be made at 8 o'clock Monday morning, July 18. More than 780 miles will be covered in the five days' run covering practically the entire State. In addition to the $800 *Sentinel* Trophy, the State association will award gold medals and certificates of merit to all cars scoring not less than 97 per cent. of the winning car's score. Cars listing at $1,601 and over will maintain an average speed of 18 miles an hour; cars listing at $801 and up to $1,600 will run sixteen miles, while those listing under $800 will follow a fifteen-mile schedule.

Philadelphia Motordrome Progressing

Work on the Philadelphia motordrome at Clementon, N. J., has taken wonderful strides in the past fortnight.

Large gangs of laborers, carpenters, mechanics, etc., have been set to work for the purpose of converting this now uncultivated piece of country into a tremendous drome for motor car races and aviation meets.

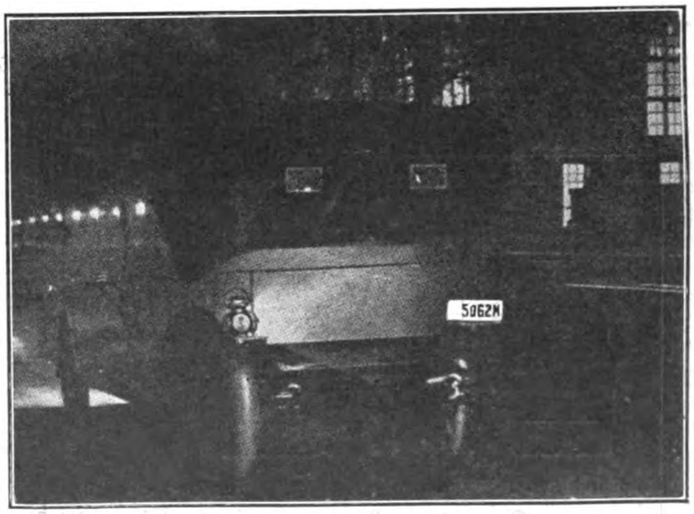
The six hangars which are being erected on the grounds for the storing of aeroplanes belonging to members of the Aero Club of Pennsylvania are near completion.

Reliability Run for Motor Trucks

A motor truck reliability run, to be held August 12-13, under the auspices of the Philadelphia *North American*, is the first event of its kind ever attempted. The contest has official sanction from the Contest Board, and its conditions have been attractively framed. The route from Philadelphia to Atlantic City will be long, varied and populous enough to test the commercial vehicles under the eyes of a considerable section of the public. The Quaker City Motor Club will co-operate with the newspaper.

Helps Motor "Cops" to Trace Offenders

In the current issue of *The Packard* is shown a new kink in the location of the rear license tag—on the right fender, with the tail light so disposed on the left fender that it casts its direct rays upon the number plate, illuminating it distinctly.



Motor "cops" can't go astray with rear lamp in this position

A New Controlling Mechanism for Motor Vehicles

LAWRENCE WHITCOMB, Treasurer of the National Brake and Clutch Company, Boston, Mass., has invented an improvement in controlling mechanism of a motor vehicle, whereby the latter is prevented from being driven at a speed in excess of a predetermined rate, while leaving the motor free to develop its full capacity when the speed of the vehicle falls below the predetermined rate. For this purpose a moving body of liquid is employed, which is responsive to the speed of the vehicle and which actuates or controls the supply of gas or explosive mixture to the motor or which controls the ignition. The moving body of liquid is put in motion by the running gear of the vehicle and may be operatively connected with a throttle valve governing the supply of gas to the motor, or it may be operatively connected with a circuit controller in the igniter circuit. Provision is made for varying the maximum speed limit at which the vehicle may travel, and provision may also be made for utilizing the moving body of liquid for applying the brakes to the vehicle when the maximum speed limit is reached.

In Fig. 1, the moving body of liquid controls a throttle valve in the gas supply pipe 20 leading from the carbureter 21 to the cylinders of the motor b, the pipe 20 being shown as provided with four branches 22. Referring to Figs. 3, 4 and 5, the throttle valve is shown as a hollow piston valve 25 provided with a central wall or partition 26 through which is extended a piston rod 27, the said piston having a series of ports 28 in its circumference, which are adapted to register with corresponding ports 29 in a cylindrical shell or sleeve 30 located in a valve casing or fitting 31 provided with a gas inlet port 32 and with a gas outlet port 33. The inlet port 32 is connected with the carbureter 21, and the outlet port 33 is connected with the gas inlet pipe 20 leading to the cylinders of the motor. The valve shell or sleeve 30 is fixed within the casing 31 and is open at its ends, and the hollow piston valve is also open at its ends, so that gas can pass into the valve from the casing 31 at all times and pass to the motor when the ports 28 in the valve register with or uncover the ports 29 in the shell 30. The valve 25 is acted upon by a spring 35 so as to open the ports 29 and supply gas to the motor as long as the speed of the vehicle is below the maximum set. The valve 25 is moved to close the ports 29 and shut off the supply of gas to the motor, when the speed of the vehicle reaches the maximum determined upon and for this purpose, the valve stem or rod 27 co-operates with a diaphragm 38 of leather or other suitable material, which may be provided as shown with a metal bearing plate or button 39, and which is interposed between the casing or fitting 31 and a liquid containing chamber or well 40, herein shown as in screw-threaded engagement with the valve fitting or casing 31. The liquid chamber or well 40 may be designated a pressure chamber, which is provided with a liquid inlet pipe 41 extended up into it, and with a liquid outlet pipe 42 leading from the bottom of the pressure chamber, the said pipes communicating with a liquid pump, which is operatively connected with the running gear of the vehicle to be driven thereby only when the vehicle is in motion. In the present instance, one form of liquid pump is shown, which comprises a casing 43 containing two intermeshing gears or bucket wheels 44, 45 (see Fig. 7), which are mounted upon suitable shafts 48, 49, within the casing, one shaft as 48 being extended through one side of the casing 43 into a second casing 50, wherein it has mounted on it a gear 51 in mesh with a gear or pinion 52, which in turn meshes with a gear 53 fast on the driven shaft d, (See Figs. 2 and 10). The pump casing 43 is provided with an outlet pipe 55, which is extended to the pressure chamber and is connected with or forms part of the liquid inlet pipe 41 therefor. The pump casing 43 is provided with a fluid inlet pipe 56, which in the present instance is connected with a liquid supply tank or reservoir 57 (see Fig. 1), which is connected by a pipe 58 with the outlet chamber 59 of a regulating device shown separately in Fig. 6, and consisting of a casing 60 having a partition wall 61 forming the outlet chamber 59 and an inlet chamber 62, which are adapted to be connected by a port 63 in the partition wall 61, with which co-operates a valve 64. The inlet chamber 62 has connected with it the outlet pipe 42 for the pressure chamber 40. The valve 64 is provided as shown with a threaded stem 65, which is extended through the casing 60 and into a chamber 66 having a removable wall or cover comprising a metal ring 67 and a glass disk 68, through which numbers on the bottom 69 of the chamber and indicative of speed units, such as miles, may be seen. The valve stem 65 has attached to it a handle or pointer 70, which registers with the numbers referred to and which may co-operate with studs or pins 71 depending from the ring 67 and forming locking devices for the said pointer or hanger to retain the latter and the valve 64 in their adjusted positions for a purpose as will be described. By turning the handle 70, the valve 64 may be moved toward or from the port 63 so as to restrict or enlarge the flow of liquid through the port and thereby increase or decrease the pressure of the liquid in the chamber 40 upon the diaphragm 38, with the corresponding result of diminishing or increasing the amount of gas supplied to the engine. The cover of the chamber 66 in which the regulating apparatus is located may be sealed or locked to unauthorized persons by means of a lock 73.

In the arrangement of the apparatus herein shown, the valve 25 is represented as independent of the usual throttle valve not shown, but which is under the control of the operator of the vehicle, and when the vehicle or car is at rest, the valve 25 is opened wide by the spring 35.

When the car is in motion, the liquid pump is driven from the running gear of the vehicle and takes the liquid from the supply tank 57 and forces it into the pressure chamber 40, from which it passes through the pipe 42 into the chamber 62 of the regulator, and if the valve 64 is open, said liquid passes through the port 63, chamber 59, and pipe 58, back to the supply tank or reservoir 57. By varying the position of the valve 64 with relation to the port 63, the circulation of the liquid may be varied so that more or less liquid accumulates in the pressure chamber 40 and the pressure of the same upon the diaphragm is varied, so that the valve 25 is operated to supply more or less gas to the engine according to the maximum speed it is desired the vehicle should travel. For instance, let it be supposed, that it is desired to limit the maximum speed of the vehicle to twenty miles an hour. In this case, the owner of the vehicle or other authorized person sets the handle or pointer to register with the number 20 of the regulator. This movement of the handle causes the valve 64 to be moved with relation to the port 63, so as to restrict the flow of the liquid through the regulator and cause the liquid to accumulate in the chamber 40, until such pressure has been increased sufficiently to move the diaphragm 38 and the valve 25 so as to diminish the supply of gas to the motor to such extent as will prevent the speed of the vehicle exceeding the maximum set, say twenty miles per hour, and if desired, the valve 25 may be entirely closed at such time. When the speed of the vehicle drops below the maximum, the pressure in the chamber 40 diminishes, and allows the spring 35 to move the valve 25 in the opposite direction and increase the supply of gas to the motor.

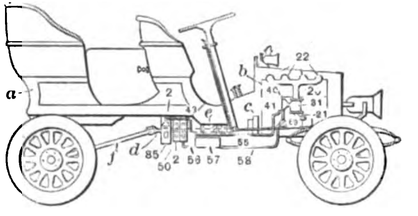


Fig. 1—Side elevation showing application of speed regulator

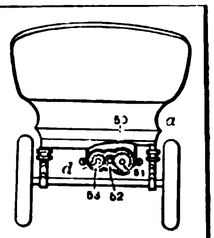


Fig. 2—Cross section on line 2-2, Fig. 1, with body in elevation

While the vehicle is traveling below the maximum speed, the operator is free to develop the full power of the motor if desired, as for instance in climbing hills or traveling over sandy roads. The spring 35 may be of such strength as will hold the valve 25 wide open until the vehicle is traveling at the maximum speed, at which time, the pressure in the chamber 40 has increased sufficiently

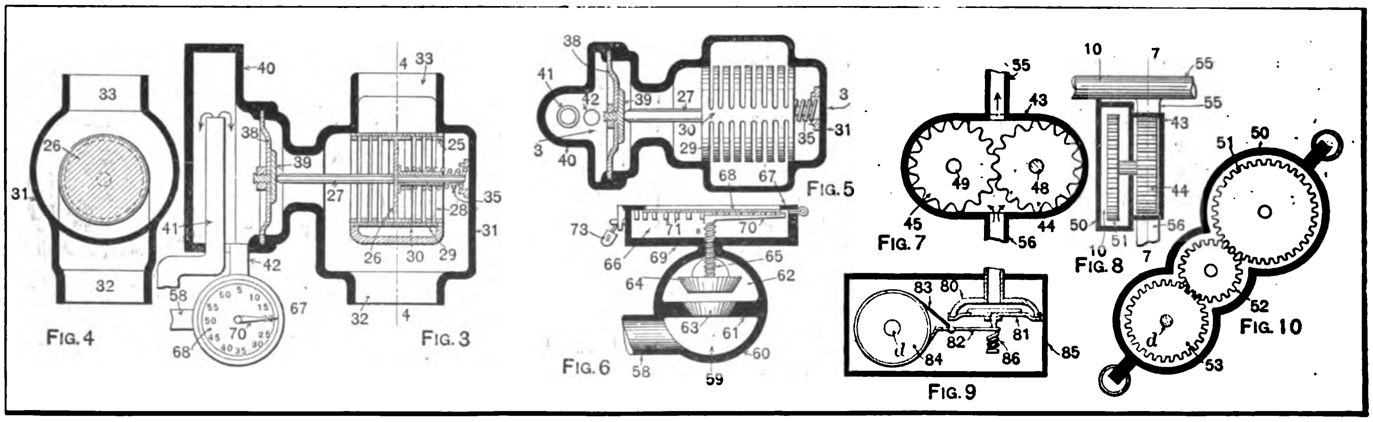


Fig. 3—Sectional detail of throttle valve and operating mechanism. Fig. 4—Cross section on line 4-4, Fig. 3. Fig. 5—Partial plan and section of throttle valve. Fig. 6—Showing details of the speed regulating device. Fig. 7—Section on line 7-7, Fig. 8. Fig. 8—Details of the liquid pump. Fig. 9—Sectional detail of liquid-pressure brake. Fig. 10—Section on line 10-10, Fig. 8

to overcome the spring and completely cut off the motor from the gas supply, or if desired the spring 35 may be adjusted to permit of a gradual closing of the valve 25. If desired the liquid pressure may also be utilized to apply a brake to stop the vehicle when the maximum speed limit is reached, which may be accomplished as herein represented, by connecting the pipe 55 with a chamber 80 (see Figs. 1 and 9), having a diaphragm 81, which acts on a lever 82 connected with a band brake 83, which engages a brake-wheel 84 fast on the driven shaft d. The brake band 83 and its operating mechanism may be located in a suitable case 85. When the fluid pressure reaches the point at which the valve 25 is closed, it may be sufficient to actuate the diaphragm 81 and apply the brake 83 to the wheel 84, and when the pressure is reduced, the brake may be released by the spring 86 acting on the sleeve 82.

Among the claims made for this device are: A valve to control the supply of explosive medium to said motor, a chamber containing a diaphragm operatively connected with said valve, a liquid pump driven by said mechanism and connected with said chamber to create a pressure upon said diaphragm by a moving body of liquid, means for regulating the liquid pressure upon said diaphragm to operate said valve and control said motor when the speed of the vehicle reaches a predetermined point, a brake, and a diaphragm operatively connected with said brake and responsive to pressure of the said moving body of liquid, substantially as described; a governor means for operatively connecting the governor with the vehicle to cause the governor to respond to the speed of the vehicle at all times while the vehicle is in motion and irrespective of the speed of the motor, and means to operatively connect said governor with said diaphragm.

Trade Notes of Interest to Maker, Agent and Garage Keeper

Adolph Eastman will sever his connection with the Wagner-Field Company on July 16.

H. G. Twelvetree has taken the active management of the Cleveland Rambler agency.

Manager F. S. Rockwell, of the Toledo Buick branch, has taken the agency for the Reliance motor truck.

The Glidden Garage Company has been incorporated in Buffalo; capital stock, $10,000. Directors: Oscar, Mary E. and Harry C. Meyer.

The R. E. Hardy Company has announced that the manufacture of Sta-Rite ignition plugs in Canada has commenced at its Windsor factory.

The New England Motor Vehicle Company, of Boston, has taken on the Parry car, the agency for which had been discontinued a few months ago.

Gray & Davis, makers of high-grade lamps, have made the announcement that they are shipping the Cadillac Motor Car Company, of Detroit, four carloads of lamps each month.

The Porter-Lovette Auto Company has just opened a fine new garage at 548 Grand River, corner Myrtle, Detroit. This is a one-story, concrete building, with a capacity of 75 cars.

V. M. Palmer, chief engineer of the Selden Motor Vehicle Company, Rochester, N. Y., has resigned his position to accept a similar place with the Sheldon Axle Company, of Wilkes-Barre, Pa.

Charles E. J. Lang, of the Rauch & Lang Carriage Company, is now on a tour around the world. He will visit many of the larger cities of the world, and incidentally will open up markets for the electric car made by the firm.

The Mercer Automobile Company, of Trenton, N. J., announces that the price of its 1911 stock model, including full lamp equipment, tools and repair kit, will be $2,150. Touring car, toy tonneau and Speedster are the chief styles.

The General Motors Company will make extensive improvements on the Elmore factory at Clyde, Ohio. A new machinery building, 200 feet wide and 250 feet long, will be erected, making the main factory structure 660 by 300 feet.

Ground was broken the past week for the Seattle Taxicab Co.'s new garage at Ninth and Pike streets. The structure will be built of brick and the cost will be $25,000.

George F. Reim, formerly with R. R. Kimball, has secured the Omaha Cadillac agency and formed a partnership with W. R. Drummond to handle the Cadillac car. The new firm will occupy the garage of C. F. Louck at 2550 Farnum street.

Joe Downey, the well-known race driver of Boston, has been spending some time at Newburyport, where William Hilliard is experimenting with a Burgess aeroplane, and he expects to go into the flying business as soon as he can get a machine.

The C. A. Shaler Co., Waupun, Wis., manufacturers of the Shaler Electric Vulcanizers, has awarded contracts for the construction of a new factory. The main building is to be of concrete, and electric power transmission is to be used exclusively.

C. J. Merbach and Gordon S. Morse will build a large garage, 100 by 100 ft. in dimensions, on Watson street, near Woodward, Detroit, with a machine shop in connection. This will be an all-concrete and steel building, and will accommodate 75 cars.

The annual outing of the employees of C. F. Splitdorf at Schroeder's Unionport Park, Saturday, June 25, was largely attended. Prize bowling, dancing and athletic events was the order of the day, the weather was perfect and the affair enjoyable.

George L. Osborne has been appointed sales manager of the Boston branch of the Peerless Company, while H. C. Mayo has been placed in charge of the outside business in New England. Manager John L. Snow announces that the new building for the branch will be ready for occupancy about August 1.

Frank F. Matbeson, general manager of the Matheson Motor Car Company, is slowly recovering from an operation for appendicitis. On the occasion of his last visit to New York on June 18, Mr. Matheson was taken suddenly ill in the Knickerbocker Hotel. He was promptly removed to Wilkes-Barre, Pa., and there underwent an operation for the removal of his appendix.

C. L. Simmons has associated himself with the Lozier Motor Company, and has started on an extended trip throughout the South and West, visiting old agencies and extending the Lozier field of operation into new territory.

B. F. Hoffman, Jack Calvin and J. M. Calkins have formed a partnership at Bryan, O., for the purpose of erecting and operating a garage and repair shop in that city. The building, which will be located just east of the Jefferson Hotel, will be 44 feet by 130 feet in dimensions, and of substantial construction.

The Tokheim Manufacturing Company, of Cedar Rapids, Iowa, has opened a branch office in Detroit at 300 Woodward avenue. This is in charge of R. P. Hanson. The company makes a line of gasoline and oil handling apparatus, both in the hand-actuated and vacuum-operated types, as well as all parts for oil storage and handling.

The Yuster Axle and Transmission Company, of South Bend, Ind., has been absorbed by a syndicate consisting of J. C. Paxton, president of the Merchants' National Bank, and several others. Mr. Yuster retains an interest as vice-president. The property will be consolidated with the Clover Leaf Machine Company. A new factory with 75,000 square feet of floor space is projected.

A Metz car, made at Waltham, Mass., is said to have traveled from Iron Hill, Md., to Winchester, N. H., traversing nine States in a single day. The States covered were Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, Massachusetts, Vermont and New Hampshire. The tour touched 18 cities having a population of more than 20,000, or an aggregate of over 7,000,000.

Albert Bennet, who has been sales manager for the Colt-Stratton Company, Eastern distributors for the Cole "30," has taken charge of the Henderson Motor Sales Company, of Indianapolis, and in addition to his work of handling the Cole car in the East will look after the Westcott "40," which is distributed through New York State and New England by the recently organized Dunlop-Taylor Motor Company.

Seen in the Show Window

ACCESSORY makers are now recognized as of the greatest importance to the industry, they being specialists, and the trade demanding a larger output than the makers of cars are able to cope with. The Cotta Transmission Company, Rockford, Ill., is handling work of this character on a large scale, and as an illustration of the character of the product being turned out at this plant, one specimen (AE) is here presented. The design is stable, the material used is fitting, and the character of the workmanship is up to a high standard.

NOT to mention the sanitary aspect of the matter, the idea of a speaking tube as a medium of communication between passenger and chauffeur has many objections. It is difficult to speak and to hear through a tube, and the electric devices which have supplanted the latter, in a measure, have the defect of a limited range of instructions, so that it frequently becomes necessary to open the window when the passenger desires to talk with the driver. The Hall's Rigid Motor Flap (AF), now being marketed by S. F. Edge (Ltd.), 14 New Burlington street, London, Eng., meets these objections very thoroughly. It is a neat and solidly made metal frame, finished in nickel or brass, and easily opened by touching a button at the bottom. The flap is held open by means of a spring.

AMONG the latest devices for transmission work is the pneumatic transmission here shown (AG), which is made by the Pneumatic Transmission & Clutch Company, Los Angeles, Cal. This device provides mechanism to take the place of the usual flywheel, clutch and transmission gears.

In accomplishing this two members are used: the one connected directly to the engine, being ordinarily the driving member, and the other connected to the shaft or driven member. On the driving member is mounted a plurality of cylinders in which pistons attached to the driven member are adapted to reciprocate. These pistons are eccentrically connected to the driven shaft while the cylinders are concentrically arranged around the axis of the driving member, so that upon any relative rotation of the members the pistons will be reciprocated in the cylinders.

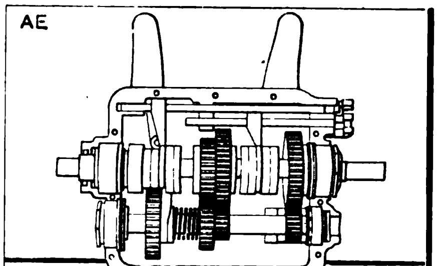
By retarding the action of the pistons in the cylinders, the driven shaft may be more or less rigidly locked to the driving member; and this retarding or locking means is compressed air in the cylinders behind the pistons. Openings in cylinders are provided which may be restricted, through which the air must pass, and thus the amount of locking effect between the two members may be regulated at the will of operator. Automatic valves are provided so that air is taken into cylinders from atmosphere and is pumped out through these restricted ports. The ports are connected with a pressure reservoir into which the air is pumped.

When it is desired to start the engine, or run the car in either direction, air is thrown from this reservoir into cylinders through the valves and the clutch-transmission member becomes a rotary air engine.

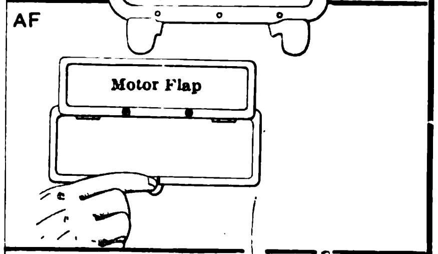
The piston chamber valves operate automatically, and the entire mechanism is controlled by one three-way valve located between clutch and storage tank by which the locking effect of clutch or driving effect of air engine is operated at will.

Air pressure in tank is automatically kept constant through a by-pass valve.

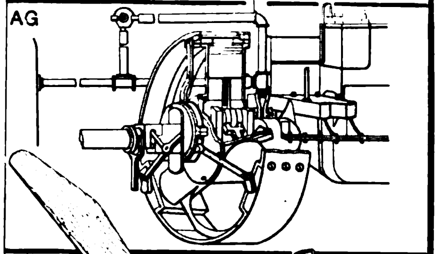
AE



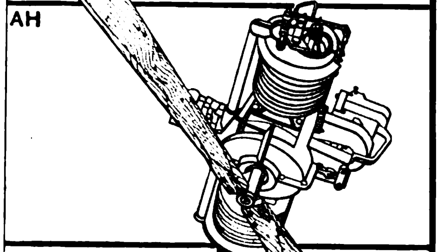
AF



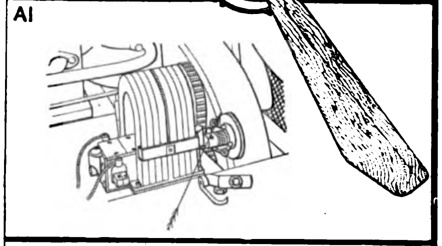
AG



AH



AI



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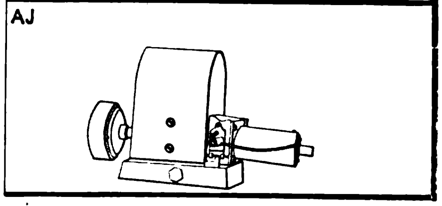


(AE)—A Specimen of the Cotta Transmission Company's Work

(AF)—The Halls Rigid Motor Flap—A Needed Convenience

(AG)—Pneumatic Transmission Which Replaces Fly-Wheel, Clutch and Gears

(AH)—The Detroit Light-Weight Engine for Aeroplane Work

(AI)—Holzer-Cabot Idea of Magneto Drive by Friction from Motor Fly-Wheel

(AJ)—The Economy Perfection Automatic Battery Charger

THE demand for a low-priced, light-weight motor for aeronautic purposes has resulted in attracting the attention of numerous designers. Among them, the Detroit Aeroplane Company has perfected and is manufacturing a two-cylinder, air-cooled engine (AH) of the double-opposed type, four-cycle, 5-inch bore and 5-inch stroke, with a speed range of from 700 to 1500 R. P. M., and developing between 20 and 30 horsepower. The complete engine weighs but 98 pounds. The company will make and attach propellers to motors on special request, and keeps in stock sizes between 5 and 8-feet diameter and 3 to 7-feet pitch.

JUST now the question of magneto ignition is being taken up by many owners of old automobiles, and in some of the used models it is quite a problem to apply a magneto. Referring to (AI) of the Holzer-Cabot Electric Company's magneto ignition equipment, it will be observed that provision is made to drive the magneto from the flywheel of the motor. A friction drive is provided, and the method of the use of the principle is such that the result is satisfactory. The plant of the company at Boston, Mass., is well equipped to do work of this character.

THE general adoption of electricity for lighting automobiles and motor boats has been retarded by lack of a proper and dependable current supply. To remedy this defect, the Economy Manufacturing Company, of Economy, Pa., has introduced the Perfection Battery Charger (AJ), which automatically keeps the storage battery always supplied at practically no expense for maintenance and obviating the necessity of removing the battery from the box. Either friction, gear or belt drive may be used with this handy device.

VOL. XXIII NEW YORK—THURSDAY, JULY 21, 1910—CHICAGO No. 3

THE AUTOMOBILE

Gasoline Reigned During Elks' Week at Detroit

THE CADILLAC FLOAT WHICH WON THE GRAND SWEEPSTAKES IN THE PARADE

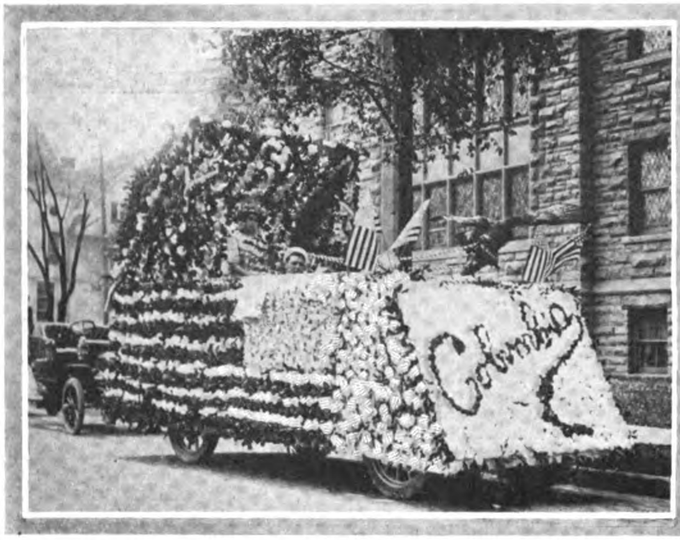
DETROIT, MICH., July 18—Gasoline reigned in Detroit last week. The supremacy of the gasoline motor was strikingly demonstrated on land and water and in the sky overhead. No other factor contributed so largely to the entertainment of the host of visiting Elks. What with speed exhibitions by some of the word's famous drivers, aeroplane flights at the State fair grounds, motor boat races on the river and one of the greatest auto parades the world has ever seen, the visitors must have been impressed.

There were a few less than 2000 automobiles in line Friday afternoon. The parade was about a dozen miles in length and as a spectacle was well worth seeing. The entire route, traversing nearly eight miles, was lined with spectators and a goodly crowd filled the grandstands on Washington boulevard.

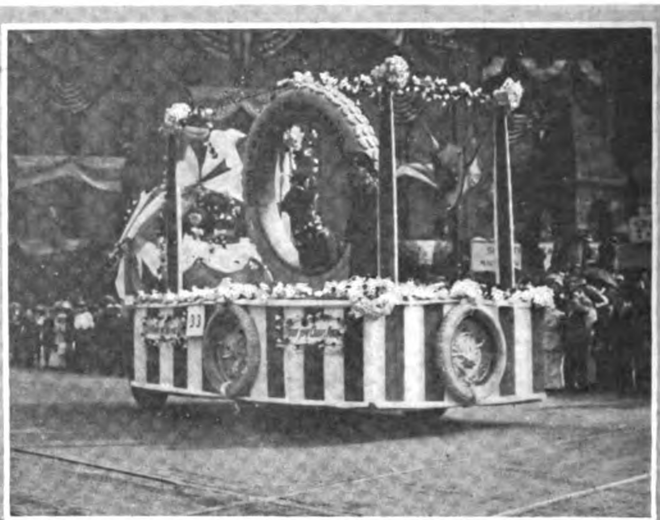
Practically all the local manufacturers took advantage of this opportunity and most of them made a creditable showing. An unusual number of 1911 models were displayed, high officials of the various companies driving them in many instances. There were some 40 sections in all.

The Cadillac Motor Car Company captured the grand sweepstakes prize; a 30-inch silver loving cup with gold lining, with its magnificent float representing Chevalier Cadillac receiving from Louis XIV. of France a commission to found a colony at Detroit. It was a reproduction in life of a painting that hangs in the city hall and which was presented to the city by the French Government on the occasion of Detroit's bi-centennial celebration.

A Chalmers "30," driven by Mrs. R. D. Aldrich, won the prize offered for the best decorated car driven by a woman. In the gasoline pleasure car division, T. A. Belinger, in a Warren-Detroit, won the first prize; Will B. Wreford, local agent of the Columbia, the second, and the third went to the driver of a Sibley "20." In the commercial-car division the first prize went to the Welch-Detroit motor car for a strikingly realistic reproduction of a scene from the battle of "Bloody Run." The second prize went to a local furniture house, and the third to Morgan & Wright, whose float contained a boy in a swing suspended from the top of a huge tire.



Columbia, which captured second prize for gasolines



Morgan & Wright float in the commercial division

The parade brought out some surprises in the way of comic novelty, but none more original than that of the Michelin Tire Company, a pair of inflated rubber giants perched on a high pedestal. The figures assumed ludicrous positions as the car sped along, its locomotive whistle screeching incessantly. The Michelin company won a prize, and the only one in the comic section.

The Buick racing cars loomed conspicuously in the parade as they trailed along behind a car in which no less than 50 prize trophies were displayed. The official party, comprising Mayor Breitmeyer, Past Grand Exalted Ruler Sammis, of the Elks; Grand Secretary Fred C. Robinson, Grand Esquire A. J. Davis and Fred S. Burgess, chairman of the Elks' executive committee, rode in a Welch car at the head of the parade, directly behind the police escort in Fords. E-M-F cars made up four divisions and the Fords and the Hupmobiles two each. The Hudson Motor Car Company had about 60 cars in line. Robert K. Davis was marshal of the parade and rode in his purple and white Maxwell roadster, followed by his aids in their individual cars. The Regal "Plugger" was there with all its labels. "Garry" Herrmann, the new Grand Exalted Ruler of the Elks, rode in the Hudson "30" won by the Cincinnati ladies for making the best appearance in the big Elks' parade of Thursday.

Aside from its historical float and a fine showing of new cars, the Cadillac Motor Car Company displayed its enterprise by rounding up a half dozen or so of its earliest type, built in 1903, and having them driven in the parade by their owners under a banner bearing this legend: "Eight years of service and still going." The company says it has yet to hear of the first Cadillac car going out of commission.

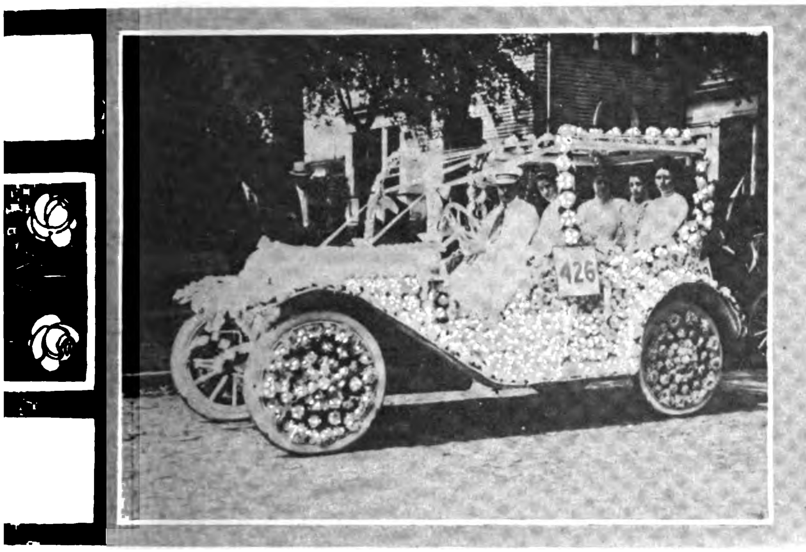
In spite of a rather heavy track, some remarkably good speed stunts were pulled off at the Grosse Pointe race track Saturday afternoon at the free exhibition matches participated in by the members of the Buick team. There were 12 events on the program, which attracted a crowd of nearly 10,000. The aeroplane flights at the fair grounds drew less than 1000 Saturday, but this attraction wasn't free.

Burman, in his special, made the fastest mile of the day in 56 4-5 seconds. This was on a second trial. The time on the first trial was 59 seconds flat. But Louis Chevrolet carried off the lion's share of the day's honors, winning every event in which he was entered but one.

Both the General Motor Company's tented garage on the D. A. C. grounds and the United States Motor Company's "white city" out Jefferson avenue were put to good use by visiting motorists during the reunion, and the courtesy shown was greatly appreciated. The Sibley Motor Car Company also offered the use of its new building at Solvay and Mackey avenues to visiting motorists. The building is just completed and the company is moving in to-day.

Regal "30" displayed to advantage on a truck

The Hudson showed up well in its class



Warren-Detroit, Winner of First Gasoline Prize

A Chalmers-Detroit float which attracted attention

The aeroplane flights at the State fair grounds Thursday, Friday and Saturday were the first exhibitions of the kind ever given in Detroit and were largely attended the opening day. Flights were made by Arch Hoxsey, Duval La Chappell and Walter Brookins, the latter of whom holds the world's altitude record, 6275 feet. No records were broken here and no attempt was made to break any, because of unfavorable conditions. While not aeroplaning, Mr. Hoxsey drove a Cartercar, placed at his disposal by George Reason, branch manager for the Cartercar company here. Between flights Leo Broker gave exhibitions with his "wind wagon," a cross between an aeroplane and a motor car, which proved as amusing as it was noisy. A race between the "wind wagon" and a motorcycle was an added feature of Friday's program, and the latter won by half a length in 1:41.2, going once around the mile course. The "wagon" is like an automobile in appearance, except for a huge propeller on the front end, which pulls the machine along when it revolves.

David Kerr, manager of the Kerr Machinery Company, has purchased the white and purple Maxwell roadster made especially for the use of Robert K. Davis, of the Maxwell-Briscoe-McLeod Company, during the Elks' reunion.

Walter E. Flanders, president of the E-M-F Company, emphatically denies a story that has gained wide circulation, that he is soon to leave the E-M-F to associate himself with E. LeRoy Pelletier, former advertising manager for the company, in the manufacture of a new style of automobile, propelled by four wheels turned by the motor instead of two.

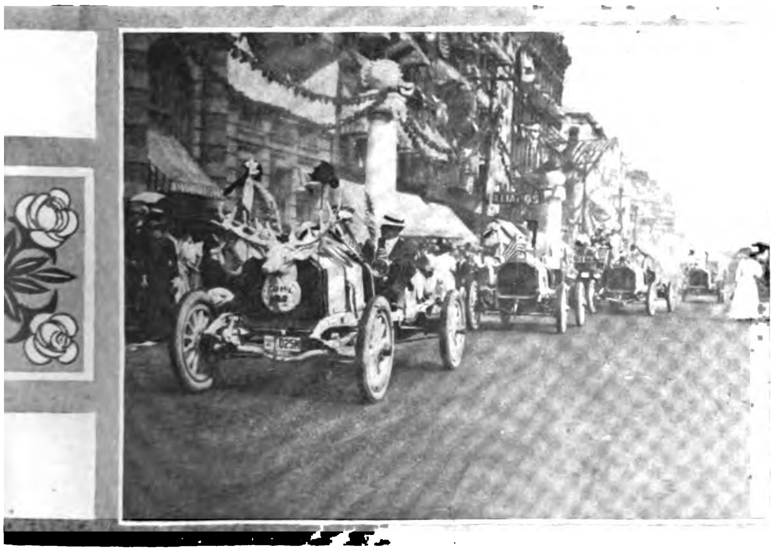
"The story," said Mr. Flanders, "is without the slightest foundation in fact."

Incidentally Mr. Flanders announces that the company has about completed plans for the manufacture of commercial trucks, which will necessitate the erection of another addition besides the two now under way.

Accompanied by a brass band, 500 employees, for the most part foremen and department heads, from the seven plants of the E-M-F company boarded a special train Friday morning for a day's outing at Lake Orion as guests of the company. This was a part of the three days' vacation given the men with full pay.

With reference to the resignation of Mr. Pelletier, the story comes from New York that J. P. Morgan, who now controls the E-M-F, was displeased with the prominence given his name in the press accounts of the sale and the publicity "dope" given out by Mr. Pelletier's department. It is reported that Mr. Pelletier's $200,000 worth of stock has been purchased by the Morgan interests at par.

After negotiations of long standing, James J. Brady has disposed of his interests in the Chalmers Motor Company to Hugh Chalmers, president of the concern. Previously he disposed of his interests in the Hudson Motor Company, the Metal Products Company and the Fairview Foundry Company.

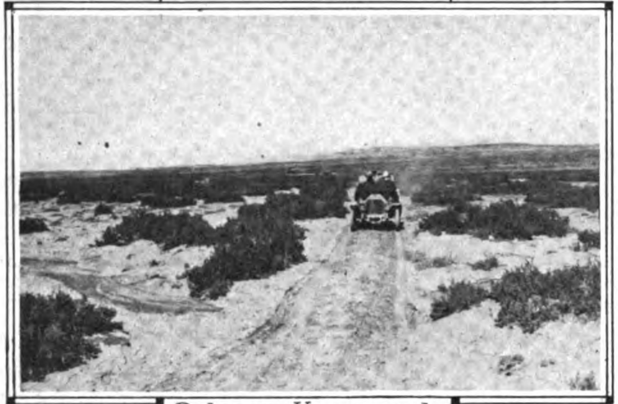


Head of the parade coming down Woodward Avenue

A particularly effective entry in the line-up


Passing Home Seekers

Through the Bitter Creek Section



Between Hanna and Rawlins

Overland Transcontinentalists

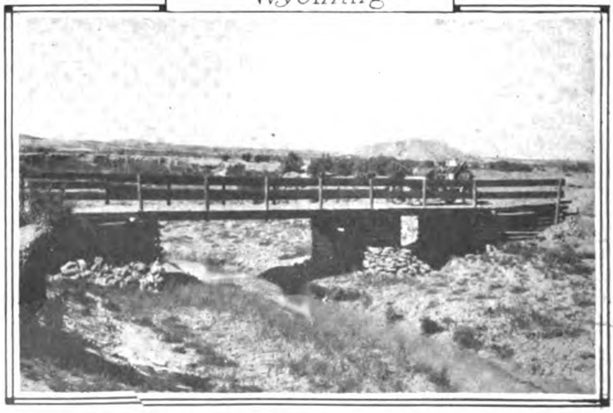
WESTWARD from the Wyoming-Nebraska State line the route of the transcontinental trip following the old Overland trail lies through some mighty lonely country. The accompanying pictures show its desolateness with remarkable clarity, but they can give no idea of the quality of the roads in bad weather, for they were taken after a long dry spell when the alkali and baked mould were packed hard as flint under a thin cushion of dust. Reports from the tourists show that the roads throughout Wyoming were an agreeable surprise as to condition.

Almost from one side of the big desert State to the other a range of yellow hills lies to the northward of the Overland trail. At Sherman the road crosses the continental divide, nearly a mile and a half above sea level. To the southward stretches a vast tangle of rugged mountains, comprising the backbone of the American continent, and as the tourists progressed on the almost imperceptible down-grade, through the wide valleys dotted with gray-green sage-brush, where for hours the only living objects within view were occasional bunches of cattle, a stray coyote or jackrabbit and a few antelope grazing on the sparse bunch-grass near the cattle, they received a foretaste of what they were to encounter further to the west.

The trails in the heart of the Rocky Mountains are sometimes miles in width, where the floor of a valley is as level as a billiard table for considerable distances. Then again they narrow down to a single roadway, and where the trails are used for heavy freighting, to and from mining camps, they may be deeply

Sunset on Prairie

Bitter Creek Bridge Wyoming



"Our Joy Ride"

Rapidly Nearing Their Goal

scarred and rutted. The arroyos, or dry washes, propound serious problems in transportation to automobile drivers, and the occasional streams all have beds that are entirely out of proportion to their size. Crossing either wet or dry washes is a trying matter for car and driver, unless adequate bridges have been constructed.

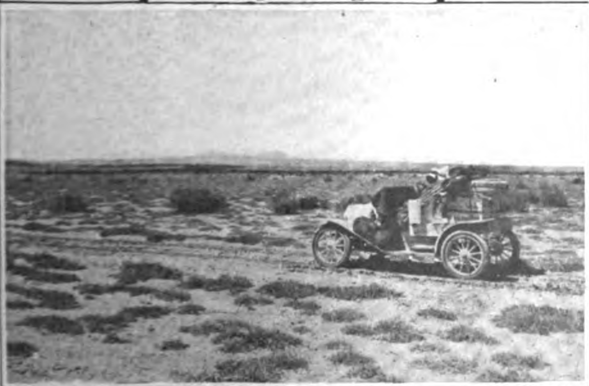
But west of Wyoming the mystery of the real desert encloses the tourist. The sharp snap in the air at dawn; the exceeding heaviness of the dew upon the sage-brush; the awesome silence of nature; the brilliance of the sunshine and the glare of the desert trails all have their part in impressing the traveler with their strangeness and unreality; but at night, when the blazing constellations seem only about as far away as the polished globes in the ceiling of a Broadway theater; when the majestic motion of the moon is distinctly apparent and the only sound to be heard is the snarling yelp of a distant prairie wolf, the smallness of mankind is borne forcefully in upon the mind of even a casual observer.

Nevada affords such a stage setting from the edge of the Great Salt Lake to the preliminary lifts of the Sierras. Entering this giant range from the east, the first sight of the saw-tooth ridge lying against the skyline is magnificent, and Miss Blanche Stuart Scott, of New York, in an Overland car which she has driven from New York, is just climbing that range at last reports. The tour is seven-eighths accomplished and while the final stretch is an exceedingly trying bit, it is no worse than some others.

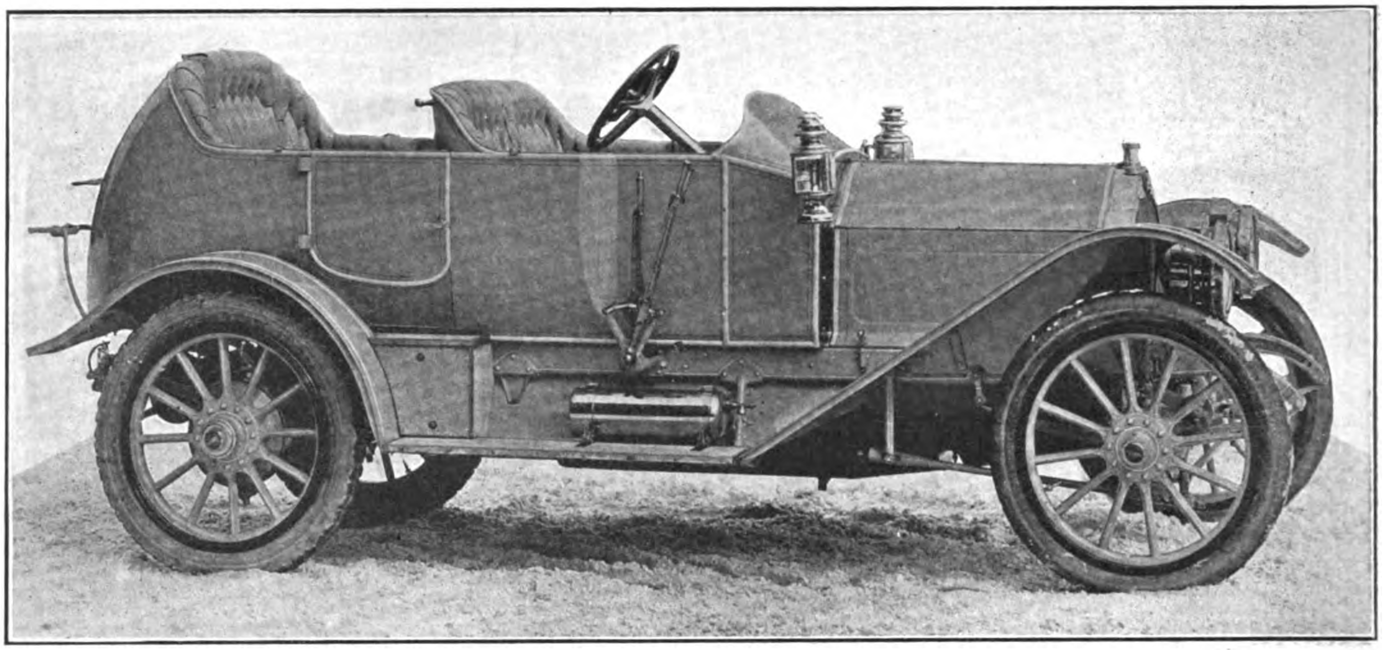
Over a Baked Stream Bed

Our Friend Blacksmith, Medicine Bow.

In the Red Desert Wyoming



Top of Mountain 85 Mile West of Laramie



Right side of torpedo model, showing side levers conveniently arranged outside of body line, with depression in body to accommodate them

Studebaker, South Bend—Offers Garford Models

DESPITE the fact that the Studebaker plant at South Bend extends over 101 acres, measuring floor space, the Garford models are made at the well-equipped Garford factory at Elyria, Ohio. The final finishing and tuning-up work, however, is taken care of at South Bend, and while the company turns out a wide variety of vehicles, including its well-known make of electric vehicles and a line of trucks, it proposes, nevertheless, to manufacture about a thousand Garford models for the coming season. The latest advices from the Garford plant are to the effect that the Model G-7 has passed so successfully through the 1909 and 1910 service that it will be continued, subject to such refinements as naturally would creep in in a progressive plant.

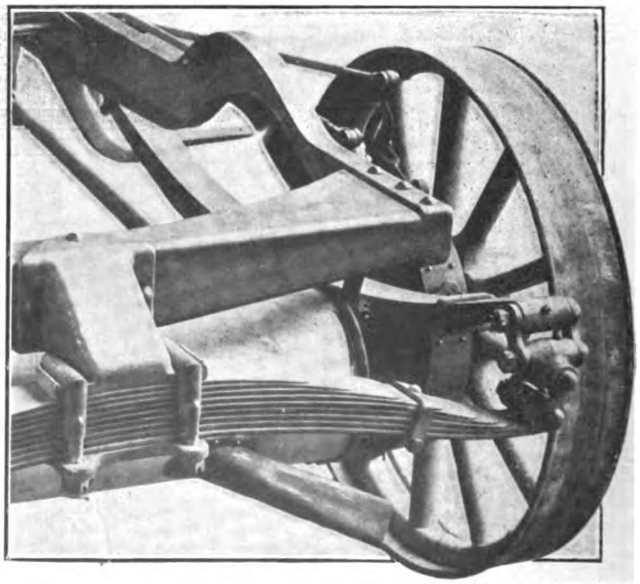
This model is offered with three types of bodies in the regular way, including a limousine at $5,000 that seats seven passengers, a touring car at $4,000 with the same seating capacity, and a speed car at $4,000 seating three. The equipment included with each of these models is two head lamps, two side lamps, tail lamp, shock absorbers, tool box with kit, coat rail, gasoline gauge, top irons, foot rest and horn.

Power Plant Includes 4-Cylinder Motor

The power plant is identical in the three models referred to, and includes the motor, which has a 36.1 horsepower A. L. A. M. rating which is based upon four cylinders working 4-cycle with a bore of 4¾ inches and a stroke of 5¼ inches. The cylinders are T-type of special gray iron with the inlet valves located on the right-hand side and the outlet valve on the left. The cylinders are cast in pairs, are water-cooled, with a centrifugal type of pump for water circulation, the latter being driven by a gear which is meshed with a half-time system. The radiator is of the honeycomb type with sufficient surface not only to serve initially, but taking into account the deteriorating influence of time. Lubrication includes a mechanical oiler with a pressure feed and provision for adjusting and observing the flow of lubricant. Carburetion is rather well cared for, utilizing a type of carbureter which has developed in this service; it belongs to the float-feed family with an auxiliary air valve which is, of course, brought into play at the higher range of speeds.

Ignition is of the make-and-break type, utilizing the Bosch magnetic plug system in conjunction with a Bosch low-tension magneto under hand control.

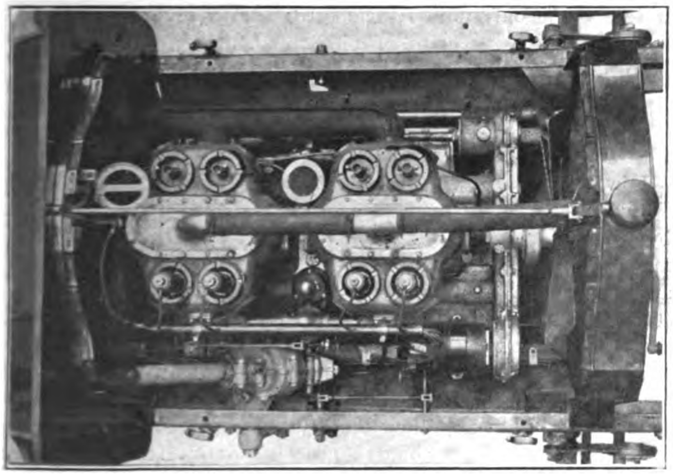
Besides the design features of the motor, which are further brought out by the illustrations here afforded, additional interest lies in the transmission system, taking advantage of a shaft-drive to a bevel gearset and a live rear axle of the full floating type. The power is taken from the motor by a cone clutch which is leather-faced with cork inserts, thence to a selective sliding gearset having four forward speeds and reverse with the distinction that the direct drive is on the third forward speed. This idea is liked by veteran tourists, because it assures that little extra increment of silence under all the normal conditions of road-going, and if perchance the sweet running qualities are slightly marred in the absence of the direct drive, it will only be at such enormously high speeds that the noise question ceases to be a factor, but with well-designed gears and the accuracy of workmanship which comes in a plant so wide in experience, it is not necessary to go into the direct drive to obtain a reasonably silent performance.



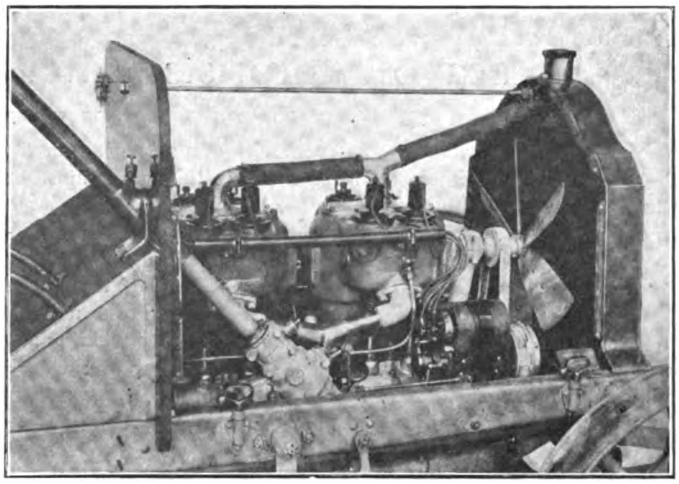
Rear of the chassis showing a stout cross member, support for the platform spring, method of shackling, upset chassis frame, and location of the muffler

Throughout the transmission system and the live rear axle annular-type ball bearings of properly sized selections are employed, notably among which will be found a thrust bearing for the clutch. The gearset, including the main and lay shaft, are mounted on these annular-type ball bearings, and the rear axle, including the floating of a differential housing passing through the front wheels, they, too, have these annular ball bearings, and, unusual as it may seem, they are extended to the steering gear. Parsons white bronze is used in the few places where it is not considered advisable to depart from conservative engineering to the extent of adopting ball bearings, as in the crankshaft, camshaft and clutch sleeve.

The fact that the car is heavily powered rendered it necessary to look well to the control system, to employ good materials in the control parts, and to so design that the application of pressure would be directly transmitted with substantial freedom from lost motion and the assurance that a pound of pressure applied to a pedal would be multiplied to the desired extent, making the pressure on the brakeshoe faces, for illustration, sufficient to skid the road wheels should the occasion require. The emergency brakes are under the guidance of a side lever; they are of the internal expanding type. The service brakes, however, are constricting, and are under the command of a pedal.



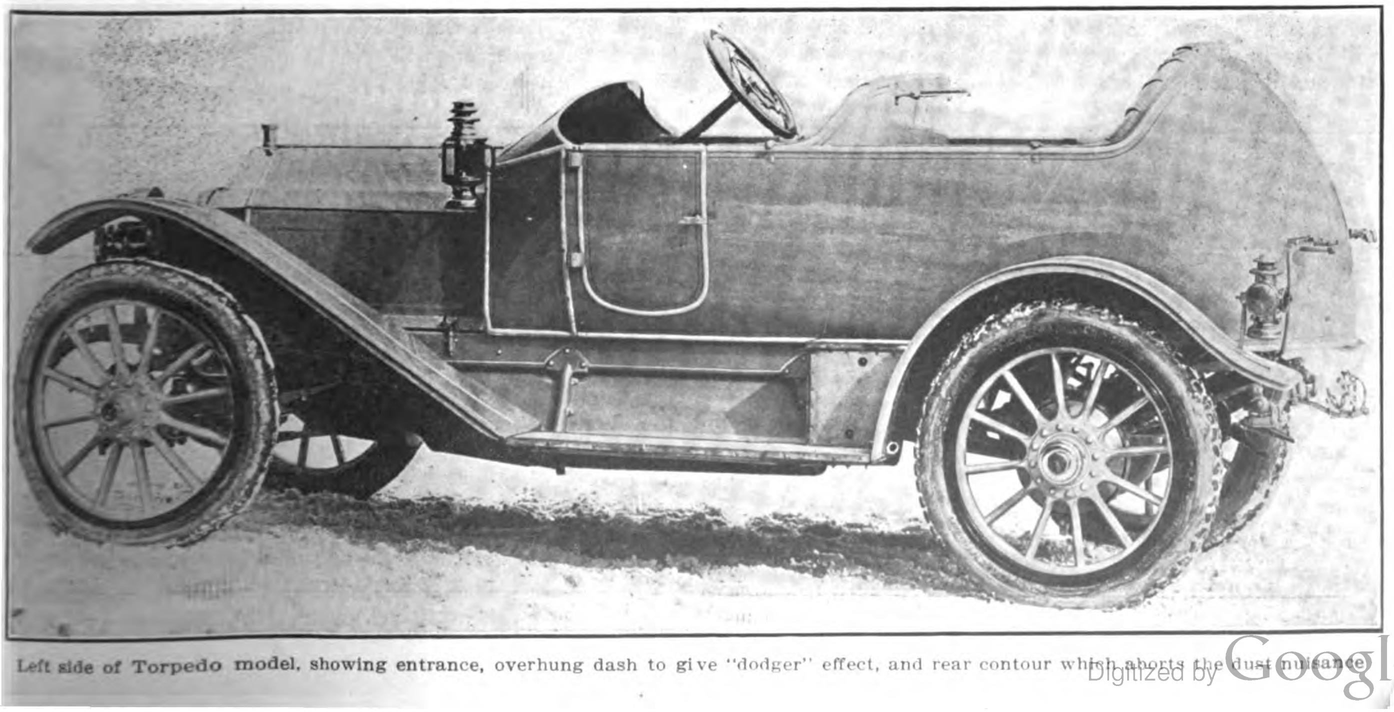
Plan of the motor depicting the relations of accessories, water connections, spark plugs, and other details



Right side of the 4-cylinder motor showing the location of the magneto, carbureter, and details

Among the details which are worked out to a fitting conclusion is the steering gear of the worm-and-sector type with F. & S. thrust-bearings, flanking the worm at either extremity, and methods of design, which induce accuracy in the machining process, together with means of heat treatment to assure a glass-hard surface of the work, and such accuracy of the jigged housing that lost motion is eliminated, not only initially, but on a permanent basis. The steering wheel is of large diameter, and mahogany rim is built up on the flanging of a substantial dished spider, which in turn is fetched up on a taper and keyed to the steering post. The spark and throttle control are by means of nice-appearing levers on the top of the steering post, the motions of which are interpreted by bevel sectors meshing with pinions at the lower extremity of the wheel. The linkages between the steering wheel and the swiveling members of the front wheels are of substantial design with liberal bearings, means for keeping out silt, and devices for maintaining a proper state of lubrication. In many other ways throughout the car these same refinements in engineering detail are fittingly cared for, and grease cups abound at every point at which a squeak could creep in in the absence of lubrication.

The wheelbase is 117 1-2 inches with a tread of 54 inches, and the tire equipment is 36 x 4 front and 36 x 4 1-2 rear. The front spring suspension is semi-elliptic, but the half-platform idea holds sway in the rear. The materials used throughout the car are in accord with the present-day idea of quality, carried to far greater length perhaps in some cases. As per illustration, the I-section front axle is die-forged in one piece from a selected grade of nickel steel.



Left side of Torpedo model, showing entrance, overhung dash to give "dodger" effect, and rear contour which aborts the dust nuisance

Chicago Motorists Entertain 1500 Orphan Children

CHICAGO, July 16.—Almost every city of prominence in the country has remembered the orphans this year—most of them during the month of June—but it has remained for Chicago to wait for settled and warm weather before showing its charity toward the youngsters. Here the weather generally is raw in June, so the Chicago Motor Club, Chicago Automobile Club and Chicago Automobile Trade Association did nothing in this line until last Thursday, when the combination pulled off the most successful orphans' day in the history of the city, taking 1,500 children in 160 cars for a pleasant drive around the boulevard system—a ride of some 35 miles which was thoroughly enjoyed by the kids.

In a way Chicago's efforts differed from those of other big cities. It was believed the children would enjoy a long ride rather than to be taken to some amusement park and, acting on this theory, the joint committee from the three organizations, George T. Briggs, John H. Kelly and Joseph F. Gunther, started a campaign for cars. They didn't have much time in which to work and up to within a few days of the run it looked as if it would be impossible to get enough machines for all the children. It was felt that it would be better to call it off rather than leave even a single child behind, so the efforts of the committee were redoubled. Prominent citizens were called up by telephone, the row was raked with a fine-toothed comb, and at the eleventh hour it was reckoned there would be enough cars to visit the fourteen institutions that had been invited to participate.

That the charity appeals to all was shown by the fact that of the 160 cars in line more than 100 had been contributed by private owners. Society women became enthused and noticed in line were several electric runabouts. True, they could not carry many children, but their owners were doing the best they could to help and their mite was appreciated. It also was noticed that there were few high-priced cars in line and it was discovered that there exists in Chicago many a rich man who would not help simply because he was afraid the children might scratch the paint in the tonneau. There were exceptions to this rule, of course, and some of the big cars that were out were packed to the limit, even to having a row of small boys perched on the tops, which were lowered for the purpose of making more room. Extremes meet, they say, and so it was in this case, for in sharp contrast to the big machines was one old one-cylinder car with a detachable tonneau, whose owner was carrying as many boys as he could and apparently he was delighted with his experience. Several women drove their own gasoline cars and in addition there were several big trucks.

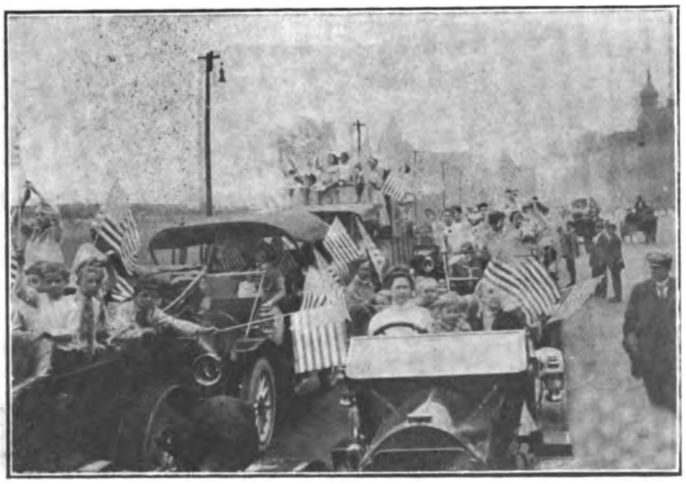
The Saurer truck carried fifty children and made an imposing appearance. The Chicago *Tribune* and the Chicago *Examiner* each sent out trucks which were filled with young humanity, while a White gasoline truck whizzed along with at least twenty-five kids aboard. The motor-cycle police were on the job and were of great assistance in keeping the cars in line and preventing scorching. Indeed, the marshals frowned down on any exhibitions of beating it and one driver was placed under arrest for endangering the orphans.

The ride was not the only feature of the afternoon. The committee had provided something else to delight the kids, distributing packages of peanuts and candy and also handing out more than 1,000 flags. While the outing was to consist only of the ride, there were many who stopped at the refectories in the south side parks and bought cake and ice cream for their charges. Toward the end of the ride there was a slight shower, but this did not detract from the joy of the kids. The orphans were not the only ones remembered, for in several of the cars were fifty from the homes for the aged, there being three institutions sending their people.

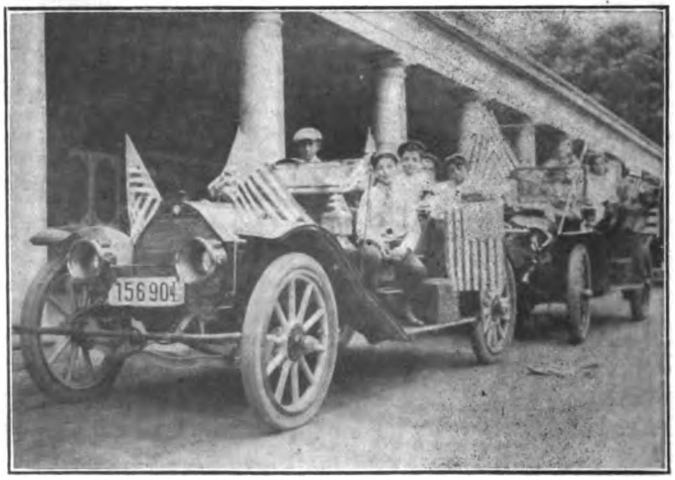
Lowell Aldermen Favor Road Race

LOWELL, MASS., July 18—At the last meeting of the Lowell Board of Aldermen action was taken on the petition presented by John O. Heinze, asking that the roads comprising the Merrimac Valley race course be closed to the public September 15, 16 and 17, and after a lengthy hearing the petition was granted. There was a counter-petition presented by Thomas A. Larkin, an attorney representing 22 residents of Varnum avenue, opposing the races, and a petition signed by a number of business firms asking that the part of Mr. Heinze's petition to close the roads on Saturday be denied. When those in favor of the petition were asked to stand to be counted nearly everyone in the chamber got up, and Mr. Larkin was the sole one to stand when those opposed were called. So the board granted the petition unanimously.

Mr. Larkin suggested that the matter might be taken to the courts by seeking an injunction. This was tried last year without avail. Mr. Heinze will appear this week before the Selectmen of Tyngsboro with another petition asking their authority to close such portions of the road as go through that town. As the Selectmen favored the petition when it was presented to the Legislature, no opposition is expected there. Two races are planned now, one for small cars, September 15, and another for big cars, September 17.



Start of the Chicago Orphans' Day outing



Many of the parentless "kids" stop at refectory for ice cream

Studies in Aviation Theory and Practice

By MARIUS C. KRARUP

(Continued from last week.)

REFERRING to Fig. 4 C, if the machine is advancing and the wings opposite to the side where the disturbance comes from reach the horizontal position, as shown in dotted lines, the counter-balancing support derived from them will be at its maximum, and on the whole the lateral stability in this type is therefore improved. But in normal flight the sloping wings do not support quite as well as the horizontal ones, and within a small angle they are more sensitive to a side wind than horizontal wings, offering a tilt aggravating the first attack, and this is especially the case because most winds are nearly horizontal. The lateral safety or stability of the aeroplane built with a strong dihedral angle, as compared with other aeroplanes, is most pronounced, it seems, in cases of extreme disturbance, as represented in the last figure of C. In any of these types the fore-and-aft stability seems to depend almost entirely upon speed and tilt rudders, which means that it is not automatic or dependable under all conditions. The most obvious means for producing stability of this description are apparently a low center of gravity well to the front, to prevent a backward tumble, and elastic rear edges for the wings of the main plane or planes, which will automatically counteract any disturbance by the wind tending to produce a headlong plunge.

Summarizing, the monoplane type has the best lateral balance, but it is difficult to build with enough surface to permit operation at small tilts, and the small tilt for normal travel alone gives range for up-and-down control (since tilt changes cease to be efficient above 15 degrees). With speed, a center of gravity placed forward of the center of a plan projection of areas can be supported, and without speed it produces automatically a gliding tilt, which is wanted when speed has ceased. Yielding rear edges give stability against forward plunging. The center of gravity may be lower than customary, if control is rendered positive by changing from rudder action by means of outlying surfaces to a system of relative mobility of the main supporting areas. Outlying control surfaces, being subject to the wind's attacks, themselves reduce stability. Planes of the highest carrying capacity per square foot increase stability by reducing wind-catching areas.

But the worst enemy of stability is any supporting plane which is located lower than the center of gravity, or on a level with it, and which is nearly horizontal in the normal position of the machine and concave downwardly, so that a change of its angle under an upsetting influence tends to produce a further change by increasing the efficiency of the disturbing wind action. This speaks for a design in which the monoplane's scant supporting area is helped out by lower supporting areas, but the latter formed with slightly convex surfaces (or the equivalent thereof) which are self-righting instead of self-upsetting. How much there should be of such lower surfaces must be a matter for experimental decision. A type intermediate between monoplane and biplane seems to be indicated as promising.

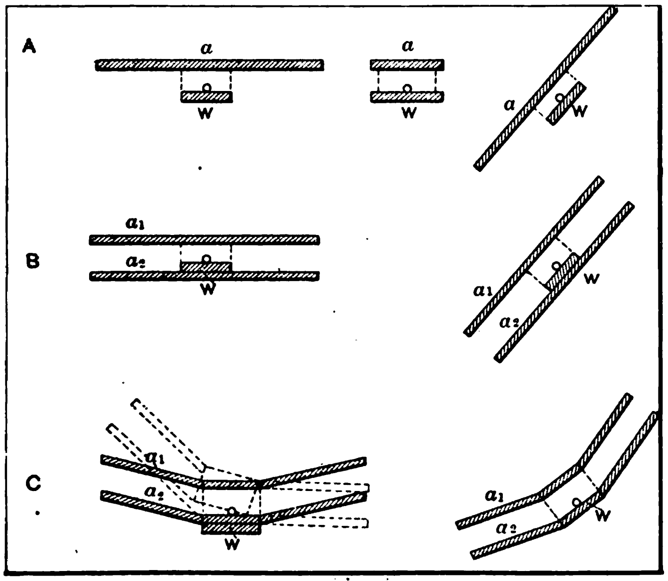


Fig. 4—Illustrating various phases of lateral stability

In several places trials are being made of boat-shaped substructures for monoplanes, and these should have a value for stability if proportioned closely in accordance with the areas and distribution of available superior surfaces and the strength of the propulsive power, because the double convexity of the boat shape—speaking of boats like the Norwegian or Malacca yawl—acts as a dihedral angle, roughly speaking, both laterally and fore-and-aft. But it is evident that the relatively feeble sustenance derived from convex surfaces in conjunction with the relatively high resistance against their propulsion should bring into play a very nicely balanced judgment on the designer's part in limiting the tangential angles of the convexity and the areas of the structures referred to. From the published reports with regard to them they seem to represent something less valuable. In some cases their designers seem to be actuated by a vague idea about imitating the shape of a bird's body, while disregarding the fact that the bird's main supporting surfaces are adjustable with relation to that body, and the other important fact that the bird disposes over a very high propulsive power not yet equaled or approximated in the use of small high-speed propellers for aeroplanes. In other instances the object of the boat-like structure is simply to provide an arrangement for starting from water or alighting on water. In principle, however, the convex auxiliary surfaces, arranged to mask features in the construction which, if left in the open, would anyway create air resistance without assisting in propulsion, seem to offer a fruitful field for investigation.

To increase fore-and-aft stability, there remains another possibility. With plane or planes extending at right angles with a vertical plane through the axis of the machine, the centers of sustentation-pressure form a line which shifts forward and backward with the speed of the machine, with a decrease and increase of tilt and therefore with changes in the load. By raking the wings of the plane rearward from the middle, so that their rigid front edges form a <, a broader support would be gained, and shifts of the centers of pressure due to accidental causes would require less counteracting by control movements; that is, the automatic stability would be improved, and the resistance to propulsion reduced.

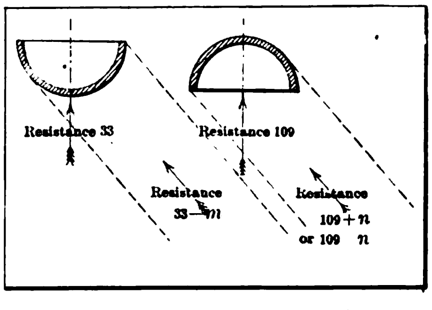


Fig. 3—Illustrating importance of shapes for stability

Automatic stability, being manifestly a product of many minor factors, each of which must be tried out quantitatively, is not likely to be gained in full measure except by the slow steps of an evolution. The designer's efforts for attaining as much of automatic stability as is consistent with facile control should be supplemented with equal efforts for reinforcing and improving the control of the machine's equilibrium and direction.

Some Points Worth Knowing About Automobile Gasoline

FUEL for internal combustion motors in liquid form is called "gasoline," which, in the old days, meant a certain distillate having a certain specific gravity, a certain value in the scale of volatilities, and its other characteristics were definitely established and generally understood by those who give matters of this sort passing notice. The coming of the automobile brought about many changes, it being true that the gasoline which was once rated as a by-product and a drug on the market mounted to the position of the fraction of first importance, and all the other distillates of crude oil were relegated to the rear, many of them reaching the low level which is normally designated as by-product. In coping with this problem, the distillers of crude oil began by tampering with the original gasoline, widening the range of temperatures used in the distilling effort, thus adding to the number of the contents, until finally the words "Automobile Gasoline" were coined to meet the occasion. That which was true of gasoline *per se* no longer obtained, since dealing with composite fuel was not the same as when dealing with a single closely confined distillate. The old idea, for instance, of sticking a hydrometer in the can to determine the specific gravity of the gasoline ceased to be valuable in the newer work since hydrometers are not made to determine the specific gravity of a plurality of distillates simultaneously. The only way to utilize the hydrometer advantageously will be to first separate the distillates, and then measure each one of them separately. These indications of the problems involved in the handling of automobile gasoline are but a few of the many which will have to be taken into account in a comprehensive estimate of its value, which, however, will only be possible if it is fully appreciated that the automobile gasoline of the day bears but slight relation to gasoline as it is technically designated.

Temperature of Change of State of Aggregation

Water boils at 212 degrees Fahrenheit, under a pressure of one atmosphere. As long as any water remains in the pot, no matter how hard the fire is urged, the temperature will remain constant until all the water boils off. The only way that steam can be superheated is to take it from the presence of water. The reason for calling attention to these well-known phenomena is in order to bring out the facts in relation to gasoline on a basis which will permit the average reader to grasp the situation. Gasoline, like water, must be changed in its state of aggregation from liquid to gas; in other words, it must be boiled, and the temperature of boiling of the gasoline must obtain in order to bring about the requisite heat exchange. Gasoline boils, of course, at a far lower temperature than water. Since it is a composite mixture, the temperature of boiling of the respective distillates are different, and in the ordinary process the more volatile of the distillates boil off first, leaving the heavier portion for the last, and the minimum temperature of boiling of the respective components is as follows:

MINIMUM TEMPERATURE OF EVAPORATION

Hexane	Heptane	Octane	Decane
17.7	3.6	19	42

As will be seen, hexane boils (evaporates) at a very low temperature. Referring to decane, however, the boiling point is 42 degrees above the freezing point of water, *i. e.*, 42 degrees Centigrade.

Heat of Evaporation Must Come Out of the Air

In the ordinary carbureter the gasoline is sucked out of the nozzle by the difference between the depression surrounding the nozzle and the atmospheric air. The spouting gasoline is more or less reduced to a cluster of multi-sized globules, the smaller of which form a sheet around the main stream in sufficiently fine subdivisions to be called a spray or mist; that there is very much mist is doubted, and one of the principal difficulties in carburetion is to obtain the minuteness of atomizing, which will permit of the quick transfer of heat from the inrushing air to the body of liquid gasoline, in order that the same may be boiled just as water is in a pot when a fire is put under the same. In the case of the pot and the water, the heat comes from the combusted fuel, and is transferred through the wall of the pot to the water to be boiled. Sometimes, however, water is boiled by directing a stream of steam into the body of same. In the case of the carbureter, a stream of air carrying heat is mingled with the stream of gasoline molecules and the excess heat in the air over that in the gasoline is transferred to the latter, and it, too, is vaporized as fast as the heat is transferred in quantity sufficient to counteract the latent heat of evaporation of the gasoline.

Minimum Temperature of Air, Considering Specific Heat

Just as the values for latent heat dispose of the question of the number of heat units required to vaporize the gasoline, so does the specific heat of air on the one hand, and of liquid gasoline on the other, afford a means of determining the minimum temperature of the air for a given temperature change. This minimum temperature is not the same for all the gasoline contents, and the table as follows tells the difference which must be observed, considering the respective distillates:

MINIMUM TEMPERATURE OF AIR FOR DIFFERENT DISTILLATES

Hexane	Heptane	Octane	Decane
1.3	21.5	36.2	56.8

These temperatures are on the assumption that no heat will be transferred to the gasoline, excepting out of the air; in other words, there must be enough heat available in the air at the minimum temperature in degrees Centigrade as above given to furnish the latent heat of evaporation, and the basis of arriving at this fact takes into account the specific heat of the gasoline and the specific heat of air. The latent heat of evaporation of gasoline cannot be stated with certainty without first ascertaining the exact proportions of the distillates. It may be approximately stated for a good grade of automobile gasoline as 210.5 British thermal units. The specific heat, or amount of heat required to raise 1 pound of gasoline 1 degree Fahrenheit is 0.500. In other words, a drop of 1 degree Fahrenheit in the temperature of 1 pound of gasoline corresponds to a dissipation of 0.5 British thermal units of heat. The specific heat of air at a constant pressure of 0.2375, and a drop of 1 degree Fahrenheit is therefore attended when 0.2375 British thermal units of heat are transferred from the air to the gasoline. If the temperature of the air is not below the minimum, as here stated, considering the respective contents, this condition will be brought about.

The Influence on Efficiency of Combustion

The highest obtainable thermal efficiency in an automobile type of motor (working 4-cycle) seems to be about 20 per cent. While it is true that the larger part of the 80 per cent. inefficiency is due to absorption of heat to the water jacket, and to heat carried away in the exhaust, the fact remains that combustion is more or less incomplete, and some of the thermal loss is directly traced to this point. With complete combustion, the products would be as follows:

PRODUCTS OF COMBUSTION PER POUND OF GASOLINE

Carbon Dioxide	Water Vapor	Nitrogen
2 pounds	1 1-2 pounds	11.8 pounds

The above result is obtained through the use of 15.3 pounds of air per pound of gasoline, assuming that the gasoline is completely vaporized and that it is burned to finality. What really happens in the average motor is that the intermingling of the air with the gasoline is more or less imperfect, and the exhaust, instead of being as above indicated, holds a certain amount of carbon monoxide and hydrogen. The loss due to these causes may be directly estimated by determining the percentage by weight of the carbon monoxide and the hydrogen present in the exhaust, and by considering their fuel value in connection with the fuel value of the original quantity of gasoline.

An Excess of Atmospheric Air Is Necessary in the Mixture

Owing to the presence of products of combustion—in other words, to incomplete scavenging of the motor cylinders—it is impossible to arrive at anything like complete combustion when the quantity of air present is the theoretically correct amount. To overcome this difficulty it is customary to utilize an excess of air, and it is not uncommon to use as much as 60 per cent. excess over and above the theoretical right amount necessary for the complete combustion of the fuel.

The exact proportion of excess of air is not to be stated as a fixed value; it depends upon the compression. The higher the compression in the cylinder of a motor the higher must be the excess of air to afford complete combustion. One reason for this lies in the fact that the rate of flame travel is increased with increasing compression, and the allowance of time for the absorption of heat, and the contact of the molecules of hydrogen and carbon with oxygen is reduced. A second reason may be directly traced to the great difficulty of scavenging with the increase in speed of the motor, which is likely to follow when the compression is increased, so that one complication adds another, and it has been found in practice that the increase of air over and above the theoretical right amount is progressive rather than proportional to the relating factors. That there can be too much air is, of course, well understood.

The Enriching of Automobile Fuel

By JAMES S. MADISON

A discussion of the difficulties following the introduction of foreign substances into a motor's cylinders in the gasoline passing through the carbureter, and the methods by which greater power may be secured from a given quantity of gasoline.

SINCE the building of the first automobile every part of it has been subjected to the most careful and exacting study, with the hope of introducing improvements. The results show a marvelous development. After it had been demonstrated that the automobile had become a permanent factor in our industrial and social activities, a tremendous amount of time and study was spent in endeavoring to improve the available power of the engine. This led to a detailed and exhaustive examination of the ignition and carburetion systems—more especially the latter—of the compression pressures, of the size and timing of the valves, etc. When these important factors had been standardized many attempts were made to generate still more power by enriching the fuel—that is, by adding certain substances to it which would cause it to ignite more readily, or, being ignited, to burn more rapidly. That such attempts have not been generally successful, and in many cases have shown results that were undesirable is probably, in a large measure, due to a lack of understanding of the elementary principles involved in the operation of a gas engine, or to what may be called the experimental difficulties necessarily inherent in the attempt to introduce foreign substances into the cylinders through the medium of the gasoline passing through the carbureter. It is the object of this article to discuss these elementary principles as simply as possible, the methods that have been used for enriching, and to point out one method by which greater power may be secured from a given quantity of gasoline.

For the purpose of discussion, let it be assumed that the piston of one cylinder of an automobile or other internal combustion engine has just completed its suction stroke, by which it has drawn into the cylinder its charge of the mixture, composed of air and of gasoline in the form of vapor, which is a transparent, invisible gas, like the air we breathe, and which will burn, if it be supplied with the proper amount of oxygen and ignited. It is the function of the carbureter to supply to every particle of gasoline (in the form of a vapor or gas) that enters the cylinder the proper amount of oxygen for its complete combustion or burning, by admitting the correct amount of air, one-fifth of which is oxygen and four-fifths nitrogen. Assuming, further, that the carbureter is performing its function normally, there is in the cylinder a combustible mixture, or in common terms, one that will burn. If the carbureter admits too little air the mixture becomes too "rich," and will burn incompletely, or not at all; or, if too much air, the mixture becomes "lean," and will give equally unsatisfactory results; hence the necessity for adjusting the carbureter until it gives a mixture containing exactly the right proportion of air and gasoline vapor. If now an electric spark be passed between the points of the spark-plug, which projects into the cylinder and is surrounded by the mixture, it acts precisely like a match, the mixture is ignited, and burns so rapidly that a sheet of flame shoots from one end of the cylinder to the other. This is commonly called the explosion, and happens hundreds of time per minute when the engine is running rapidly. The burning of combustion has caused the formation of at least two new substances (there may be more under certain conditions, and usually are, but a reference to two will be sufficient for the present purpose) from the mixture of air and gasoline vapor; one of them is water vapor, or steam, and the other is the gas, carbon dioxide; in addition to these there is present in the cylinder the gas nitrogen which, as stated above, is a constituent of the air, and which was drawn into the cylinder with the charge. These three substances, and any others that may be present, under the influence of the intense temperature of the flame expand enormously—there is an enormous increase in their volumes—which produces a great internal pressure on the cylinder walls and piston head; since the latter is the only moving part, it receives from the expanding gases a tremendous impulse, which results in what is called the power stroke, the motion of the piston is communicated by means of the transmission and drive shaft or chain, as the case may be, to the rear axle. It thus appears that the motion of the road wheels is due to the burning, or combustion, taking place in the cylinder. The impulse imparted to the piston by the suddenly expanding gases, causing it to move, is the same kind of an impulse that is imparted to the projectile in a rifle.

One reason why the burning is not more rapid and the impulse transmitted to the piston not more powerful is that for every part of oxygen drawn into the cylinder four parts of nitrogen are also drawn in. This nitrogen is not only useless in increasing the effects of the burning, but, on the contrary, it is a positive deterrent, since it dilutes the oxygen to such an extent as to neutralize much of its desirable effect. If the proportion of the nitrogen could be reduced, the burning would be correspondingly more rapid with the consequent more rapid expansion of the gases formed, which would result in more powerful impulses being delivered to the piston. One method of reducing the proportion of nitrogen is to increase the proportion of oxygen. This has been done many times by mixing certain substances with the gasoline. A substance, to be of value in this connection, should have the following properties: it must contain a fair proportion of available oxygen; it must decompose readily into its constituents; it must be soluble in gasoline; when burned in a closed space it must not leave a liquid or solid residue, and the products formed by burning it must have no injurious action on metal.

(Continued on page 114.)

Letters Interesting, Answered and Discussed

Discussing burning qualities of gasoline; the principles of magnetos; causes of wobbling of front wheels; electric lighting; qualities for racing drivers; automatic stability in aeroplanes.

May Be Slow Burning

Editor The Automobile:

(2,333)—I have a garage made of wood within 10 feet of the wooden dwelling in which I live, and while I have no trouble getting insurance, the fact remains that I worry about the fire risk, and wonder if the insurance will be hard to collect in case the house burns down due to a fire resulting from the presence of gasoline in the garage. Can you set my mind at rest?

G. J. M.

Evansville, Ind.

Call upon the Board of Fire Underwriters and see if the rules are being violated by having a garage within 10 feet of a dwelling house. If so, move the garage far enough away to conform to the rules. Rules are formulated for reasons that are probably good, and to follow them is a necessity if you wish to be sure that you will not be held responsible for their violation. In the meantime, gasoline in liquid form in a tank is non-inflammable, due to the fact that oxygen cannot mix with it in its liquid state, but even if oxygen were dissolved in the liquid up to the limit of saturation it would still be non-inflammable. The only way gasoline can be burned is by changing it to a gas in the presence of oxygen, and even then it resists burning to some extent. Fig. 1 is a simple illustration of the non-burning qualities of gasoline. It shows a torch which is lighted, and so adjusted that the flow of gasoline is at a high rate. The excess gasoline splashes against the plate shown, and trickles down over the surfaces to the ground without burning. The particular part of the gasoline that burns is hexane, of which there is only a small portion present; the volatility of the rest of the gasoline is relatively slow, and it fails to burn under the conditions shown, because it resists the gasifying process, and as before stated, it will not burn until it is gasified.

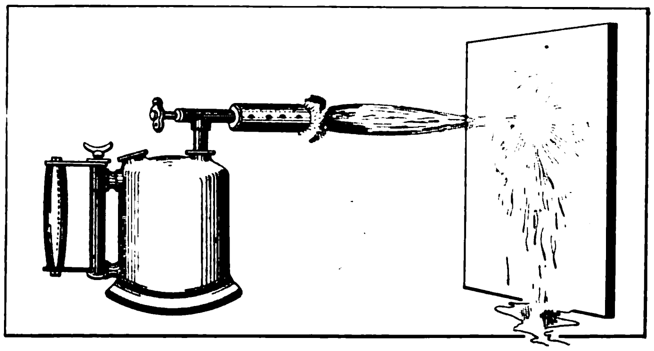


Fig. 1—A lighted gasoline torch blowing the burning liquid against a sheet of tin, burning the hexane, and the heavier distillates, after splashing against the plate, trickle down to the ground.

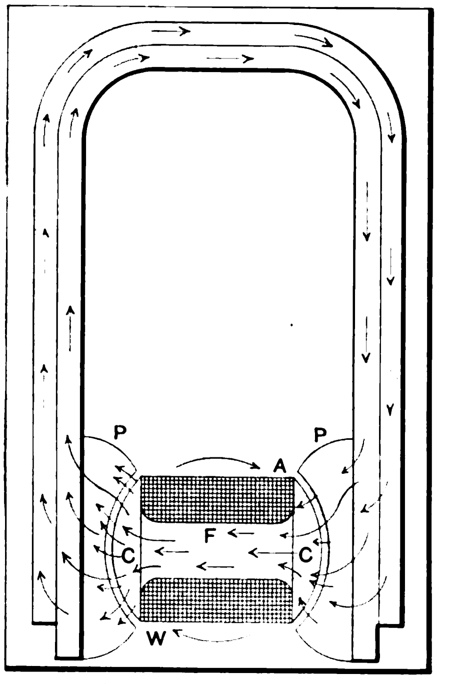


Fig. 2—Characteristic diagram of a magneto with a single winding on the armature showing the closed magnetic circuit

If the tanks containing the gasoline are not tight, it will evaporate even at normal temperature and form a combustible mixture with the oxygen of the atmosphere, which will ignite upon contact with a flame.

Some Questions in Relation to Magnetos

Editor The Automobile:

(2,334)—When I look at a magneto as it is installed in an automobile, I see so many trinkets hanging thereon, and find it nested among so many other things, that, in view of my lack of experience I become confused, and yet I realize that a man who drives an automobile ought to understand the A B C of the situation, and I appeal to you in my helplessness, hoping, perchance, that you will be able to separate out a few of the essential particulars and illustrate them in your customary clear fashion for my benefit, but I think I may say that I am not alone in this wilderness of confusion, so that your audience will scarcely be limited to one subscriber.

Perplexed.

Camden, N. J.

You can scarcely expect to obtain all the information you want outside the two covers of a "fat book." In the meantime, if the ignition situation is separated into its components, the respective divisions may be studied with some hope of eliminating confusion. There are three types of magnetos in vogue, (a) low-tension, (b) high-tension, and (c) combination magnetos. All magnetos, of whatever system, are composed of a wire-wound armature and a permanent magnetic field. As a rule, the armature rotates and the lines of force, which reside in the permanent magnetic field circulate through the rotating armature as shown in Fig. 2, the arrows indicating the direction of flow of the magnetic flux, and when the armature rotates, the lines are throttled as shown in Fig. 3. The variation in the magnetic flux, as indicated between Figs. 2 and 3, is responsible for the induced current which is set up in the wire windings on the armature, which current is the product of the difference of potential which results from a change in the intensity of the magnetism. The windings do not have to be on the armature, and Fig. 4 shows a type of magneto which has its windings on the soft polar members to which the permanent magnets are attached. In this case the intensity of

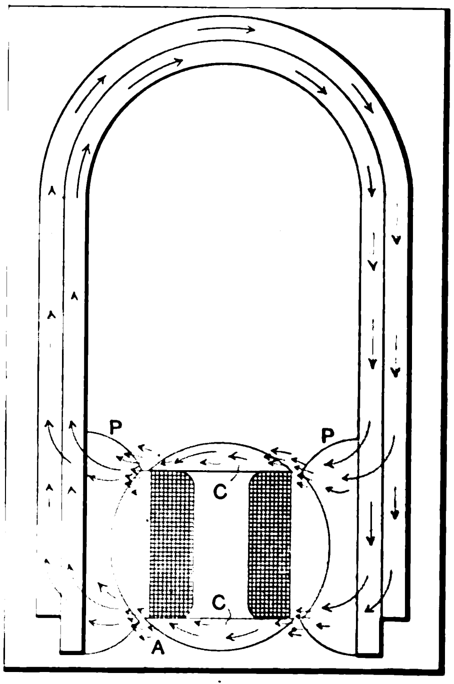


Fig 3—The same as Fig. 2, with the exception that the armature is rotated 90 degrees and the circuit is interrupted

the magnetic field is varied through the revolution of the rotor A, which has radially disposed extensions, and the path of the magnet field is interrupted periodically. Still another form of magneto is given in Fig. 5. In this case, the armature is stationary, the windings W being over a fixed body. The permanent magnets are bolted to soft polar horns, and a shell-like rotor occupies the space between the polar faces of the wire wound bobbin and the soft polar horns of the permanent magnets. Here again, the rotor is responsible for variations in the magnetic field brought about by periodically interrupting the continuity of the magnetic circuit. Fig. 6 is offered in order to bring out the point to be made in relation to the "condenser," which is always used in conjunction with ignition systems. In this example, the magnetic field comprises permanent magnets F, G and H with soft polar horns BB bolted thereto, and the bobbin wound rotor A, the windings showing at D, but the condenser E is housed in a rectangular aperture within the bobbin. The condenser is made up of flat sheets of tinfoil insulated from each other, and connected up in parallel. The difference between a high and low-tension magneto, barring a few details in connections and arrangement, is confined to the winding on the rotor. If there is only one winding of coarse wire, it is a low-tension magneto, but if there are two windings, one of coarse wire and the other fine, a high-tension magneto results. The composite arrangement is made up of a low tension winding on the rotor of the magneto, which connects to an ordinary spark coil which may be located on the magneto or elsewhere. The voltage of a low tension magneto is too low to jump the gap in a spark plug, so they use a wipe spark system, which is so arranged that the circuit is first made by a hammer striking an anvil and when the hammer bounces off of the anvil, the arc is drawn, and the mixture in the cylinder is ignited. With the high-tension system, the voltage is about 20 times that of the low, and the spark gap in the plugs is broken down at the right instant, thus inflaming the mixture. There are many other points in detail which ought to be looked into by an inexperienced autoist, but there is no reason why confusion should result. All of the items to be mastered are quite simple, and by taking them one at a time, just as one must do in acquiring a knowledge of the French tongue, for instance, the progress that can be made in a short while is astounding.

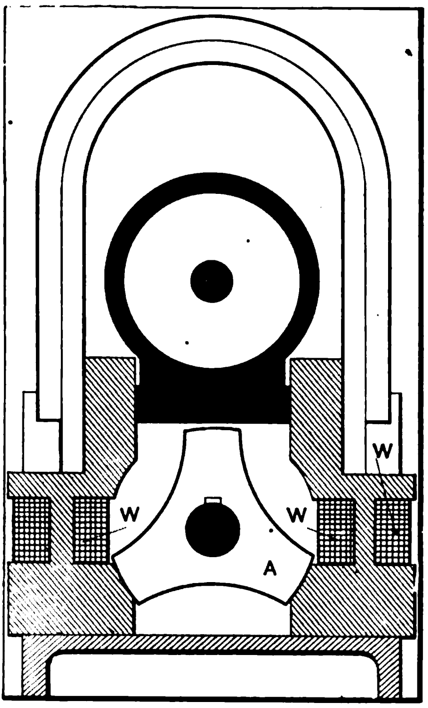


Fig. 4—Type of magneto using a rotor to interrupt the magnetic circuit, but the windings are on soft polar members to which the permanent magnets are bolted

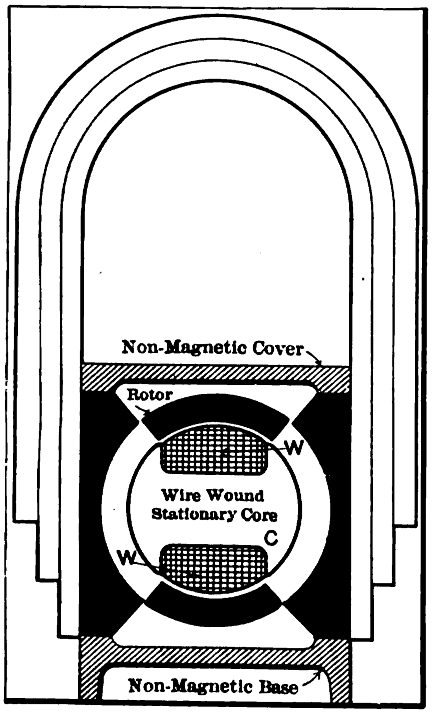


Fig. 5—Type of magneto using a shell rotor, permanent magnets bolted to soft polar horns, and fixed armature of bobbin-like design on which windings are placed

Wrong Design or Worn Out

Editor The Automobile:

(2,335)—I have never seen anything in your valuable paper in reference to the front wheels of an automobile wobbling. I am troubled this way, and perhaps others are, so an answer in your "Letters Interesting" would perhaps help a number of your subscribers. I am annoyed by my front wheels wobbling when going over rough places, and I understand some French cars do the same: I have gone over all the parts and joints and they are all absolutely without play; they are all ball and socket type, so can be adjusted perfectly. The only looseness is in the steering gear proper. When running fast or on smooth roads the wheels do not wobble. Any advice you can give me will be appreciated. W. W. Trevor.

Lockport, N. Y.

One cause of wobbling of the front wheels is assignable to short steering knuckle arms. This difficulty is rarely present in automobiles, it being the case that most designers realize that the steering knuckle arms should be quite long so that the steering action should be quite "slow." Lost motion is, of course, a prominent cause of front wheels' eccentricities. The way to overcome this trouble is to have the automobile repaired.

Electric Lighting Has Many Advantages

Editor The Automobile:

(2,336)—Will you please advise me in your question and answer column whether you consider it worth while to replace acetylene lights with electric lights. I can appreciate that it would be a great luxury to be able to turn the lights on or off by pressing a button, but I believe that storage batteries would soon be discharged, and do not want the bother of taking them off the car to be recharged. I would like to have a complete lighting plant on my car.

A. E. W.

New York City.

If you can afford to install an electric lighting system it will serve you well, and add to the pleasure of touring. If you keep your acetylene system in order, it, too, will be your faithful slave.

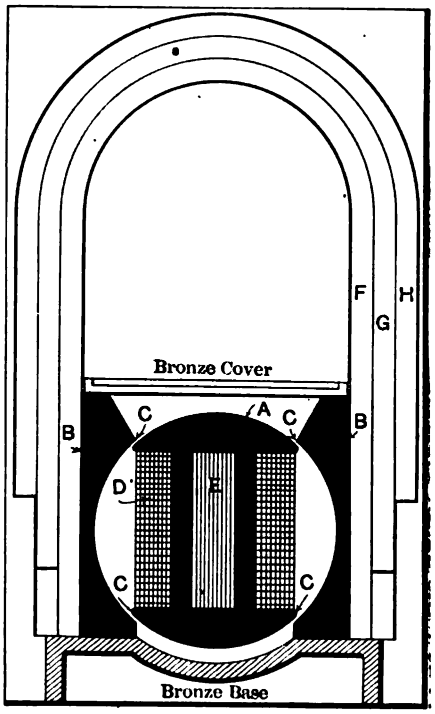


Fig. 6—Type of magneto using a bobbin wire-wound armature, soft polar horns to which the permanent magnets are bolted with the condenser within the armature

Questions That Arise—General In Scope

Discussing ills of mufflers; proper methods of suspending mufflers; advantages and disadvantages of the several shapes of pistons; main points in relation to valve springs; manner of contriving valve motions so that timing can be varied at will.

(178)—Is silence of a muffler attended by increased pumping losses of the motor?

Not necessarily; but, as a rule, silence is attended by back pressure, and the pumping losses are augmented in consequence. Fig. 1 shows a conventional type of muffler which works on the obstruction principle; the exhaust flows into the muffler through the exhaust pipe, and is split up by having to pass through a large number of small holes on its migration to the muffler chamber. This splitting process is at the expense of back pressure, and to whatever extent the obstruction suffered may be estimated in pounds per square inch as back pressure, it represents the measure of the deduction which must be made from the mean effective pressure before the same can be used in the formulæ for determining power. The gas after being split up by passing through the small holes as it enters the main chamber is scattered and it then oozes out through the orifice robbed of its ability to make a noise.

(179)—How should mufflers be suspended on the chassis frame, all things considered?

In view of the fact that mufflers are heated to a point sufficiently high to vaporize lubricating oil, they should not be placed in a position where lubricating oil can get at them, for then they will become a nuisance and serve as the basis for a violation of smoke ordinances. They should be flexibly mounted, and the piping leading from the motor should be so hung that its weight will not come on the muffler. The suspension shown in Fig. 3 is a fair illustration of a good way, but the exhaust pipe leading from the muffler to the atmosphere should not be pointed down as therein because the exuding exhaust will then brush against the roadbed, picking up dust, thus becoming the basis of a road nuisance. Fig. 2 shows the exhaust pipe to the atmosphere in the right position, but in this figure the muffler is not flexibly mounted, and it has the further disadvantage of having to carry the weight of the exhaust pipe and the additional fault of having the exhaust pipe in interference with the rear axle. As a final injunction, attention is called to the necessity of noiselessness, and this requisite is only to be consummated if the parts are all in secure relation and free from interference. A muffler cut-out serves no useful purpose whatever. It offers to a chauffeur wide opportunity to annoy the public at large, giving him a means of calling attention to his exalted position, and it is proof of the fact that the motor is not big enough for the work to be done, or that the back pressure of the muffler is greatly in excess of that which is dictated by good designing, unless it is attached as a matter of business expediency, with the idea that it will serve as a selling point, hoping to attract the notice of the budding autoist, who, unfamiliar with the technical situation, absorbs information from whatever source indiscriminately.

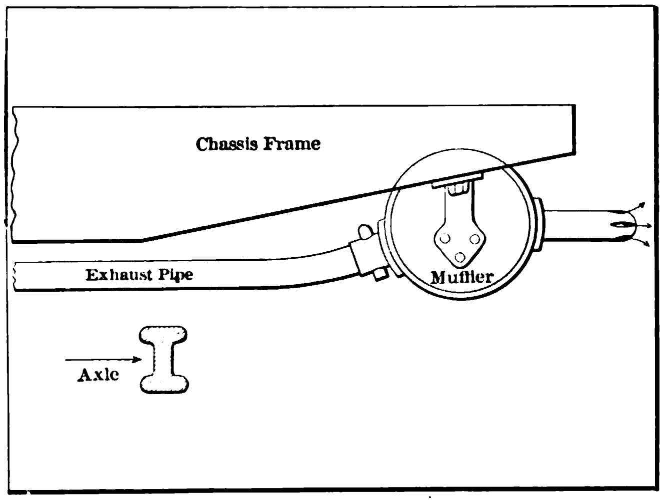


Fig. 2—Faulty method of suspending muffler, showing exhaust pipe in the right position

(180)—What are the advantages and disadvantages of the several shapes of pistons?

Referring to Fig. 4, A is a flat-head piston, B is of the convex-head type, C is spherical, and D represents the inverted sphere. Taking them in the order named, A, the flat-head type, offers no advantage, but it has the inherent defect which comes when a weight must be supported by a flat member, instead of an arch, has the further defect of not being a good shape from the foundry point of view, and when the internal strains are released, as they must be sooner or later, the head is likely to crack. B, with its convex head, which may have the form of a flattened ellipse, is regarded as the conventional type. It has the arched structure, which is capable of sustaining the greatest possible weight, and its shape is agreeable to foundry practice, so that the internal strains are relieved, and the chances of cracking in service are substantially eliminated. This form of head lends itself perfectly in designing; it permits of a spherical dome of the combustion chamber, and works out so that the compression of the motor will be substantially 75 pounds per square inch (absolute). Referring to C, of the spherical head, it has the disadvantage of offering too much surface, thus permitting a large amount of heat to pass through the wall and to the crankbox, hence decreasing the thermal efficiency of the motor and complicating the lubricating problem. But if there is no encouragement to be offered for the design C, the fact remains that it has many points in its favor as compared with the design D. All that has been said against C applies to D, but there is the further disadvantage in the latter in that it not only adds to the surface which will serve as a gate for the transfer of heat, but the metal of the head, where it joins the metal of the barrel, makes a bunching and a shrink hole is pretty nearly sure to be induced, if, indeed, there may not be a collection of them all around the rim.

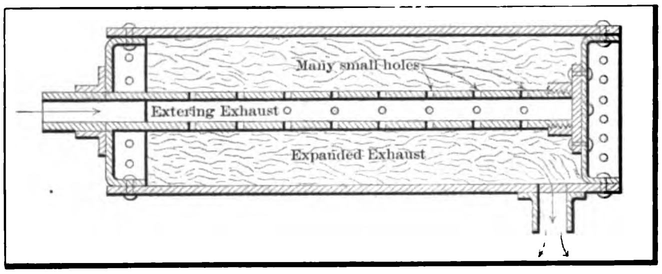


Fig. 1—Characteristic type of muffler which induces back pressure

(181)—What are the main points in relation to valve springs?

The wire should have the properties which come from the use of the best spring steel; there should be at least 10 turns of wire in the spring, as shown in Fig. 5, and the distance S should be so great that when the spring is compressed the respective turns will not contact with each other. The diameter of d of the wire should be so regulated that the diameter D of the coil will be sufficient to afford a live spring limiting the torsional moment to a point well within the elastic limit of the material so that the spring will remain substantially of constant strength from the beginning of its life to the ending of the life of the motor. This latter condition will only be possible if the spring is so placed that it will not be annealed by the heat which radiates from the motor cylinders. A table of the dimensions of various sizes of

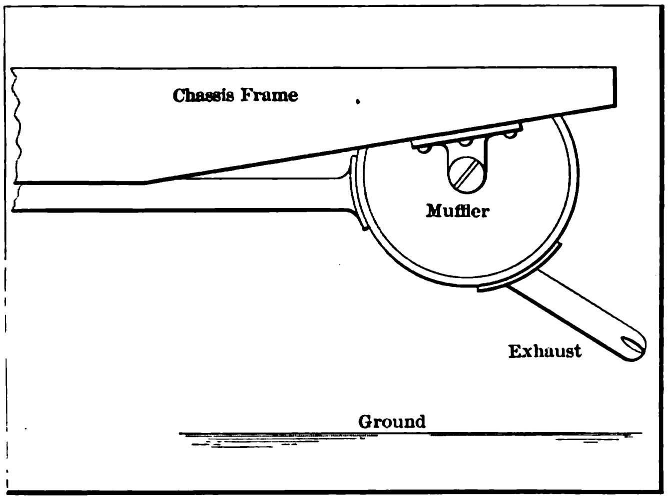


Fig. 3—Flexibly mounted muffler, showing the exhaust pipe in the wrong position

springs is given in Fig. 6. Knowing the weight in pounds which the springs must exert, it is possible to pick out sizes which will do the work.

(182)—Why is the "finish" so much restricted in cylinder designing, and why is it not a good idea to allow for several reborings?

The reason why it is necessary to re-bore a cylinder is because the wall surfaces are of uneven texture, and too soft to withstand continuous service under the severe conditions obtaining. Designers desiring, in the first place, to have the weight efficiency as high as possible take advantage of the fact that white metal is dense, hard, and strong. Gray iron, on the other hand, is soft and is likely to be of varying texture. White metal in a cylinder is induced by so regulating the charge that it will take on the property technically known as "chill." This "chill" is not to a great depth in good cylinder metal, so that in order to preserve the white metal surface the finish must be restricted. It will be remembered that all finished metal is machined off, and what is wanted in completed cylinders is just enough finish to permit of making a smooth bore without cutting through the white metal coating into the gray iron texture. Fig. 7 illustrates the situation with sufficient clearness, showing the chilled surface metal and the soft core.

(183)—Is there not some way of contriving valve motions so that timing can be varied at will?

There are several plans which include mechanical means for varying the timing of valves, one of the most interesting of which is shown in Fig. 8. In this case there is an auxiliary roller mounted on a boomerang which is pivoted at one end to an arm, the bearing of which is concentric with the camshaft. The boomerang, not being to unit radius, affords a means for varying the distance between the face of the cam and the roller proper on the valve lift. By rotating the boomerang arm the adjusting distance is changed at will, and the amount of adjustment may be fixed upon by changing the contour of the roller contact surface of the boomerang. This device is said to work extremely well, and while it offers some evidence of complication, the fact remains that the parts are stable and there is ample room in a motor for a device of this character.

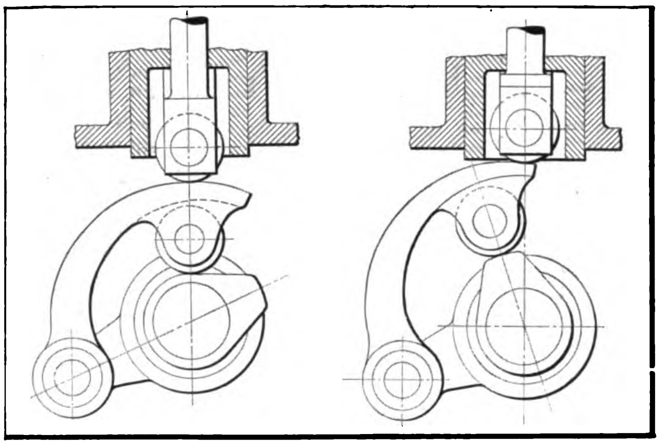


Fig. 8—Boomerang type of mechanism for use in timing valves

(184)—What are the troubles to be expected from timers?

It is difficult to predict; the best way is to test the particular timers and locate the troubles. The following test of a Herz timer should prove interesting.

The timer consists of a primary breaker and a high-tension distributor.

The timer was driven by a 5-horsepower shunt motor, using an Autocoil and a Gould 6-volt storage battery. Speed constant at 1200 r.p.m.

		Elapsed Time		
Started	Stopped	Hr.	Min.	Speed
10:20	12:05	1	45	1200
12:30	2:45	2	15	"
10:20	12:00	1	40	"
12:30	2:05	1	35	"
8:30	12:00	3	30	"
12:30	5:40	5	10	"
8:00	12:00	4	00	"
12:30	6:00	5	30	"
		25.4		

Therefore, the total number of revolutions =

$$25.4 \times 60 \times 1200 = 1,828,800.$$

The sparking was very irregular at 1200 unless the contact cam faces were wiped clean frequently. The highest speed for good

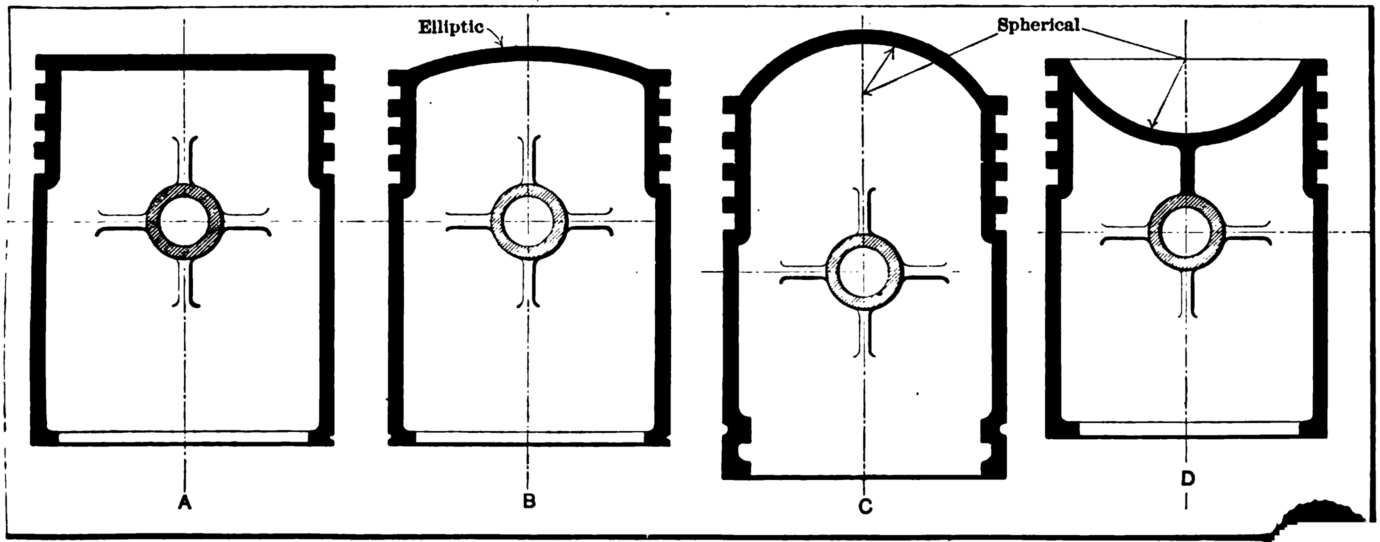


Fig. 4—Depicting various types of pistons, only one of which is satisfactory

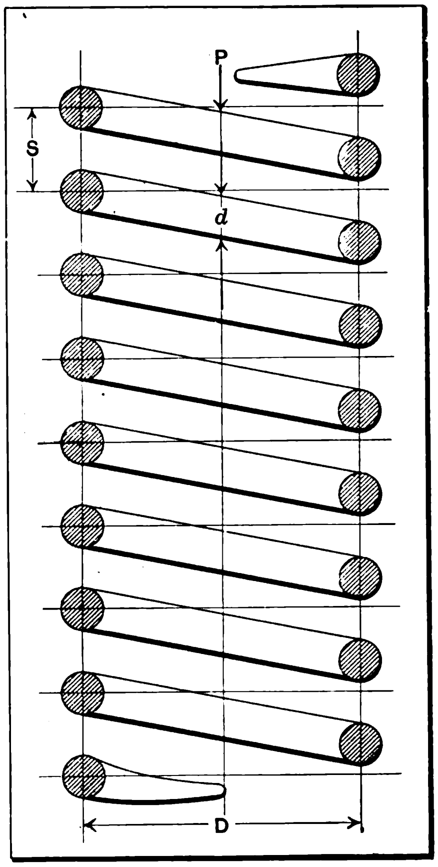


Fig. 5—Diagram of a valve spring to be used in conjunction with the table in Fig. 6

sparking was in the neighborhood of 1,000 r.p.m. Several different coils were used, but no great difference was noted in the sparking.

(185)—In view of the extended use of the Wheeler & Schebler carbureter in racing work, considering its simplicity of design, and remembering that many foreign makes of carbureters are almost as complicated as motors, considering further the fact that detailed information is not obtainable from racing reports, it becomes of interest to learn something of the detailed performance of this carbureter. Can you give the information?

The following test of a Wheeler & Schebler carbureter conducted in accordance with the directions usually furnished by the maker, speaks for itself:

Three runs were made with a No. 5 needle, and the best run is chosen to show the action of the carbureter. Other runs were made, among which five, using a No. 7 needle, but it was found that up to 1,200 revolutions per minute there was no appreciable difference. Beyond 1200 revolutions per minute the No. 7 needle produced a better result. The carbureter performed favorably throughout the range of working speeds of the motor. It was found, of course, that at very high speeds the torque of the motor fell away, but it was not shown that this dimension in torque was due to the carbureter, although it is quite well understood that carbureter problems become serious at high motor speeds. However, the fact remains that motors do not thrive at high speeds.

WHEELER & SCHEBLER CARBURETER TEST

Speed	Gross Load, Lbs.	Tare, Lbs.	Net Load, Lbs.	D. H.P.
600	52.00	27	25.00	15.00
700	52.50	27	25.50	17.80
800	51.50	27	24.50	19.60
900	50.75	27	23.75	21.40
1000	51.75	27	24.75	24.75
1100	51.00	27	24.00	26.40
1200	50.00	27	23.00	27.60
1300	49.25	27	22.25	29.00
1400	48.00	27	21.00	29.40
1500	47.00	27	20.00	30.00
1600	46.00	27	19.00	30.40
1700	45.00	27	18.00	30.60
1800	44.00	27	17.00	30.60
1900	43.00	27	16.00	30.40
2000	43.00	27	16 00	32.00

(186)—Can you show a test of a muffler on a motor which will give an idea of the amount of back pressure induced?

The following is the test of a muffler which was made at the plant of the E. R. Thomas Motor Company, Buffalo, N. Y., by L. C. Freeman, which is fairly representative of this situation. The back pressure is given in pounds per square inch at speeds increasing by 100-pound increments from 400 to 1,500 revolutions per minute, inclusive. The conditions of the test were as follows: The muffler was connected to the motor with 15 feet of 3-inch (outside diameter) steel tubing, having a wall thickness of 1-16 of an inch. The back pressure in this length of tubing was found to be one-quarter of a pound at 1,500 revolutions per minute, but fell to a nominal point at 1,000 revolutions per minute. The muffler was 9 inches in diameter, and the throttle valve was wide open at all speeds during the test. The exhaust, as observed, was a soft, steady purr at all speeds when about two-thirds of the maximum power was being developed. Beyond this point the noise increased somewhat, but it was claimed that this increase was not more than might be expected from mufflers in general. The test was somewhat marred, due to the fact that the muffler leaked around the head.

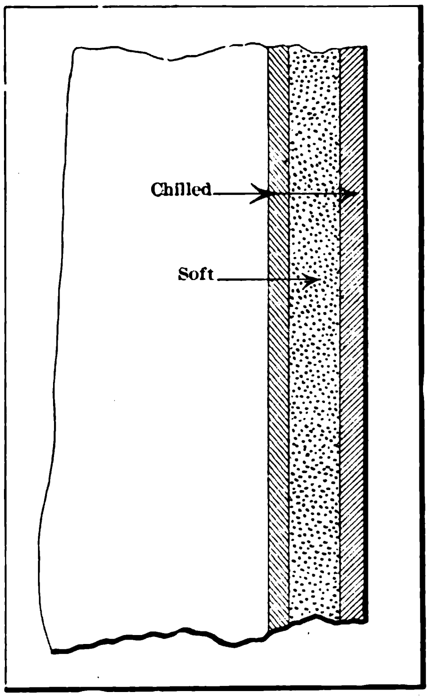
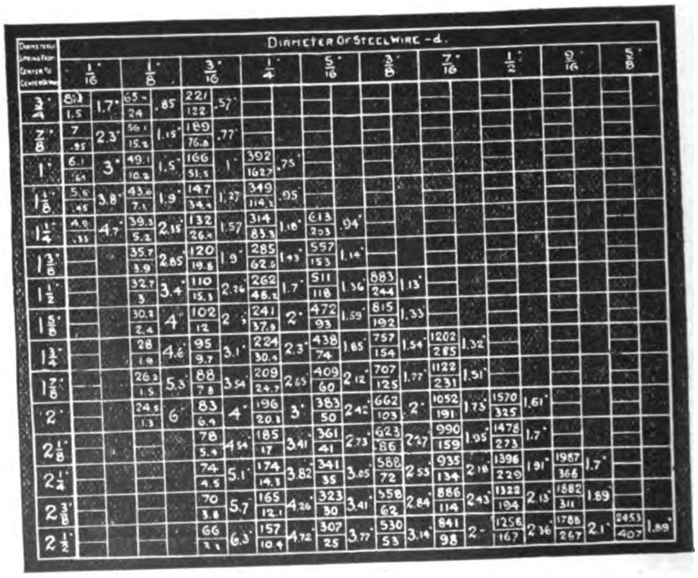


Fig. 7—Section of cylinder wall showing chill metal on surfaces and soft gray iron in the core

DATA OF THE MUFFLER TEST USING A MANOMETER

R.P.M.	Brake	Manometer Inches of Mercury	Back Pressure	H.P.
400	84	1.5	.73	19.2
500	81	1.75	.86	23.
600	75	2.00	.98	26.7
700	67	2.37	1.35	26.8
800	64	B	1.47	29.4
900	64	3.25	1.59	32.8
1000	61	3.75	1.84	34.8
1100	60	4.00	1.96	38.7
1200	60	5.00	2.45	43.3
1300	55	5.25	2.60	40.6
1400	53	5.75	2.80	42.2
1500	49	6.00	2.94	42.0

Note: This back pressure is not unreasonably high. The motor was not developing the maximum power of which it is capable at the speeds given, so the back pressures are correspondingly lower.



Diameter of Spring from Center to Center of Wire	Diameter of Steel Wire -d.																			
	1/16"		1/8"		3/16"		1/4"		5/16"		3/8"		7/16"		1/2"		9/16"		5/8"	
3/4"	8.1 1.5	1.7"	65 24	.85	221 122	.57"														
7/8"	7 .95	2.3"	56.1 15.2	1.15"	189 76.8	.77"														
1"	6.1 .64	3"	49.1 10.2	1.5"	166 51.5	1"	392 1627	.75"												
1 1/8"	5.6 .45	3.8"	43.6 7.1	1.9"	147 34.4	1.27	349 114.2	.95												
1 1/4"	4.9 .33	4.7"	39.3 5.2	2.35"	132 26.4	1.57	314 83.3	1.18"	613 203	.94"										
1 3/8"			35.7 3.9	2.85"	120 19.8	1.9"	285 62.6	1.43"	557 153	1.14"										
1 1/2"			32.7 3	3.4"	110 15.3	2.26"	262 46.2	1.7"	511 118	1.36"	883 244	1.13"								
1 5/8"			30.2 2.4	4"	102 12	2.5	241 37.9	2"	472 93	1.59"	815 192	1.33"								
1 3/4"			28 1.9	4.6"	95 9.7	3.1"	224 30.4	2.3"	438 74	1.65"	757 154	1.54"	1202 285	1.32"						
1 7/8"			26.2 1.5	5.3"	88 7.8	3.54"	209 24.7	2.65"	409 60	2.12"	707 125	1.77"	1122 231	1.51"						
2"			24.5 1.3	6"	83 6.4	4"	196 20.1	3"	383 50	2.42"	662 103	2"	1052 191	1.75"	1570 325	1.61"				
2 1/8"					78 5.4	4.54"	185 17	3.41	361 41	2.73"	623 86	2.27	990 159	1.95"	1478 273	1.7"				
2 1/4"					74 4.5	5.1"	174 14.3	3.82	341 35	3.05"	588 72	2.55	935 134	2.18"	1396 229	1.91"	1987 366	1.7"		
2 3/8"					70 3.8	5.7"	165 12.1	4.26"	323 30	3.41"	558 62	2.84"	886 114	2.43"	1322 194	2.13"	1882 311	1.89"		
2 1/2"					66 3.1	6.3"	157 10.4	4.72"	307 25	3.77"	530 53	3.14"	841 98	2"	1256 167	2.36"	1788 267	2.1"	2453 407	1.89"

Fig. 6—Table giving the various sizes of valve springs and a method of determining as to the strength of each

Liquid Fuel for Motor Car Engines

By DR. JAMES B. READMAN, F. R. S. E.

Paper read before the Royal Scottish Society of Arts; treats with fuel of various grades; a Sunbeam side-chain drive thermo-syphon car was used; fixed road conditions were adhered to; the fuel used during the trial comprised Borneo petrol, benzol, motor spirits, naphtha, and other distillates in different proportions.

AT a recent meeting of the Royal Scottish Society of Arts a paper was read by James B. Readman, F.R.S.E., giving the results of a series of tests with the various fuels used on a 20-horsepower Sunbeam chain-driven car adapted for the trials. The car had four cylinders, 105 by 130 mm., thermo-syphon cooling; tires, 880 by 120 mm. The main petrol tank was below the driver's seat, and a second one for the experimental fuel was fixed to the dashboard. The tanks were connected by a pipe to the carbureter, which was provided with three-way cock, so that the fuels in either tank might be used at will. To make the results as closely comparative as possible, Dr. Readman selected a suitable portion of the high road leading from Penrith to Appleby. The tests took place over one part of the road, so as to eliminate any difference in gradients, and they were all carried out on one day, to avoid, as far as possible, any climatic changes.

The fuels used were as follows:

1.—Shell Borneo petrol, sp. gr. .720, as a standard well-known fuel.

2.—Ninety per cent. benzol, sp. gr. .880. Engine very difficult to start when cold.

3.—Shale motor spirit, sp. gr. .704. This spirit begins to boil at 44.4 degrees C. (112 degrees F.), and 65.5 per cent. is distilled at the boiling point of water. Engine starts readily.

4.—Shale naphtha, sp. gr. .740. This begins to boil at 82.2 degrees C. (180 degrees F.), and 58 per cent. distils over at the boiling point of water. Repeated trials have proved that the engine starts fairly readily with this spirit, even when all is cold.

5.—Fifty per cent. shale motor spirit with 50 per cent. benzol, sp. gr. .785.

The incoming air to the carbureter in the type of motor used is heated from the exhaust gas pipe. No attempt was made in any of the experiments to alter the float of the carbureter.

Results of the Tests.

The following tables give the results of the tests:

One-fifth of a gallon of each fuel was used. Four persons were in the car. Dusty road. Weather and temperature: Sunny; 54 degrees F. Weight of car (empty), 30½ cwt.

Fuel.	Miles per hour.	Time. M. S.	Distance. Mls. Yds.	Fuel per car mile. Gals.	Miles per gal.
1	26.2	8 26	3 1177	.054	18.3
2	24.8	10 0	4 250	.048	20.7
3	25.2	8 40	3 1110	.055	18.1
4	26.5	8 50	3 1360	.053	18.8
5	26.5	8 34	3 1327	.053	18.7

No smoky exhaust from any of the fuels. The engines pulled well with all except No. 4. The temperature of the water in the radiator was 195 degrees F., at the end of each run, in every case except No. 2, when it was 200 degrees F. Benzol gave the best result—*viz.*, 20.7 miles to the gallon, against 18.8, the best of the other four. Dr. Readman observed no practical [illegible] in the behavior of the engine with the exception of the naphtha, with which it misfired a good deal. A mixture, [illegible] of 40 per cent. of naphtha with 60 per cent. of the [illegible] gave a fairly good result, and one that the car had [illegible] many miles satisfactorily. At the start, however, the engine inclined to misfire for a short time. He said that with an auxiliary tank for motor spirit or petrol to start the engine, the use of the home product, benzol, could not be too strongly recommended, and its further production encouraged. The use of Scottish shale spirits offered a good alternative fuel. Its strong odor, however, was a drawback to its general use.

Dr. Readman gave the results of two comparative trials to ascertain what difference, if any, there was in the fuel consumption when removable non-skid bands were used on the two back wheels, compared with the same wheels uncovered. The road selected for the first trial was an extremely hilly one in Cumberland. In one stretch of 1,184 yards the rise was 280 feet, the gradient going to one in five in places; the total length of the round was 3.51 miles. The speed was maintained as near as possible the same in each trial, and both were made over the same road, in the same direction. A known quantity of motor spirit—more than sufficient to take the car the distance stated—was put into the auxiliary tank, and the quantity left over after the completion of the run was deducted, thus giving the amount actually consumed. The results from the first trials were:

Load three persons; dusty road	Plain tires	Non-skid bands (a)	Non-skid bands (b)
Total distance (miles)	3.51	3.51	3.51
Time (minutes)	13	13.6	13.40
Average speed miles per gallon	16.2	16	15.4
Petrol used (gallons)	.3292	.326	.311
Petrol used per mile (gallons)	.0937	.092	.088
Miles per gallon of petrol	10.6	10.7	11.2

The next two experiments were done on the Penrith to Appleby road, where the conditions, both of surface and gradient, were in strong contrast to the first tests.

Carload four persons; dusty road	Plain tires	Non-skid bands
Total distance (miles	3.1110	3.833
Time (minutes)	8.40	9.7
Average speed (miles per hour)	25.1	22.8
Petrol used (gallons)	1-5th	1-5th
Petrol used per car mile (gallons)	.055	.057
Miles per gallon of petrol	18.1	17.35

Importance of Sturdy Accessories Recognized

Farming as it is done by the makers of automobiles is confined to the parts they are unable to produce (a) as cheaply as they can purchase them (b) with the facilities at their disposal. Accessories are divided into classes as follows:

(A)—Complete car units, as motors, transmission gears, steering gears, live rear axles, front axles, wheels, rims, tires, magnetos, carbureters, radiators, and such other aggregations as are essential to the completion of the chassis independent of the body.

(B)—For the completed chassis, with a view to bringing it up to the user's requirement, the further considerations are by way of bodies, tops and the incidentals for comfort.

(C)—Accessories along necessary lines independent of the chassis and body work include lighting systems, etc.

In the plants where automobiles are made, farming is mostly confined to the production of parts from designs by the makers of the cars, and as a rule, these parts are delivered in dissembled lots to be used as the occasion requires in the assembling of the automobiles. It was thought for a time by some who take an interest in such matters that farming would ultimately pass out of vogue, for two reasons, (a) on the ground that a maker of automobiles can not long afford to allow a portion of his earnings to be absorbed by parts makers, and (b) for the reason that a better quality is to be expected if responsibility is centered. Thus far in the history of the industry it has not been shown that any of the reasons given have much weight alongside of the fact that a maker of specialties becomes skilled in the art, and he must make good because his bread and butter lies in maintaining a satisfactory standard of quality; in other words, the accessory maker has every chance to learn how to do the work rightly and his success depends entirely upon quality.

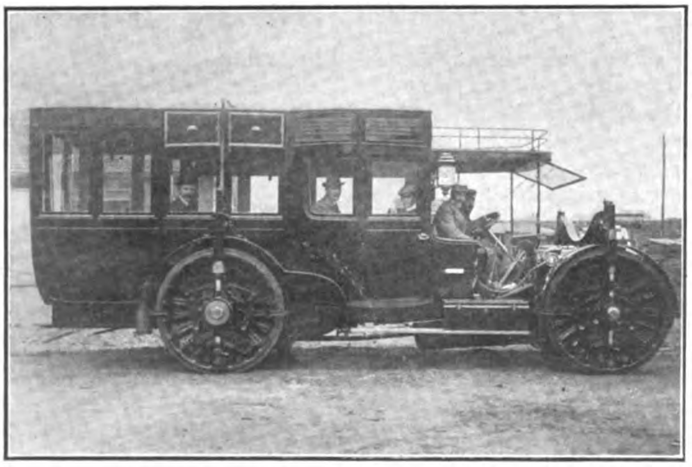
Trying to Abolish the Use of Rubber Tires

Depicting a system which is a radical departure from accepted practice; low center of gravity is one of the aims; how it is realized is shown; suspension is from above instead of from below; large diameter wheels are used; the plan has been given a practical try-out; instead of tires of rubber or steel, a system of leather bandages is used; the scheme looks heavy, but the designer thinks that quantity building will soften this defect.

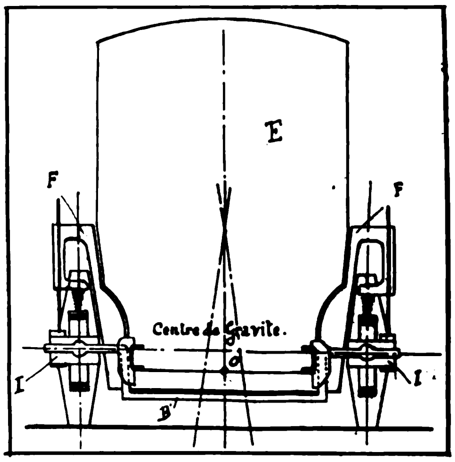
WITH rubber at a record price and still rising, inventors of spring suspensions, shock absorbers, and other devices intended to abolish the use of pneumatics or to lengthen their natural life, find this the right moment to bring their wares before the public. J. J. Heilmann, a French engineer of considerable repute, has a system which is a radical departure from the standardized method of suspending automobile vehicles. He objects to the small wheels used on automobiles in order to obtain a low centre of gravity; he considers that the overhanging suspension in relation to the vertical passing through the axis of the wheels and the point of contact with the ground is contrary to engineering principles; and naturally he is of the opinion that pneumatics are out of the question where economy has to be considered on heavy commercial vehicles.

The principle of the Heilmann suspension can be gathered on reference to the figures. The vehicle is no longer carried from below, but is suspended at FF" in the vertical axis of the road wheels, and on their hubs II". The axle, B, is entirely free, merely carrying its own weight, serving to unite the two wheels, and guiding the chassis and the body in fixed grooves attached to the chassis. As the body is not laid on the springs, but is suspended from above, all swinging of the upper portion is abolished. Although the wheels are almost twice the diameter of those usually employed, the centre of gravity is brought down to O, below the axis of the wheels, and the body is as near to the ground as with the ordinary system of suspension. Further, by the interposition of a universal joint in the axle, each wheel can respond to road inequalities without a twisting of the chassis, or in any way affecting the opposite wheel.

Engineer Heilmann has given a practical application to his system on a Pipe six-cylinder chassis, fitted with a handsome 22-passenger saloon body. Very satisfactory experiments have been made, and although some changes will be carried out before construction in series is commenced, these will be of a structural nature only, the principle remaining unchanged. The wheels, as can be seen from the illustrations, are metal ones of very large diameter, with all the suspension in the vertical axis. This consists of two short semi-elliptic springs, one above and one below the hub of the road wheel, and two hydraulic shock absorbers. By reason of the large diameter of the wheels and the various organs of suspension all vibration is abolished. The distance that vibrations have to travel from the rim to the road wheel to the chassis is over 14 feet, compared with an average of 50 inches on automobiles with the usual small diameter wheels and semi-elliptic springs.


Pipe 6-cylinder saloon body by Labourdette of Paris "compound," Heilmann suspension

Neither pneumatic nor solid tires are necessary. The inventor would prefer to use metal bandages, but on account of their side-slipping propensity and the noise they make he has discarded them for a patented compressed leather bandage. This has no resiliency, but it deadens noise and prevents slip. The external appearance of the suspension suggests considerable additional weight, but according to the inventor the system is lighter than wooden wheels, solid rubber tires and semi-elliptic springs, as ordinarily used. Complete with 23 passengers, the Pipe saloon car with the Heilmann suspension weighs from 11,000 to 13,000 pounds, according to the nature of the passengers. When built in series very much weight will be saved, for the first model is almost entirely in cast steel, with a very large safety margin. Steel stampings could be used for most of the metal parts, with, of course, a great decrease in weight. By the use of air buffers Engineer Delpeuch has found it possible to abolish the use of springs, as well as pneumatic tires, for motor vehicles of any size or weight. Briefly, his system consists of four cylindrical air buffers, in place of the four springs. The usual way of converting an ordinary car is as follows for the front suspension: The semi-elliptic springs are entirely dismounted, and the frame members are sawn off about an inch ahead of the front of the radiator. To this projecting end is attached a wrought-iron vertical member, the upper curved end of which receives the head of the cylindrical air buffet. In order that the harmonious lines of the car may be observed the frame to carry the cylinders is a scroll work, generally with one arm made to support the front end of the mudguards. The connecting rod of each piston is bolted to the axle in practically the same way as springs are attached. An effort is made to provide against shock which is more pronounced in this plan than with springs.



Sketch showing principle of Heilmann suspension

Two small tanks, carried within the frame, contain compressed air for the suspension, one tank feeding the two front buffers, and the other the rear ones. The air is put under pressure through a dashboard connection, either by means of a tire pump or a mechanical tire inflator. On the dashboard, also, are two manometers, indicating the pressure in the forward and the rear pair of cylinders, and provided with cocks for passing the pressure from one set of buffers to the other, as desired. Thus it is possible to increase the pressure at the rear and decrease it at the front, or *vice versa*.

The cylindrical buffers are each fitted with a special piston capable of holding compression equal to that usually maintained in pneumatic tires. This is obtained by a piston without compression rings, the nature of the metal being a secret of the inventor, and covered by a patent. A charge of lubricating oil is placed in the cylinder when fitted, and this is generally sufficient for the normal life of the piston. As a proof of the entire absence of leakage a set of buffers fitted to a car were inflated to the normal working pressure of 5 kilogrammes and left untouched for four months; at the end of this time the loss from all causes was less than half a kilogramme.

Suitable piping, a part of it being flexible rubber tubing, united each buffer to the compressed-air tanks. In the head of the cylinder is an ordinary type of automatic valve which opens in the direction of the tank on the rise of the piston due to a road shock. Immediately on the pressure being released, the valve closes and air begins to pass through a hole in the centre of the valve until the pressure in the buffer has been re-established. In practice, over a rough road, the valve is continually being opened by the repeated road shocks, and just as frequently air is flowing back from the tank to the buffer.

The system has been found so satisfactory that it is possible to do without both springs and pneumatics. The car shown in the illustration is temporarily fitted with pneumatic tires, because no satisfactory solid tire was immediately available. It is found that best results are obtained with a tread of two inches for a medium-sized car, the rear bandage being fitted with diagonal grooves as a preventative of side slip. It is also necessary that the metal rim shall be of such a nature as not to come in contact with the rough ground surface. This type of rim and bandage is now being made specially for the suspension. As a practical test two cars were presented, one with the Delpeuch air suspension, and the other with ordinary springs and pneumatic tires. Experienced automobilists were taken a night ride in both over some of the worst paved streets around Paris, without knowing in which car they were seated. In no case was it found that the air suspension was the less advantageous.

A strong point of the system is that it is possible to vary the pressure according to the load to be carried, or to decrease or increase pressure at front and rear, as is desired.

Technical Tests of the Partington Spring Wheel

COMMANDANT L. FERRUS presents a report on the Partington spring wheel submitted for trial to the Technical Commission of the Automobile Club of France. The wheel is of the type with a rigid rim sliding in grooves fixed on a central hub, also rigid, with the elastic medium placed between the rim and the central hub. Its distinguishing feature is that instead of the elastic medium consisting, as usual, of springs or solid rubber, it is here composed of an air tube. Following the letter references in Figs. 1 and 2, the characteristic of the Partington wheel is the absence of a special organ forming a locking mechanism between the rim G and the hub. This latter is really composed of a complete wheel, the rim of which, A, is undulated. The encircling band, on the contrary, carries a hollow toothed rim, A1 A2, composed of fiber and canvas, the teeth of which, A1, and the hollows A2 correspond respectively to the depressions and the projections of the interior rim, Figs. 1 and 2.

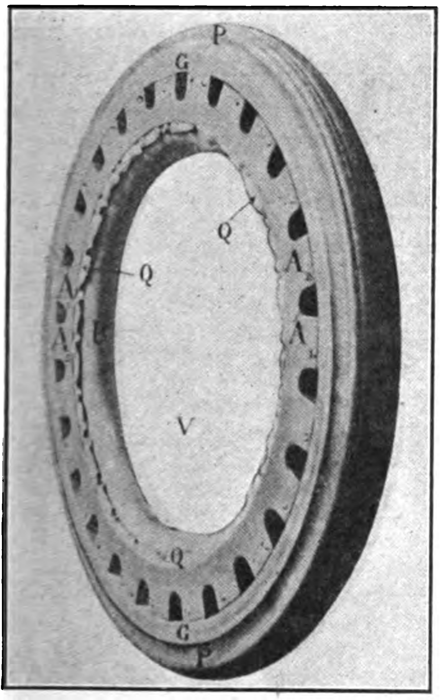


Fig. 2—Partington spring wheel, sectional view

A reinforced air tube, protected by a thick bandage of chrome leather, Q, is interposed between the rim A and the toothed circle, A1 A2 A1 A2. This tube is inflated to a pressure of 5 kilos and enters between the depressions and the projections of the two undulated surfaces, facing one another and makes them into a rigid whole.

Two circular discs are attached by bolts to the rim, and united between them by the bolts which pass through the openings A1, forming a sliding groove for the rim G, and the hollow circle, allowing them to oscillate radially or tangentially between these flasks, while at the same time resting in contact with the air chamber, B. The bolts F limit, in case of necessity, these oscillating movements.

It will be seen that the rim is driven without any difficulty and that the central hub is freely suspended in the interior of the air chamber without transverse rigidity being impaired. When starting the hub turns very slightly in relation to the rim G and the hollow rim A1 A2, bringing them into movement with an elastic motion and without any shock. When stopping or braking, an inverse movement takes place. It is found that starting and stopping take place without any shock. No displacement of the air chamber takes place by reason of the large number of teeth in the two rims. Any such movement would tend to tear out the valve, and tests have shown that the valve is not in any way affected. The flexibility of the bandage is very satisfactory. On an indifferent or really bad road it is equal to that of a pneumatic tire. On an ordinary road, and especially on one with few rough places, there is less flexibility than with a pneumatic tire, for this wheel does not "absorb" small obstacles; the car holds well to the road, even at high speed and on turns.

Objections are that the wheel is rather heavy, and that this may have an ill effect on the axle stubs; this difficulty should be overcome by better methods of construction. Price is high, but is compensated by the lower cost of upkeep. Due to wear the air chamber may not remain air tight. These objections, however, appear to be more theoretical than real.—*Bulletin Officiel de la Commission Technique de l'Automobile Club de France*, April, 1910.

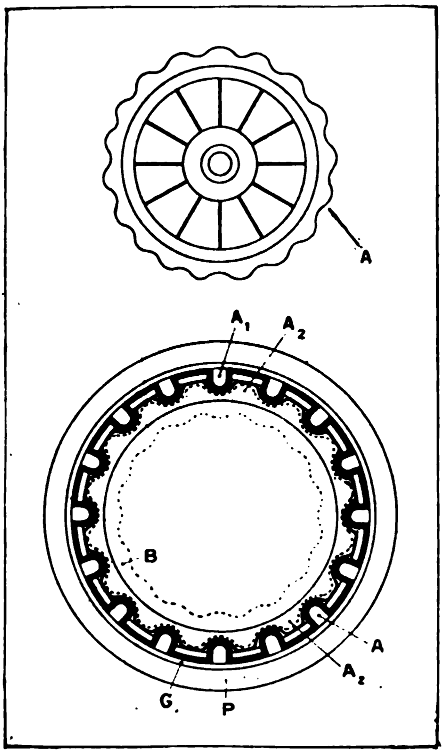


Fig. 1—Partington spring wheel

Abstracts from the 50 Best Foreign Papers

Digest Along Technical Lines for the Engineer

Throttling and lubrication in revolving-cylinder motors——Gasoline motors with reserve power——The possibilities for developing them——The Gore construction——Nervous or soft motors——Their torque and their wear——More light on concentric valves.

Comparing the Gnome and the Adams revolving motors, Eric Walford gives credit for the early conception and practical work of the Adams-Farwell construction and finds them similar in principle. While the greater lightness belongs to the Gnome, the Adams has important constructive advantages. The power of the engine is controlled by varying the compression. A lever permits the adjustment of the inlet cam with relation to the revolving engine. For full power the cam operates as usual, but otherwise the inlet valve remains open during part of the compression stroke, so that part of the gas is blown back in the inlet pipe and less is compressed. This has the advantage that, when the engine is throttled down considerably, the pressure within the cylinders does not fall very low on the suction strokes, as in ordinary engines, and the lubricating oil will not be liable to be drawn past the piston rings into the combustion chamber. By this provision one of the great difficulties of revolving motors seems to be obviated in the Adams type. It has no exhaust pipe or muffler, but auxiliary exhaust ports at the bottom of the stroke break up the exhaust into two portions and reduce the noise. The gas is not fed into the crank chamber, as in the Gnome, but into an induction chamber and thence through five radial inlet pipes to the tops of the cylinders, so that this engine does not resemble the radial-flow turbine as much as the Gnome, in which the gas travels radially outward through valves in the piston head, and then expands inward, passing outward through the cylinder heads again on the exhaust stroke.—*The Autocar*, June 4.

Not the flexibility but the reserve power of the steam engine is the envied feature with which designers of gasoline motors have recently been trying to endow their creations. There is after all sufficient flexibility and suppleness in a six-cylinder or an eight-cylinder engine or in a four-cylinder engine of the two-cycle system. But the maximum value of the mean effective pressure is a strictly limited quantity obtained only when the cylinder receives its maximum charge of gas mixture. And the maximum charge is only obtained at low-motor speeds. Above a certain number of revolutions the power of any motor ceases to increase in proportion to its speed. The piston speed is limited by the increasing resistance to aspiration of gas, more than by inertia or the difficulties of lubrication, which, however, also make themselves felt and impose another, but higher, limit to the increase of power. The pressure on the steam piston, on the other hand, is only limited by that on the boiler walls which may be raised by more intense heat. Now it is a question if the loss of charge at the moment of gas induction could not be suppressed and whether in fact the charge might not be increased beyond the natural cylinder volume, since there is nothing inconsistent in having the charge at more than one atmospheric pressure, by means of a system of forced feed for the gas. The danger of automatic ignition limits the pressure that might be employed, of course. But suppose we admit into a cylinder of one liter volume 1½ liters of gas which we compress three times, or to 4½ kilograms per square centimeter, and in another cylinder of the same volume we admit ¾ liter of gas compressed six times, giving the same pressure as in the first case. The volumes occupied by the gas after the explosion will be identical at the moment the exhaust is opened, and, as the first contained twice as much gas as the other, it stands to reason that the pressure in the first, at the moment of exhaust, is greater than in the other, and indeed as great at the bottom of the stroke as it was at the middle of the stroke in the second cylinder. Consequently, if one has obtained a higher mean effective pressure in the first case, one has also a poor efficiency, since the expansion of the gas has not been well utilized.

There seem to be three possibilities for raising the present maximum power of the motor:

(1)—To find means for introducing a charge reaching a little above atmospheric pressure at the end of admission, even at high speeds.

(2)—The gas admission is not limited but varied according to the power demanded of the motor, while the compression is designed so as to be about normal, 4kg. per sq. cm., when the charge is admitted at atmospheric pressure, and the gasoline is not injected till the moment the explosion is wanted, thus excluding premature ignition when an overcharge has been admitted and the compression consequently raised. The efficiency with this method remains fair, since the conditions are normal for normal operation, and under the forced regimen the resulting overcompression compensates in part for the incomplete expansion.

(3)—The gas admission is not limited, but the volume of the compression chamber is varied so as to have no overcompression or premature ignition. The efficiency in this case is good, so long as the charge remains below atmospheric pressure, but beyond this the incomplete expansion causes a lessened efficiency which, however, is admissible, since the forced march is the exceptional expedient for overcoming exceptional resistance.

The second solution of the problem seems to offer the best averages for all speeds and many designers are working it out experimentally. Nevertheless, it is the first solution which has been taken up successfully in the Gore motor. This comprises five vertical cylinders in a row, working on crank pins 72 deg. apart. A sixth cylinder is the air compressor, which sends air to a tank, whence it goes to the cylinders, passing on the way through a carburetting or gasoline-injector device, but a hand-operated valve on the air conduit permits the operator to shut off the compressed air. The carburetion takes place as follows: The compressed air passes with great speed into a double horizontal cone, siphoning into this cone whatever air can penetrate from the atmosphere by raising a small valve below the gasoline jet (jet and valve both located in vertical tube extending below the cones). A separate oblique needle valve below the valve admits regulation of the air thus drawn in and thereby of the degree of carburetion. So that the compressed air shall not raise all the induction valves at the same time but allow them to remain under control of their respective cams, the inventor has recourse to compensating valves, on the same plan as in Doué's automatic starting device. The holes bored in the cylinders for the guides of the valves are in this motor of a diameter equal to that of the valve, and the valve guides slide in them, while the valve springs are lodged in seats hollowed out in the guides. At rest the latter abut against a portion of the cylinder by means of a flange, but as soon as compressed air enters the admission chamber below the admission valve and surrounding the upper part of the valve stem, the pressure on the top of the guide makes it descend to its seat with a force equal to that which tends to open it by direct air pressure, the lower area of the valve being equal to the top area of the guide, as mentioned.

The inlet cam shaft can be made to slide longitudinally, thereby varying the period of admission for the compressed gas.

Normally, the admission closes at 15 per cent. of the stroke, but at the forced regimen it remains open for 0.30 of the suction stroke. The gas admitted during this period is under a pressure of about 3.5 kg. per sq. cm. and distends during the rest of the suction stroke, till at the end it is at 0.52 of one atmosphere in normal operation, but at 1.05 atmosphere when the motor is forced. In an ordinary motor the pressure on the charge at the end of the suction stroke is about 0.65 atmosphere at 1,500 r.p.m. One may ask if this first compression by a pump followed by expansion in the cylinder and by a second compression in the cylinder does not involve losses. But the first expansion is a motor power and contributes to cooling of the motor. On the other hand, there must be losses in the conduits made necessary by the system. At small speeds, the system gives ten motor impulsions for each two revolutions; namely, five explosions and five admissions of compressed gas. To complete the analogy with a steam engine, the Gove motor has, besides the cams of varying profile permitting variable duration of gas admission, also double admission and exhaust cams permitting the engine to be reversed. The starting of the motor is automatic. It is only necessary to open the shut-off valve for the compressed air and the latter finds the cylinder whose admission valve is open and starts the motor even under load.

The inventor states that a motor of his construction with cylinders 90 by 127 mm. gives 50 horsepower at 1,000 r.p.m. and with a full consumption of 215 cubic centimeters per hp-hour. The mean effective pressure is given as 15.7 kg. per sq. cm., which, however, exceeds the power mentioned by 3-7 kg. Doubtless the inventor is optimistic, as an ordinary motor of his dimensions, with allowance for the large gas charges, should not give more than 42 horsepower at the most.—From reprint in *Automobile-Aviation de Belgique*, June 30.

With reference to concentric valves, of which a comparative study was presented in these columns on June 9 after *La Vie Automobile*, the maker of the Miesse motor and valve offers remarks of general interest in objecting to the reviewer's estimate of his construction. It can not be considered objectionable, he writes, that the valve lift reaches as high as 10 millimeters. The shock on the tappet roller is no more sudden than with ordinary construction, since the projection on the cam is divided in two advances no higher than those of an ordinary cam, and, as to the drop, it is effected at an angle differing considerably from that indicated in the illustration, so that the possibility of fracturing the parts is entirely obviated. It seems at all events simpler and safer to employ a positive mechanical movement for raising the valves than the variable and problematic action of a counter-spring. While the interval between the upper exhaust valve and the intake valve at the bottom contains burnt gases which enter the cylinder again at the suction stroke, this is no more than takes places in all ordinary motors with L. or T. valve chambers, while in the Miesse construction the space referred to is closed between the valves during the explosion stroke and does not affect the thermic efficiency. It is stated that the exhaust valve, whose central location distinguishes this system from all other concentric valve designs, is never cooled. In reality it has been placed where it is precisely with a view to obtaining perfect cooling, and in its position lies the superiority of the system. In none of the other designs does the cooling medium come in contact directly with the seats of the valves or the valves themselves, while in the Miesse the air is driven with great force by the ventilating fan directly against the large exterior valve and its seat; and, besides, the fresh gases lick the exhaust valve seat exteriorly and, as the surface of the valve proper is much smaller than that of the seat which always remains cool, it is readily seen that the cooling is effected much more surely and rationally than in the usual case, where the question is that of cooling the largest of two valves. In other words, it is easier to cool a small than a large valve. In the Miesse motor there is moreover provided an auxiliary exhaust at the bottom of the stroke which notably diminishes the quantity and heat of the gas passing through the exhaust valve.—Letter from J. Miesse to *La Vie Automobile*, June 4.

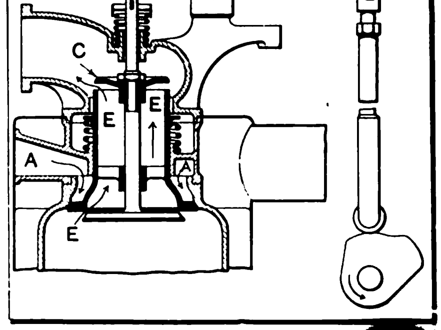
Various methods for blueprints, and a suitable equipment of a modern factory for this purpose are described by Reishaus in *Werkstattstechnik* for April, with drawings of the blueprint machines made by Halden & Co., of Manchester, Eng.

On the subject of "nervous" or "soft" motors, A. Contet, a well-known French engineer, maintains that the distinction, while popular, is devoid of genuine merit and is dictated mostly by commercial considerations. The "soft" motor with the customary short stroke and moderate compression gets all the characteristics of the "nervous" motor at low motor speeds, while the "nervous" motor under an overload forcing it to small speed becomes "soft." The question is one of torque at the various motor speeds. The torque of the short-stroke motor (or 110 by 120 millimeters) of the heretofore ruling design is generally superior below 1,500 revolutions per minute, while that of the long-stroke motor, developing the same power with 85 millimeters bore and 160 millimeters stroke, is superior above 1,500 revolutions per minute. With regard to the bearings of the long-stroke motor, Contet maintains that their rapid wear is simply due to the erroneous practice of using only two bearings for the shaft of a four-cylinder motor, which compels the use of very large diameters and consequently rapid wear of connecting rod bushings, due to the high linear speed. He considers that every "pushed" or "nervous" motor should necessarily be equipped with five crankshaft bearings for four cylinders, so that crackpin diameters may be reduced to their minimum, and that these bearings furthermore should be ball-bearing, so as to give room for widening the connecting rod knuckles and diminishing the pressures per square inch. By this means the pushed motor may be made just as durable in all its parts as the customary type.—A. Contet in *L. V. A.*, June 25.

Valuable articles on steel testing, very elaborate; on electric heating and pyrometry; on case-hardening and on the A2 point in chromium steel, are found in *Engineering* (London) for June 3 and 17.

A method for testing iron and steel shapes for defects by means of corrosion, which quickly lays bare the dangerous formations, is described and proposed by Charles Frémont, engineer, in a quarto pamphlet of 54 pages, with 41 illustrations, published by Dunod & Pinat, Paris; price, 2 francs. The same author has an article on the dynamics of the screw, with special reference to accurate determinations, as for use in dynamometers, in *Revue Mecanique*, May 31.

Referring to a loss of "aerial pilots" making a total of 81, *Motor Car* (June 8, 1910) goes on to say: "Here we get some idea of the commerce done by the different firms, for by looking over this list we find twenty-five H. Farman biplanes, twenty-two Blériot monoplanes, ten Voisin biplanes, nine Wright biplanes, six Antoinette monoplanes, and ten other different types. It is not easy to ascertain the true number of aeroplanes and airships, but the total is about 345, divided amongst the principal countries: England, 20 aeroplanes, 4 dirigibles; France, 190 aeroplanes, 10 dirigibles; United States, 50 aeroplanes, 7 dirigibles; Germany, 15 aeroplanes, 16 dirigibles; Italy, 15 aeroplanes, 3 dirigibles; Japan, 5 aeroplanes, 1 dirigible; Austria-Hungary, 10 aeroplanes, 1 dirigible; Belgium, 8 aeroplanes, 2 dirigibles; Russia, 6 aeroplanes, 2 dirigibles.



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Testing Steel—For Impact, Bending, Etc.

By BERTRAM BLOUNT, W. G. KIRKALDY and Capt. H. RIALL SANKEY

(Fourth Installment)

It was found that the average of 4 test pieces when broken by repeated bending was within 4 per cent.; a greater variation was traced to effect of position; appearance of fracture same as that due to static testing; energy required for rupturing can be calculated; measurements of strength discussed.

FOUR test-pieces were broken for each type of steel by repeated bending, and the average disparity of the various observations from the mean was of the order of 4 per cent.; where greater variation than this occurred it could be traced to the effect of the position of the test-piece; the effect of position is very marked in some cases. The readings of the maximum bending effort of each set of four test-pieces are much closer than those of the bending effort of the first bend. It would appear that the latter depends a good deal on the position of the test-piece and also on the degree of annealing. The effect of the bending is to stiffen the material, and apparently this stiffening tends to a limit; hence a greater uniformity in the readings of the maximum bending effort which agreed within 2 per cent. In the case of the initial bending effort the disparity is as much as 4 per cent. Except in a few cases, the number of bends sustained by each of the four test-pieces of a set agreed within 6 per cent, and the measurement of energy absorbed agreed within the same percentage. In most cases the disparity can be accounted for by the effect of the position from which the test-pieces were taken, but in some there is no apparent explanation. A note was taken of the position of the skin with reference to the direction of bending, but no decided effect was observed.

The appearance of the fractures of the impact tensile tests agreed with those of the static tensile tests. The fractures of the repeated-bending tests had, however, a somewhat different appearance, but no better terms than silky and granular suggest themselves. In addition to these two kinds of fracture, small bright crystalline patches were observed in some cases (see Items Nos. 8 and 9, column 25, Table 2. As a rule, it is possible to find a likeness between the various fractures sufficient to classify them.

Comparison of the Results Obtained.—Broadly stated, the object of applying a mechanical test to a piece of steel is to obtain information as to its strength, its ductility and the energy required to rupture it. Although the energy required for rupture can be calculated from the ordinary tensile tests it is not usual to do so. In the case of impact tests it is the principal measurement made; in fact, with notched specimens it is the only measurement possible. As regards repeated bending the energy absorbed is automatically recorded by the machine used in these experiments, as already explained.

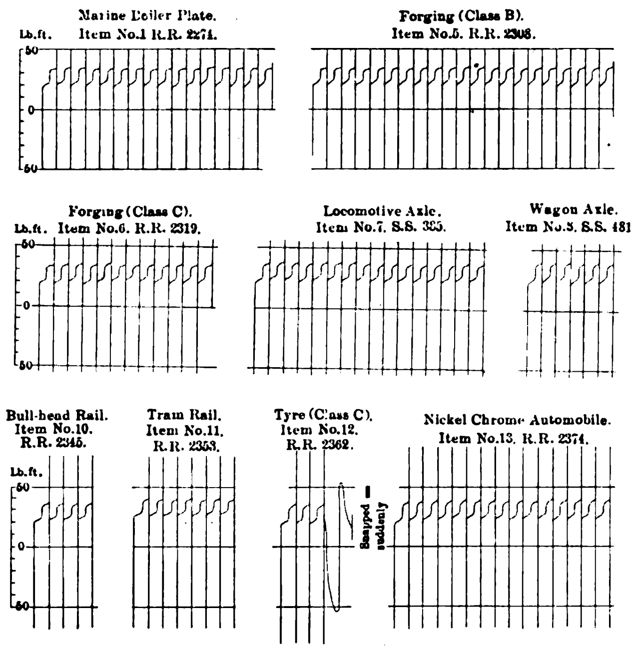
Measurement of Strength.—Some idea of the strength can be obtained from the impact tests by dividing the elongation into the energy absorbed per cubic inch, i.e., column 13, Table 3, by column 17, Table 2; this has been done and result is given in column 3, Table 3, and the ratio of column 3 to the breaking stress (column 7, Table 2) is given in column 4. There is a fair agreement proportionately, but the strength is exaggerated.

In the case of the repeated bending it is clear that there must be some connection between the initial bending effort and the yield stress, and it is probable that there is also a relation between the maximum bending effort and the breaking stress.

These comparisons are given in Table 3, columns 5 and 6, and it will be seen that as regards the yield stress and initial bending effort the average ratio is 2.1 for steels containing up to about 0.3 per cent. carbon, and it may be stated that practically the same figure has been many times obtained before with steels of similar carbon content. For steels containing more carbon, however, the ratio is greater, namely, an average of 2.7. The nickel chrome steel does not, however, conform to this rule, nor is the agreement good in the case of items 1 and 2. The disparity may, however, be in some measure due to the known difficulty of accurately determining the yield stress. The ratio of the maximum bending effort to the breaking stress is very fairly constant throughout, the average figure being 1.54, and the greatest disparity is 7 per cent.

The meaning is that an approximate idea of the tensile yield stress can be obtained by dividing the initial bending effort by the 2.1 in the case of mild steels (below 0.3 carbon) and by 2.7 for stronger steels. In all cases the tensile breaking stress can be calculated to a fairly close approximation by dividing the maximum bending effort by 1.54. These results are also shown diagrammatically in Fig. 9.

Measurement of Ductility.—The impact-tensile test gives elongation and contraction of area, and it is to be noticed that the figures are in all cases greater than those obtained with the static tensile tests of the small specimens. As regards elongation the probable explanation is that the suddenness of the breaking effort tends to produce a more general extension. In the repeated-bending test the number of bends increases with the ductility, and in order to establish a comparison with the ductility as evidenced by the tensile tests, the ratio of the number of bends to the elongation,* to the contraction of area, and to the product of the elongation and the contraction of area have been computed with the results given in columns 8, 9, and 10, Table 3. It will



Item No.	Type of Steel.	Min.	Max.	Emergy.	No. of Bends.	Fracture.
		lb.-ft.	lb.-ft.	ft.-lb.		
1	Marine Boiler Plate . .	45	51	2,300	31	silky
5	Forging (Class B) . .	38	50	3,000	41.1	silky
6	Forging (Class C) . .	63	69	2,000	23.1	silky
7	Locomotive Axle . .	48	54	2,090	32.1	granular and silky
8	Wagon Axle . . .	49	55	1,120	12.3	crystalline
10	Bull-head Rail . . .	65	73	900	8.1	45% crystalline and granular
11	Tram Rail . . .	64	73	1,600	14.8	granular
12	Tyre (Class C) . . .	76	84	830	6.3	fine crystalline
13	Ni. Cr. Automobile . .	71	79	3,320	29.2	fine silky.

Fig. 8—Records of repeated-bending tests on nine types of steel

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* In order to make a true comparison the elongation for a gauge length of $4\sqrt{A}$ has been computed from elongations given in columns 8 to 12, Table 2. A is the area of the cross-section.

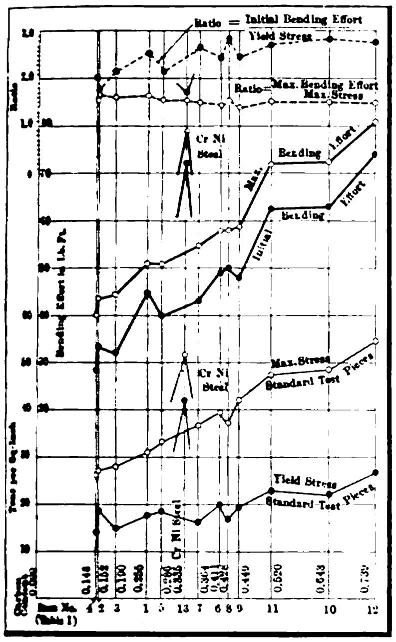

Fig 9—Comparison of repeated-bend tests with tensile tests

be seen that the ratio varies somewhat in the first two cases, but is fairly constant in the last (column 10). It may be said therefore that the number of bends is proportionate to the ductility as obtained by the static tensile tests. These results are also shown diagrammatically in Fig. 10.

Measurement of Energy Absorbed.—A comparison of the energy absorbed in rupturing the test-pieces by the three different methods of test is given in columns 11 to 17, Table 3. In the static tensile tests the formula used is:

Energy per cubic inch

$$= \frac{\text{elongation}}{\text{gauge length}}\left(\frac{2\text{ breaking-stress} + \text{yield-stress}}{3}\right).$$

This formula assumes that the top of the stress-strain diagram is sensibly parabolic in form, and it was originally proposed by Sir Alexander Kennedy. The calculation has been made both for the small and for the standard test-pieces; in the latter case the elongation for a large test-piece geometrically similar to the small test-piece was computed. It will be seen that the energy per cubic inch absorbed by the large test-piece is in all cases smaller than by the small test-piece.

It will be further noticed that the energy absorbed per cubic inch in the impact tensile test is considerably greater than in the static tensile test, the ratio being approximately 1.6 (see column 14) which may be due to the suddenness of the action.

On examining the broken repeated-bend test-pieces it was found that the whole of the metal was profoundly disturbed for about 1.3 inch of its length (varying from 1.1 to 1.5). The energy per cubic inch can, therefore, be calculated approximately, and the result is given in column 15, Table 3. It will be observed that the figures in most cases are of the order of five to ten times greater than those for the static tensile tests (standard specimens, column 12). In the case of the latter, however, the far greater portion of the metal is only distributed to the extent due to the yield stress (even if so much), and it is only close to the actual fracture that it is fully disturbed, whereas in the bending test, as already pointed out, nearly the whole of the test-piece is profoundly disturbed. An estimate of the energy absorbed in the neighborhood of the point of rupture in the tensile test can be obtained as follows: The energy absorbed per cubic inch by the general extension can be found by establishing simultaneous equations based on the elongation on 2 inches and on 3 inches given in columns 8 and 9, Table 2. To this must be added the energy per cubic inch required close to the point of fracture by the additional disturbance there. A cubic inch, consisting of a cylinder 1 square inch area and 1 inch length, will be deformed into a cylinder whose cross-section is that of the contracted area. The elongation of this cylinder is, therefore:

$$\frac{1}{1-\text{contracted area}} = l$$

and the force acting is the breaking stress. This energy can therefore be calculated and added to that due to the general elongation. The result is given in column 16, Table 3, and the ratio of the energy required by repeated-bending to this energy is given in column 17. It will be seen that the ratio is fairly constant, and roughly the energy per cubic inch required by repeated bending is twice that needed by a static pull at the point of maximum disturbance. This appears reasonable seeing that the alternate tensions and compressions to which the metal is subjected in repeated bending produce an irreversible action, so that the energy required is likely to be considerably greater than that needed for a simple pull. An interesting point to note is that the variation in the energy absorbed per cubic inch, both in the static tensile and in the tensile impact tests, does not greatly vary with the different types of steel; whereas in the repeated-bending very marked differences occur. These results are also shown diagrammatically in Fig. 11.

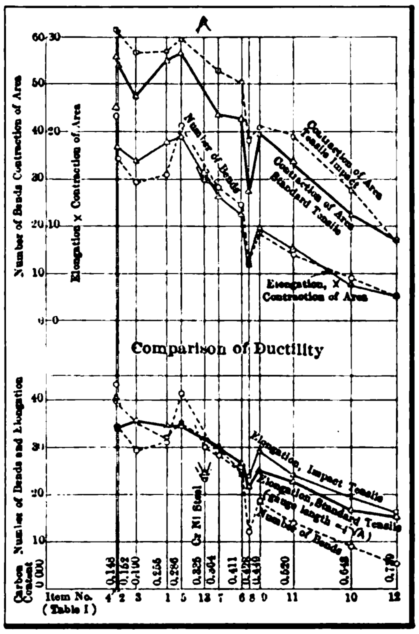

Fig. 10—Comparison of ductility by static tensile, impact tensile and repeated bending

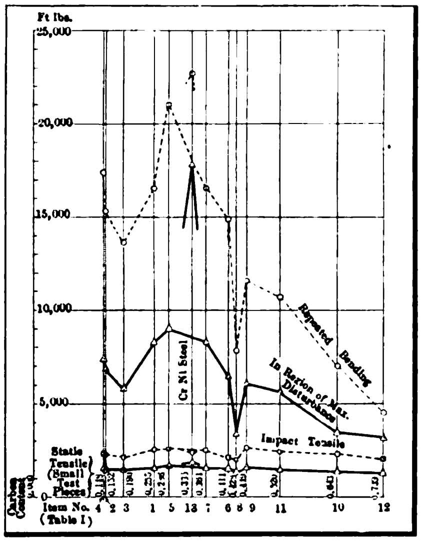

Fig. 11—Comparison of energy absorbed per cubic inch of metal by static tensile, impact tensile and repeated bending

The results of the impact tests are similar to those obtained by the static tension test, and this agrees with similar tests made by M. P. Breuil and others, but it would appear from these latter tests that in the case of steels containing an undue percentage of phosphorus much lower results are obtained by the impact method than by the static method. Such steels were, however, not included in the original scope of experiments.

Summary

1. The static tensile test forms a standard of comparison, and gives the strength and ductility of a sample of steel in terms which are well understood. The average energy absorbed per cubic inch can be computed, but does not vary greatly, and, therefore, does not assist in discriminating between the various types of steel.

2. The impact tensile test gives the ductility in the same terms as the static tensile test, namely, elongation and contraction of area, but always with higher numerical values. The breaking stress of the material can be inferred, but must be reduced by a factor in order to obtain the same numerical values as given by the static test; also it only gives the breaking stress. The energy absorbed per cubic inch does not vary greatly with the various types of steel; it is approximately 50 per cent. more than that obtained by the static tensile test, and is also no definite criterion of the type of the steel; at any rate, of normal steels containing a small proportion of phosphorus. From the experiments referred to by M.

Breuil it would appear that steels containing an undue proportion of phosphorus give a much smaller energy per cubic inch with impact tensile tests.

3. The repeated-bending test gives strength, ductility and energy, but in terms different to those obtained by the static or the impact tensile test. Strength in the same terms as the static test can be inferred as follows:

The yield-point expressed in tons per square inch can be obtained by dividing the initial bending effort, expressed in lb.-ft., by 2.1 for mild steels, namely, those containing less than 0.3 per cent. of carbon, and 2.7 for medium carbon steels. The breaking stress in tons per square inch can be obtained by dividing the maximum bending effort, expressed in lb.-ft. by a factor 1.54 for all types of carbon steel. The ductility of the steel is given in different terms to those in which it is expressed by the static tensile test, namely, the number of bends, but the product of elongation on a gauge length of $4\sqrt{A}$ multiplied by the reduction of area is equal approximately to the number of bends divided by 1.9. The energy expressed in ft.-lb. per cubic inch required for breaking by repeated bending varies considerably, and is a characteristic of the type of steel.

The paper is illustrated by eleven figures in the letterpress and is accompanied by an appendix.

Appendix

The following is the calculation that has to be made to obtain the energy absorbed by the tensile impact test. As given on page 53 (July 14 issue), the formula is:

$$\text{Energy absorbed} = W\left\{H - \frac{1}{2g}\left(\frac{h}{t} - \frac{gt}{2}\right)^2\right\}$$

but since in almost every case the height of fall H was 30 feet, and the fall after fracture *h* was 10 feet, this formula can be reduced to:

$$\text{Energy absorbed} = W\left(35 - \frac{1.553}{t^2} - 4.035t^2\right)$$

Test-piece No. 307, taken out of locomitive plate not subjected to flame (Item No. 3), will be taken as an example; in this case W = 20 pounds and the tape record gave $t = 0.365$ second.

Hence:

$$\text{Energy absorbed} = 20\left(35 - \frac{1.553}{(0.365)^2} - 4.035\,(0.365)^2\right)$$

$$\text{Energy absorbed} = 20\,(35 - 11.64 - 0.53)$$

$$\text{Energy absorbed} = 456 \text{ foot-pounds.}$$

The error in determining the energy absorbed in rupturing a test-piece by tensile impact depends on the error in the time measurement, and also on the ratio between the energy absorbed in breaking the test-piece and that remaining in the tup immediately after fracture.

If δ is the error in the measurement of the interval-time, it can be shown after some reduction* that the percentage of error in the value calculated from the above formula is:

$$\frac{2\delta K}{1 - K^2}\left\{\sqrt{\frac{h}{H} + K^2} - \frac{\delta}{2}\left[\frac{h}{HK} + 2K + \sqrt{\frac{h}{H} + K^2}\right]\right\}$$

where K is the ratio of the velocity of the tup immediately after rupturing the test-piece to its velocity immediately before impact, hence $1 - K^2$ is the ratio of the energy absorbed to the energy in the tup immediately before fracture.

The following numerical examples, set out in a tabular form, will show the per cent error in the energy measurement for various values of K when $\delta = 1$ per cent. and 4 per cent., respectively. In all cases H = 30 feet and $h = 10$ feet.

Value of K	Ratio of energy absorbed to energy in tup immediately before fracture $1 - K^2$	Error in energy measurement $\delta = 1$ per cent. Per cent.	Error in energy measurement $\delta = 4$ per cent. Per cent.
0.2	0.96	0.25	0.93
0.4	0.84	0.66	2.50
0.6	0.64	1.5	5.8
0.8	0.36	4.3	16.5

With lower falls (H) the error is somewhat greater, with higher falls it is somewhat lower. It is obvious, therefore, that K should not exceed 0.5 in order that the error in the energy measurement should not exceed the error in the time measurement; that is, the velocity after impact should not be greater than half the velocity immediately before impact.

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*This investigation was made by Capt. C. E. P. Sankey, R. E.

Storage of Benzin

The increasing use of benzin as motive fluid for automobiles, motor boats and self-propelled dirigible airships—to say nothing of its employment as a solvent of india rubber, and its use as a menstruum for paints—makes anything tending to diminish the undoubted danger attending its storage and use of special interest. The liquid in question is, as all know, "water white"; but all do not know that its boiling point lies at from 105° C. = 221° F. down to as low as 80° C. = 176° F. Just what "benzin" is depends very much on the custom of the trade on the one hand, and the orders of the petroleum refiners on the other, for other products that pay better. The flash-point of this liquid, as ordinarily known in the automobile branches of industry, is about 21° C. = 69.8° F. The danger attending its use arises, not from its low flash-point, but from the fact that with air it forms an explosive mixture, when present in quantities lying between 2.8 and 4.4 volume per cent.

In 1893 Richter made a number of experiments as to the explosibility of this material, and found that up to that time its unexplained spontaneous ignition was due to its electric excitability. By the addition of salts of oleic acid (antibenzinpyrin) this danger was done away with. In 1899 the Society for Vessels that are Safe from Explosions, Salzkotten, produced vessels surrounded by wire gauze, so as to act on the principle of the Davy lamp, and the employment of such receptacles enables pouring benzin or other similarly explosive fluids into the fire without an explosion taking place. These receptacles are not, however, safe against lightning.

By filling one vessel with benzin from another, by means of compressed air, many explosions have been caused. To do away with this danger it has been recommended to use cold gaseous products of combustion. A further step in the direction of safety was made by the use of carbonic acid gas to produce the required pressure. According to Prof. Lunte, the addition of only 12 to 13 per cent. of this gas to an explosive mixture of benzin and air will render it harmless. One form of apparatus for storing and handling benzin has a tank for the benzin and a vessel of compressed carbonic acid gas; and between them a safety chamber buried in the earth.

Another safety arrangement, that of Grümer & Grimberg, in Bochum, permits the use of compressed air as a medium of transfer. It consists of a riveted boiler-plate receptacle, which is always out of the reach of fire (being buried in the earth), and from which the benzin is forced into the smaller vessels to be filled, by throwing into the connections a supply of compressed air. There is a steel tank of compressed carbonic acid, from which the gas is forced under very slight excess of pressure into all part of the piping and receptacle, so that the development of an explosive mixture of benzin vapor and air is impossible. An automatic safety appliance renders impossible any false arrangement or handling of the apparatus by carelessness. The quantity of carbonic acid gas necessary is very slight. An excess of pressure of one-tenth of an atmosphere is sufficient to insure the entrance of the gas into all parts of the piping and that part of the main receptacle not filled with benzin.

Automobile Accidents and "Autlers"

GERMANY has for some time past kept statistics concerning the number, kind and cause of automobile accidents, and results show that a large proportion of these—some of which were very severe—were due not to the speed at which the car was traveling, but to the foot passengers or others who were injured. Regierungsrat Dr. Haaselau had an article in *Der Tag*, of Berlin, calling attention to the almost incredible carelessness of foot passengers in regard to motor cars, and further, to a group of accidents in which the occupants of the car were injured and the driver alone was to blame, not by reason of speed, but because of his incapacity. There are drivers—both car owners and employees—with whom one feels absolutely safe at 60 miles an hour, and who have never had an accident.

As a parallel case, the author cites a second-class trapeze "artist," who would attempt to perform first-class feats, but who would be in constant danger of his life, because his physical elasticity was not equal to doing that which a first-class performer would easily perform. It is the same thing with motorists. Besides technical education, natural ability or adaptability, presence of mind and good nerves are of great importance as regards the degree of perfection or skill in handling a motor-car. There are drivers who can direct a car at 20 miles an hour with perfect skill, and at that speed are perfect masters of the situation, but as soon as they increase the speed in any degree are unsafe, and in a tight place they funk.

"How is this evil to be done away with?" inquires Dr. Haaselau. To do this by police regulations, setting a limit to the speed at which any given driver may conduct his car—as is the case in many towns in England—is impracticable. For instance, in many cases the limit is set at a point corresponding to the average ability of the drivers, namely 10 miles per hour, which reduces the whole ability of the automobile to that of the horse-driven vehicle. This completely shuts out the possibility of the use of the car in such towns.

Dr. Haaselau is of the opinion that better education and more experience should be demanded of the driver. The existing schools have, with few exceptions, no interest other than to turn out the maximum number of "chauffeurs" in as short a time as possible. They assume no responsibility for the subsequent performance of their pupils. Even the testing of their capabilities by experts offers no security, being not sufficiently thorough, and largely dependent on chance. The "chauffeur's" training should take place in schools having no pecuniary interests in turning out drivers, and should be, if possible, conducted by the municipal authorities, so that the official examination could take place at the end of each course.

Here unsuitable elements could be weeded out in time. The pupils would also be taught the dangers of high speeds. Drivers from such schools would naturally have the preference among car owners, and the time would come when none but such would be employed.

Imports of Automobiles Into Russia

The importation of vehicles of all kinds into Russia increases each year. In 1906 the total value was only 1.8 million roubles; 1907, 3.5 millions; 1908, 5.1 millions. This development is principally due to the growing demand for automobiles. In 1904 and 1905 the importation amounted to only 100,000 roubles each; in 1907, however, 1.6 million, and in 1908 to 3.1 million roubles. Preference is given to large cars with four to six seats. Of these, in 1908, there were 2.8 million roubles' worth bought abroad; of the smaller ones, only 0.3 million. The Russian automobile manufacturers have made only slight progress in 1908. Most of the work in this line consists in assembling parts bought abroad, and in the "carosserie," or carriage-making proper. These factories have, however, but limited custom. For expensive cars only French makes are preferred, while the German ones are taken for heavy passenger cars and for omnibuses. But the German manufacturers are making every effort to push the sale of their more expensive makes in Russia. In the automobile races, which take place once in a while, most of the cars are German. That they are better suited to the miserable Russian roads than the French has been shown by the recent races between St. Petersburg and Riga. The increasing importance of Russia as a market for automobiles has also brought American manufacturers on the scene. These strive specially to push the sale of the cheaper sorts, but by reason of their cheapness, says the German consul in St. Petersburg, they do not appear to be very desirable.

Coming Events in the Automobiling World

Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Jan. 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories Exclusively.
Feb. 6-Feb. 11, '11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc. Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill-Climbs, Etc.

July 18-23	Milwaukee, Wis., Tour of Wisconsin State Automobile Association for Milwaukee Sentinel Trophy.
July 22	Atlanta, Track Meet, Atlanta Automobile Association.
July 23	Brighton Beach, Track Meet, Motor Racing Association, New York City.
July 25-26-27	Cleveland, O., Reliability Run, Cleveland, Ohio, News.
July 25	Chillicothe, O., Track Meet, Chillicothe Order of Owls.
July 30	Wildwood, N. J., North Wildwood Automobile Club, Speedway Races and Club Run.
July 30	Long Island Motor Parkway, Track Meet.
Aug. 1	Minneapolis, Minn., Reliability Run of Minneapolis Automobile Club.
Aug. 3-5	Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 11	Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Aug. 16	Start of Munsey Tour.
Aug. 17	Cheyenne, Wyo., Track Meet.
Aug. 31	Minnesota State Automobile Association's Reliability Run.
Aug. 31-Sept. 8	Kansas City, Mo., Reliability Run, Auto Club of Kansas City.
Sept. 2-5	Indianapolis, Ind., Speedway Meet.
Sept. 3-5	Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 5	Wildwood, N. J., Track Meet.
Sept. 17	Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept. 24	Santa Monica, Road Race, Licensed Motor Car Dealers of Los Angeles, Cal.
Sept	Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.
Oct. 1	Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 3	Louisville, Ky., Reliability Run, Louisville Automobile Club.
Oct. 6-8	Santa Anna, Cal., Track Meet.
Oct. 7-8	Los Angeles, Cal., Speedway Meet.
Oct. 8	Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 15	Long Island Motor Parkway, Grand Prize, Automobile Club of America.
Oct. 15-18	Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.

THE AUTOMOBILE

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TO enable the user of pleasure cars or of trucks to get along with a small motor and yet have power for emergencies is the object of many experimental efforts among the designers of Europe to-day, and this trend toward economical refinement in automobile motors goes side by side with the bold departures from current practice which are witnessed in the aviation field. Other things equal, the most economical power must eventually prevail here as well as in less favored countries, and for this reason, if for no other, the brief accounts of Europe's feverish experimentation recorded weekly in our Extracts from Foreign Papers, claim the attention of the provident manufacturer. They should help to anticipate and forestall unpleasant commercial surprises. Refinement in constructive thought is Europe's strong point, and eventually there must be a reckoning, once more, between the merits of its practical results and those of our eminently successful refinement in the methods of mass production.

* * *

PREPARATION is rapidly going forward for the great meeting of the automobile engineers, which is to be held at Detroit, on July 28, 29 and 30. Indications point to a large program; many papers will be read, and knotty points will be aired. In addition to these important matters, there will be visits to plants, entertainment of the instructive sort, and, in addition, the great question of standardization of the materials used in automobiles will be earnestly debated. The Society of Automobile Engineers, while it is assured of a full attendance of its large and growing membership, has invited all automobile men to go to Detroit and participate in the doings—a welcome is assured, nor is it necessary to await further invitation. Go to Detroit; have a vacation and enjoy three days of automobile reviewing; even take part in the discussion and add a mite to the progress to be made.

* * *

FORTUNATE to relate, almost every autoist becomes acquainted with his car and its workings, excepting the ignition system, in a very short time. The electrical part of the equipment gives him sleepless nights; nor does he make any effort to cast off the hypnotic spell. There is nothing about an electric system that cannot be mastered by almost any autoist within a few days, and it is too bad that it is not given more attention and a little better care. When a man decides that he does not understand a thing, his inclination is to let it alone, and when an electrical device is neglected, the chances are that it will go awry.

* * *

FANCY free, with money in hand, the man with a penchant for real enjoyment, purchases a good automobile and goes forth to conquer. This is as it should be, and the money expended in enjoyment of this form is actually invested on a dividend paying basis. But this is not all; piano-forte makers are now complaining that even on the pay-as-you-please plan for a more or less good instrument, women are just a little timid—a natural inclination with them—and it is claimed that the automobile pleases them more; being used to having their own way, they get what they think will be of the most benefit, and as men of any wisdom will testify, a woman's judgment is rarely ever far wrong.

* * *

MUSIC and its charms are accompaniments of life that can ill be dispensed with, but it is not believed that it is better to possess a cheap piano on the installment plan than it is to purchase an automobile for cash, and with it learn of the beauties of nature, and fill the lungs with life-giving oxygen. As an economic proposition, should pianos be peddled on the installment plan? Is it economical, speaking in the broader sense, to purchase musical instruments on the installment plan? Is it not better to buy automobiles for cash?

* * *

AGITATION nearly always has the misfortune to be one-sided. The financiers, for illustration, who are so fearsome about the money that is being utilized profitably in automobile work, type their logic and send it forth, hoping that they are the only ones who know how much they need the money in their own enterprises. But they can only imitate that bird of gay plumage, the ostrich, hiding the head of their tale in the sand of piercing public gaze. The real question is, Can these agitators present as sound an investment, and do they offer the future with all its security that the automobile presents? The record of the automobile industry is clean; no battery of telephones was ever used in a "thimble rigging" process to bolster it up. It requires no such support. How about the methods of the interests that are decrying the automobile? Are their escutcheons without a splash of the blood of murdered enterprises?

New York State in Throes Due to Callan Law

CHAUFFEURS, of whom there are upwards of 35,000 in New York City and vicinity, are being introduced to the intricacies of the new Callan law. The Secretary of State, through his publicity agent, has been leading the public to believe that chauffeurs would be given a regular and comprehensive examination under the direction of a corps of capable examiners headed by a chief examiner whom the public could rely upon in every particular. To what extent the Callan law is a good one remains to be seen. The autoing public, however, assumes the attitude of a "first night" audience. In some respects the situation does not look promising; there are but a few days available for the examination of chauffeurs, and up to the present time but a small proportion of them have been accommodated.

* * *

JUDGING by the character of the publicity which is alleged to emanate from the office of the Secretary of State, a chauffeur is a man who must be fettered. It was said that a rigid examination would be instituted, and that the chauffeur of no competence and small respect for law would be eliminated. As it stands at the present time, it would be impossible to give a comprehensive examination to the chauffeurs were they to apply for same and appear, as they have a right to, within the few fleeting days before the law dates to go into effect. If the Secretary of State is trying to "mould" public opinion, and if he thinks it can be done by flooding the press with hollow publicity, it is feared that the average autoist has enough civic intelligence to permit of generously disagreeing with him.

* * *

FAIRNESS demands more than criticism, and the idea that Senator Callan is a mere "chestnut puller" must include the assumption that he hopes to please such of our citizens as are afflicted with a disease called "Autophobia," and that he thinks the rest of the public is so dull that it will be herded to the polls by the "machine" despite the fact that the users of automobiles in the State of New York will have to pay $2,000,000 for the privilege, which, according to Governor Charles E. Hughes, is the size of the hole in the budget that autoists are expected to stop up. This is scarcely possible.

* * *

CHARITY, with its broad mantle, is said to be sufficient to cover a multitude of sins, and assuming that it has the characteristics of caoutchouc, it may be utilized to advantage in the further effort involving the Callan Act. How this mantle will be rendered sufficiently expansive, however, to hide some of the defects of this law is the problem which confronts plain citizens. Quite a few autoists would like to know by what constitutional right legislative power can be delegated to the Secretary of State. Under the Callan Act chauffeurs must be licensed by the Secretary of State, but the methods involved in the process of licensing this class are not prescribed in the law itself, but the Secretary of State is empowered (according to this law) to prescribe conditions. It is left to him to arbitrarily establish the qualifications that shall be required. Is this not legislative power?

* * *

IT is prescribed in the new law that no new licenses shall be granted where one has been suspended or revoked, unless the discretion of the Secretary of State authorizes it. Does the Secretary of State get his right to legislate (as here indicated) by virtue of "Senator" Callan's 25-year-old acumen? According to this law, and the interpretation alleged to be put upon it by the Secretary of State, no license will be issued to a driver of known recklessness. Why should the taxpayers of New York support a large body of respected Justices if it is no longer necessary to try a man for an offense and convict him by due process of law? When did the Legislature acquire the right to manufacture retroactive law?

* * *

TAKING up the question of fees, they are graduated according to horsepower in lieu of all taxation. Did the "Senator" in his desire to work into the good graces of his constituents overstep the bounds? Does he think it is constitutional to exempt automobiles and not exempt other vehicles?

* * *

DOES the "Senator" think that autoists will appreciate the exemption from taxation as it is written in the law? True, the automobile is exempt from taxation, but the cost of the exemption clause is $2,000,000. Is the "Senator" worth $2,000,000 a year to the owners of automobiles in the State of New York? It would be interesting to hear from a few thousand more autoists on this point, or, better yet, it would be worth knowing just how liberal they do feel. Certainly they can find no ground for assuming that the "Senator" may not ultimately give them another exemption at a cost of $2,000,000 more.

* * *

WHEN the new law was framed, and the claim was made that drivers of automobiles should be compelled to indicate that they are capable, if the foundation of the new law was fundamentally right, was it not a fair inference that the examiners should show their capability before they were licensed to examine? Can the blind lead the blind? Are the people of the Empire State likely to receive any additional protection from reckless chauffeurs through an examination conducted by examiners who are not required to pass an examination themselves? Would it not be just as reasonable to appoint bartenders as examiners, or men who are quite familiar with the inner workings of a jail, as it is to make political appointments to fill the examiners' chairs, when, as a matter of fact, the examination to be of any value must be technical?

* * *

WHEN the necessity arose for a revision of the law as it related to the automobile, the politicians who had the matter close to their hearts voiced a sentiment which sounded like sweet music, contending that the fees for licensing should be dissolved in road building. Every autoist knows that a good road is a money-maker for him, that if the road is in a bad state of repair his automobile will catch the disorder just as smallpox spreads through an improvised camp, and with one accord the automobile users, backed by the manufacturers, supported the issue. They could not have foreseen that any politician would be so shortsighted as to abandon a good position and go the length of transferring the money returns to the General Budget, thus destroying every reason for worming cash out of a man's pocket simply because he rides in an automobile.

* * *

GOOD roads are recognized as a necessity, not only for the automobile, but for every other vehicle as well. The farmer knows the value of a good road leading from his front door to the market square in the nearest town, and the modern farmer finds it to his advantage to resort to methods of "intensive cultivation," which methods are incomplete in the absence of "intensive transportation." The modern farmer shows by his progressive acts that he knows these things, but it is a question if the lawmakers have kept pace with progressive farmers, and it is believed that the framers of the Callan law, instead of pleasing the farmers and hoodwinking the rest of the people, have pleased no one, and it remains to be seen if they can hoodwink any one.

A. L. A. M. Files Decree in Long-Pending Selden Suit

Judge Charles M. Hough Acts in Favor of Complainants

Ford Lawyers Contend for Bond Rather than Injunction

A TENTATIVE decree covering the salient points in the opinion rendered by Federal Judge Charles M. Hough in the suit of George B. Selden and the Columbia Motor Car Company, exclusive licensee under basic patents granted to Mr. Selden for improvement in road engines, was filed with Judge Hough July 19 in the parlors of the New Mathewson Hotel at Narragansett Pier.

The decree submitted was that drawn by Frederick P. Fish and Samuel R. Betts on behalf of the complainants and under its terms the Columbia Motor Car Company is installed formally as party complainant to the suit and substituted for the Electric Vehicle Company, which instituted the action. It holds that George B. Selden is the legal inventor of the gasoline road engine and that the defendants, the Ford Motor Company and C. A. Duerr and Company, representing the Panhard Motor Company, had been guilty of infringing sections 1, 2 and 5 of the letters patent.

It holds that the complainants are entitled to recover the profits, gains and advantages that have accrued to the defendants by reason of the infringements and orders the whole matter to be reported to a Master of the Court to take account of the measure of damages that shall be taxed.

The decree also provides that a perpetual injunction issue against the defendants, prohibiting them from continuing to infringe the patents.

Besides Messrs. Fish and Betts, George B. Selden and Alfred Reeves appeared on behalf of the complainants and Edmund Wetmore, W. Benton Crisp, Frederick R. Coudert, James Cousins and Charles K. Offield represented the defendant companies.

The question of issuing an injunction was sharply contested by the defendants, who asserted that if an injunction was to issue pending an appeal of the cause to the Federal Court of Appeals, a substantial injustice would be worked to the interests of the 4000 men employed by the Ford Motor Company with its big factory and seventeen branch houses. It was urged that the defendants were quite as anxious as the complainants to bring the matter to a final decision, and for that reason the suggestion was made to the Court that a sufficient bond to cover damages and profits might better be required pending such final decision.

Complainants' attorneys in discussing this phase of the matter mentioned the figures of $500,000 as the size of the bond to be filed by the Ford Company and $50,000 by the Panhard Company.

Whether the issuance of such an order will be made is problematical and will not be known in the immediate future because the decision of Judge Hough as to the exact form of the decree is still under advisement.

The Court is in vacation at present and Judge Hough was visiting Narragansett Pier for the purpose of addressing the Sixteenth Annual Convention of the Commercial Law League of America.

The proceedings of the case will come up for final review and an ultimate decision in October before the Court of Appeals. A preferential position for the matter has been secured on the calendar of that Court.

The full text of the decree submitted follows:

At a stated term of the United States Circuit Court for the Southern District of New York, held in and for said district on the Nineteenth day of July, 1910. Present Hon. Charles M. Hough, Judge. The Columbia Motor Car Company and George B. Selden, Complainants. vs. C. A. Duerr & Company and Ford Motor Company, Defendants. In Equity No. 8566 On Selden Patent No. 549,160.

This cause having come on for final hearing upon the original pleadings, and the proceedings, and the testimony and the proofs filed on behalf of both parties, and having been orally argued before the Court on the issues raised by said pleadings and proofs on the 28th and 29th days of May and the 1st, 2d, 3d, and 4th days of June, 1909, by Frederick P. Fish, William A. Redding and Samuel R. Betts, counsel for complainants, and R. A. Parker and W. Benton Crisp, counsel for defendants, and an opinion herein having been filed by His Honor, Judge Hough, on September 15, 1909, and this cause thereafter having come on to be heard on the supplemental bill and answer and replication, and the proceedings, and the testimony and proofs thereunder, filed on behalf of both parties, and having been orally argued before the Court on the issues raised by said supplemental pleadings and proofs, on the 19th day of July, 1910, by Frederick P. Fish and Samuel R. Betts, counsel for complainants, and Edmund Wetmore and W. Benton Crisp, counsel for defendants, now, after due proceedings had, it is, upon consideration, ordered, adjudged and decreed as follows:

1. That the Columbia Motor Car Company, as an assignee of Electric Vehicle Company, be and is hereby made a party complainant to this suit in the place and stead of said Electric Vehicle Company, and is hereby given the same benefit of the record and proceedings herein, and of any decisions, orders or injunctions heretofore or which may hereafter be granted against the defendants herein, as the said Electric Vehicle Company, or its Receivers, or either of them might have had, if they had not made the assignments dated June 30, 1909, to said The Columbia Motor Car Company. That the said the Columbia Motor Car Company is hereby authorized to continue the prosecution of this suit with George B. Selden, patentee of the letters patent proceeded on herein, against the defendants, as of the 30th day of June, 1909, and as a complainant therein in the place and stead of said Electric Vehicle Company.

2. That the letters patent of the United States issued to said George B. Selden on November 5, 1895, No. 549,160, for Improvements in Road Engines, are good and valid in law as to the first, second and fifth claims thereof, being the claims proceeded on in this cause, and which are as follows:

> "1. The combination with the road-locomotive, provided with suitable running gear including a propelling wheel and steering mechanism, of a liquid-hydrocarbon gas-engine of the compression type, comprising one or more power cylinders, a suitable liquid fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device and a suitable carriage body adapted to the conveyance of persons or goods, substantially as described.
>
> "2. The combination with a road-locomotive, provided with suitable running gear, including a propelling wheel and steering mechanism, of a liquid-hydrocarbon gas-engine of the compression type, comprising one or more power cylinders, a suitable liquid fuel receptacle, a power shaft connected with and arranged to run faster than the propelling wheel, an intermediate clutch or disconnecting device and a suitable carriage body located above the engine, substantially as described.
>
> "3. The combination with a road-locomotive provided with a propelling wheel, of a liquid-hydrocarbon gas-engine of the compression type, comprising two or more working cylinders and pistons arranged to act in succession during the rotation of the power shaft, a suitable liquid fuel receptacle, suitable devices for transmitting motion from the power shaft to the driving axle, and a clutch or disconnecting device, substantially as described."

3. That the said George B. Selden was the sole, first and original inventor and discoverer of the inventions described in said Letters Patent, and claimed in the said first, second and fifth claims thereof.

4. That the said George B. Selden, complainant, is the owner of the legal title to said Letters Patent, and that the complainant, The Columbia Motor Car Company, is the exclusive licensee thereunder, with power to grant sub-licenses.

5. That the defendant Ford Motor Company has infringed upon the said Letters Patent and said claims 1, 2 and 5 thereof, and upon the exclusive rights of complainants under the same, by manufacturing, using and selling, in the United States, within the Southern District of New York and elsewhere, without right or license, road engines, vehicles or gasoline automobiles containing, embodying or employing the said inventions and improvements described in said Letters Patent and claimed in the said first, second and fifth claims thereof; and that the defendant, C. A. Duerr & Company, has infringed upon said Letters Patent and the said claims 1, 2 and 5 thereof, and upon the exclusive rights of complainants under the same, by using and selling in the United States, within the Southern District of New York and elsewhere, without right or license, road engines, vehicles or gasoline automobiles containing, embodying or employing the said inventions and improvements described in said Letters Patent and claimed in the said first, second and fifth claims thereof.

6. That the complainants do recover of the defendants the profits, gains and advantages which the said defendants have derived, received or made by reason of the said or any infringement by the said defendants of said claims 1, 2 and 5 of the said Letters Patent; and that the said complainants do also recover of said defendants any and all damages the complainants or their assignors may have sustained by reason of any infringement of said claims of said Letters Patent by the defendants.

And it is hereby referred to a Master of this Court (who is hereby appointed for the special reason to take and state an account of such gains, profits and advantages, and to assess such damages, and to report to the Court thereon with all convenient speed. And the defendants and each of them are hereby directed and required to attend before said Master from time to time as required, and to produce before him such books, papers and documents as relate to the matters at issue, and to submit to such oral examination as the Master may require.

7. That a perpetual injunction issue out of and under the seal of this Court enjoining and restraining the defendants and each of them, and their and each of their officers, directors, associates, attorneys, solicitors, clerks, servants, agents, employees and workmen from directly or indirectly making, or causing to be made, using, or causing to be used, or offering or advertising for sale, or causing to be offered or advertised for sale, or importing or causing to be imported, or selling or causing to be sold in any manner, or disposing of in any way, within the United States, any road-engines, vehicles, automobiles, devices or apparatus containing or embodying or employing any of the inventions described in said Letters Patent and claimed in said first, second and fifth claims thereof, or substantial or material parts thereof, or from infringing said claims of said Letters Patent in any way whatsoever.

8. That the complainants do recover of the defendants their costs and disbursements in this suit, to be taxed by the Clerk of this Court, and that the question of increase of damages and all further questions be reserved until the coming in of the Master's report.

Jersey May Hold Up Tourists as Reprisal Act

MEASURES of reprisal which have been adopted by several States adjoining New Jersey against that State on account of the Jersey statute that makes it obligatory for touring automobilists who venture wheel upon the sacred soil of the Garden State to take out a license or suffer the various penalties provided by law for just such cases, have aroused Jersey automobilists to a pitch they have never reached before.

The feeling against the State of New Jersey on account of the stringent road law has taken concrete shape in Pennsylvania and New York. In Pennsylvania, particularly in the city of Philadelphia, the status of the visiting Jersey motorist is unpleasant. No sooner does a touring Jerseyite enter Philadelphia than he is arrested if he has no Pennsylvania permit. What makes the Jersey citizens froth at the mouth about this procedure is the fact that any car bearing a New York license is not disturbed in any way in Pennsylvania.

Only recently a fine example of how this practice works was afforded by a case in Philadelphia. A New York tourist who had been spending some time in Jersey and who was equipped with a State license of that State crossed the ferry and started up Market street. He managed to get three blocks before the watchful officers spied the triangular license tag and descended upon him.

Up to the City Hall he was taken by the police and a fine as well as payment of the Pennsylvania license fee seemed certain. The prisoner protested that he was a New Yorker and had a New York license. The police asked to be "sighted," and when the prisoner produced the New York permit he was instructed to remove the Jersey license and replace it with that of New York. This was done and the prisoner and car were released with the injunction to go as far as they liked.

It is such instances as the one recounted that get on the nerves of Jerseyites.

Last winter an amendment to the automobile law was passed making it possible for non-resident tourists to secure touring licenses in New Jersey for a period of eight days during one year. These permits may be withheld in the discretion of the commissioner, and such action is being contemplated against automobilists of Pennsylvania and other States in which Jersey owners come afoul of the law. The action with regard to Jersey on the part of Pennsylvania is similar to the recent attitude taken against Maryland.

Twenty-Four Start in Wisconsin A. A. Run

MILWAUKEE, WIS., July 18—Twenty-four cars were sent on their way at 7 o'clock this morning for the first annual reliability competition of the Wisconsin State Automobile Association for the $800 Milwaukee *Sentinel* trophy. In addition, there were five official cars, the 1911 Peerless acting as pacemaker.

The contestants are:

No. Car	Entrant	Driver
1—Rambler	Rambler Garage Co.	Edward Collier
2—Rambler	Rambler Garage Co.	Art Gardiner
3—Badger	Badger Motor Car Co.	E. W. Arbogast
4—Badger	Badger Motor Car Co.	H. A. Arbogast
5—Mitchell	Mitchell Auto Co.	F. P. Wilkins
6—Cadillac	Jonas Automobile Co.	Aug. A. Jonas
7—Jackson	W. L. McEldowney	W. L. McEldowney
8—Buick	Buick Motor Co.	Wm. Fisher
9—Buick	Buick Motor Co.	
10—Kissel	The Kissel Kar Co.	N. C. Rice
11—Kissel	The Kissel Kar Co.	W. R. Rice
12—Kissel	The Kissel Kar Co.	Arthur Ove
14—Pierce-Racine	Morrison Motor Car Co.	Lewis Strang
15—Johnson	Johnson Service Co.	J. W. Eviston
16—Ohio	Case Plow Works	Ross Neuwood
17—Pope-Hartford	Emil Estberg	F. L. Buckbear
18—Reo	Curtis Auto Co.	E. H. Thomas
19—Corbin	Curtis Auto Co.	Gordon Bird
20—Ford	Hickman-Lanson-Diener Co.	W. H. Diener
21—Franklin	Franklin Auto & Supply Co.	M. E. Springer
22—Overland	Bates-Odenbrett Auto Co.	John Heber
23—Staver	Stephenson Motor Car Co.	Chester Cheney
24—Petrel	Petrel Motor Car Co.	G. D. Waite
25—Marion	Geo. Browne	Geo. Browne

The route of the tour covers a distance of 808 miles, including practically every section of the State of Wisconsin within a sweeping circular course. The night stops will be at Madison, the State capital; La Crosse, Eau Claire, Merrill and Appleton. David Beecroft, of Chicago, is chairman of the Technical Committee.

Secretary Elliott Makes Denial

"Have never, in any position which I have held, criticised my superior officer."

State Troops to Guard Elgin Road Race Course

CHICAGO, July 19—The Chicago Motor Club and Elgin Automobile Road Race Association, which are promoting the road races at Elgin, Illinois, on Friday and Saturday, August 26 and 27, to-day secured military protection when the services of the Fifth Regiment of the Illinois National Guard were promised by Colonel Frank S. Wood, the officer in command. The Fifth will furnish between 200 and 300 men, plenty to guard a nine-mile course. The contractors are busy on the course at the present time and next week the trophy question will be settled.

The Chicago Motor Club also announced to-day that the annual Hill Climb at Algonquin, will take place August 11 instead of August 4 as first intended. The club has been obliged to give a $20,000 bond to protect Dundee County, in which Perry Hill is located. Entry blanks are now out.

Franklin Branch Managers Meet

SYRACUSE, N. Y., July 18—The branch managers' convention of the Franklin Automobile Company was held this week, beginning Wednesday and closing to-day. There are 13 Franklin branches—the concern finds 13 a lucky number—and Boston and 'Frisco and much intermediate territory were represented. J. E. Walker presided and S. E. Ackeman was secretary.

The district managers present were: J. F. McLein, San Francisco; S. N. Lee, Albany; F. H. Sanders, Rochester; George E. Messer, Syracuse; H. T. Boulden, Cincinnati; C. H. Rockwell, Cleveland; F. L. Thomas, Chicago; George Ostendorf, Buffalo; E. W. Orr, Buffalo; A. B. Henley, Boston; W. F. Reynolds, Pittsburgh; W. S. Jewell, New York, and W. E. Brearley, St. Louis. The salesmen present included R. H. Laporte, Glenn A. Tisdale, L. E. Hoffman, J. L. Wetherby, D. F. Garber, G. S. Ruhl and F. A. Babcock.

Matheson Creditors Believe in the Future of the Company

CREDITORS of the Matheson Motor Car Company, of Wilkes-Barre, Pa., which went into the hands of a receiver July 7, met at the Hotel Breslin Tuesday at the suggestion of the receiver to formulate some plan by which the life of the company might be insured.

The meeting was attended by 52 creditors, representing a majority of the claims both in number and amount. E. C. Fretz, of the Light Manufacturing & Foundry Company, of Pottstown, presided.

The purpose of the meeting was outlined by several of the speakers. They said that it was their wish to arrive at some plan by which the receivers might be discharged as soon as possible, both for the sake of the creditors and for the company itself. The fact was emphasized that the assets of the company showed $262,000 more than the liabilities, and that a little time would develop whether or not the company would be able to rescue itself.

C. W. Matheson was called upon to outline present conditions and said that at the time the receiver was appointed the company had valid contracts upon its books for the sale of 228 cars of a wholesale value of over $600,000.

That sum would be sufficient to wipe out the claims, according to many of those who attended the meeting.

The underlying reason for the difficulty in which the Matheson company finds itself is the weather that obtained throughout the country last Spring, particularly in the Middle West. There were two months of unseasonably cold weather, followed by six weeks of rain, and the result was that automobile dealers who contracted for cars from the factory and made the usual deposits upon them were unable to make deliveries to their customers because of the bad weather. Few purchasers of cars care to give them their initial try-out in a driving rainstorm or at a time when ear-muffs and bearskin gloves are necessary. As a consquence, even where dealers had closed with purchasers, there was much delay in placing the cars.

The four chief creditors of the Matheson Motor Car Company are the Light Manufacturing & Foundry Company, the Bosch Magneto Company, the Diamond Rubber Company and the Reading Metal Body Company.

In naming a committee of creditors to investigate conditions and to act in harmony with the management of the company and the receivers, Chairman Fretz appointed himself, representing the Light Manufacturing & Foundry Company; G. J. Bates, of the Diamond Rubber Company, and J. C. Reiber, of the Reading Metal Body Company. The Bosch Magneto Company, although one of the heaviest creditors, did not seek a place upon the committee.

The meeting adopted resolutions of confidence in the company and the car, and endorsing any action that the committee may take.

The resolutions pledge co-operation with others in interest to devise ways and means for the speedy discharge of the receivers. The action of the creditors was unanimous in all material points covered by the meeting.

It was pointed out that a receiver is simply an officer of the Court, that all receiverships are costly, and that in case of the creditors securing the discharge of the receivers the business of the company could be vastly facilitated.

A reorganization of the corporation upon a larger basis of capital was clearly outlined in the proceedings.

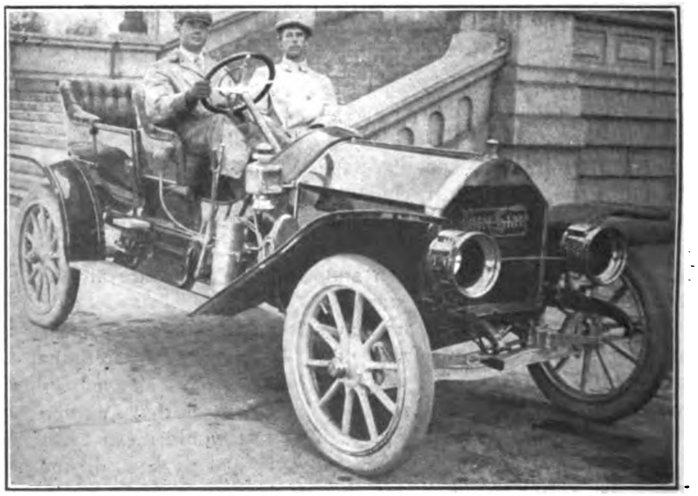
The Matheson Automobile Company, the selling company for the product of the factory, remains intact. Definite action on the part of the committee will probably take place in the immediate future and something in the nature of results is likely to develop in a month.

There was a distinct feeling of confidence apparent at the meeting.

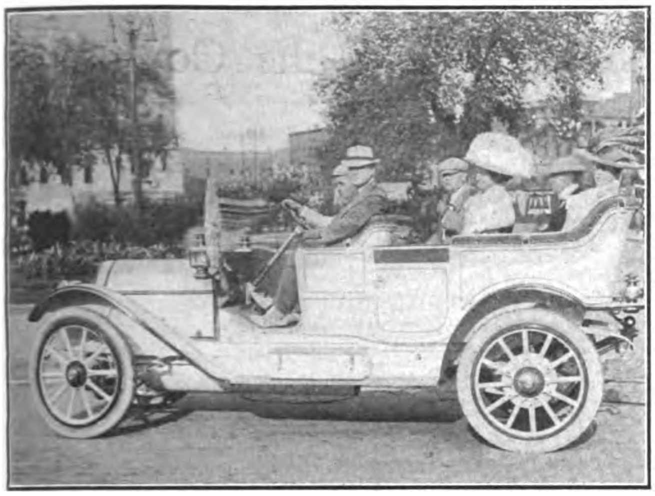
1911 Parry Models Increased in Number

With the broadening of the facilities at the Parry plant in Indianapolis the Parry Auto Company is bringing out eight 1911 models ranging in price as follows: $1,000 for Model 25; $1,300 for Model 43; $1,350 for Model 42; $1,500 for Models 37 and 39; $1,600 for Model 44, and $1,850 for Models 41 and 46. A certain amount of curiosity is evinced on the part of the auto-purchasing public, and, remarkable as it may seem, the old idea that the automobile is to be lowered in price marvelously in the course of time is vanishing. This range of prices for Parry automobiles, for instance, shows a certain stability. While the company offers a wider range of choices and a better value of equipment, it is holding its market tenaciously. Take the tire problem, for instance; the lowest-priced car, which is the roadster Model 25, has relatively large tires, considering the weight, but jumping to Model 39, which is the Combination Roadster, the tires are 34 x 3½, which, by the way, was originally stated in the advertised announcement of July 7 in THE AUTOMOBILE to be 36 x 3½. Obviously, the 34 x 3½ is a better proportion for this model. The Model 46, however, is fitted with 36 x 3½ tires and demountable rims.

President Taft used the White as an official car at the Fourth of July celebration in Boston



Up-to-date Inter-State in complete trim for touring ready for the ambitious owner to appropriate to his own use



Grand Exalted Ruler Sammis in the purple-and-white Chalmers "40" at the Elks Convention in Detroit

Chalmers "40" the Official Car at Elks Convention

Throughout the week of the national convention of the B. P. O. E. in Detroit—July 11th to 17th—Grand Exalted Ruler J. U. Sammis, of Iowa, attended to his official business in a 1911 Chalmers "Forty" touring car. This car was specially finished in white with purple striping and royal purple upholstering for the big Mogul of all the Elks. The driver wore a uniform of white with purple trimming.

Arch Hoxsey, the daring aviator, who occasionally does a little land traveling in his Cartercar

Daring Aviator an Accomplished Autoist

Arch Hoxsey, who is said to be the most daring operator of a Wright aeroplane, barring the Wright Brothers themselves, is also an enthusiastic automobilist. Last week his flights at Detroit were the most sensational ever witnessed in Michigan. While in Detroit Mr. Hoxsey drove a Cartercar, and is shown at the steering wheel with George Reason, branch manager for Cartercar, beside him.

Aviation News of the Week

OFFICIAL announcement of the terms and conditions of the aeroplane race from New York to St. Louis or from St. Louis to New York has been made. The New York *World* and the St. Louis *Post-Dispatch* offer a purse of $30,000 to the aviator who first accomplishes the feat under the rules, which are as follows:

The start shall be made some time between August 15, 1910, and January 1, 1911; the time limit is 100 consecutive hours and the entrant must use the same aeroplane throughout the trip. The only condition made by the donors of the rich prize is that three days' notice shall be given to either of the newspapers of intention to start.

The first announcement of the intention of the Pulitzer papers to hang up a big prize for a cross-country flight was made by Mayor William J. Gaynor, of New York, on May 31, this year, when he acted as spokesman for the donors at a banquet tendered to Glenn H. Curtiss after the completion of his flight from Albany to New York city.

Interest in the project was intense and immediate, not only on the part of the aviators themselves, but also in the public mind, both here and abroad. Glenn H. Curtiss is preparing to make the attempt as early as possible; the Wrights are completing an advanced type of racing machine; Clifford B. Harmon, the New York amateur; Charles K. Hamilton, who made the round trip from New York to Philadelphia recently; J. C. Mars, of Kansas City; Hubert Latham, Paulhan and Graham White are all considered more than probable starters.

Under the rules the aviators may select any routes they please and may stop as often as they like. It has been figured that traveling five hours during each of the four days allowed will prove sufficient sailing time to cover the 900 miles that intervene between the metropolis and St. Louis. That would mean a rate of at least 45 miles an hour, which has frequently been demonstrated as within the limits of the aeroplane. In order to remove the chance for technical disqualification that might exist if any binding system of elaborate rules were enforced, it is provided that the contestant himself shall be the judge of the start. If he finds after traveling any distance that his machine is defective, he may declare it "no start" as far as he is concerned, and may make another attempt.

British aviators and public have had their attention fixed for the past week on the Bournemouth meet, which has resulted in a series of distressing accidents, including the one which cost the Hon. Charles Stuart Rolls his life. One of the most sensational performances of the week was that of Robert Loraine, actor, who essayed to make the circle around the Needles, spindling rocks in the Solent. Almost from the moment of the start Loraine and his machine were enclosed in storm clouds, and before the actor had progressed to the outer mark he lost his way completely. With no idea of direction and unable to catch a glimpse of sea or land through the driving rain, the Thespian simply kept flying until his machine emerged from the storm and he was able to make a landing at Alum Bay, on the Isle of Wight.

Alan Boyle, son of the Earl of Glasgow, suffered a nasty fall with his monoplane, and at latest reports is hovering between life and death.

Count De Lesseps, who was the star performer at the aviation meet that closed Saturday at Toronto, made a high flight in his Blériot machine, scaling the air over 3,000 feet. On account of possible complications with the courts on account of the Wright injunction, the Frenchman will not perform in the United States for the present or immediate future.

Walter R. Brookins, who holds the world's record for high flight, gave an exhibition at Detroit Saturday in a gale that blew 25 miles an hour.

Plans for the International Aviation Tournament to be held at Garden City, L. I., in October are being made along unique and interesting lines. One of the main features of the meeting will be a sham battle in the air, in which European aviators wil be cast in the parts of the invaders, while the Americans take up the roles of defenders. A committee of aviator military men are preparing the details of the proposed

Matters of Interest to Boston Autoists

BOSTON, July 18—Motorists, who a few days ago believed that it would be an easy matter to convince the highway commission that the rule barring motor cars from the park system is a bad one, are not so sanguine that they can do so. The matter has taken on something of a political aspect, and the men who have watched the trend of affairs would not be surprised now if the commission approved the ruling, which would put it squarely up to Mayor Fitzgerald, of Boston. In other words, the highway commission may object to being used for political purposes.

As a result of what has developed there will be a lot of owners and dealers on hand when the hearing is held July 27 to protest against closing the roadways.

Secretary James Fortesque has sent out letters to the members of the Massachusetts State A. A.; the officers of the Bay State A. A. have taken up the matter also; the Boston Automobile Dealers' Association is to have a meeting to take action on the matter; the Automobile Legal Association officials have asked William A. Thibodeau to represent it at the hearing; and the National Automobile Association will be represented by Francis Hurtubis, Jr.

A number of individual motorists have already written letters of protest to the highway commission. It promises to be a lively hearing for the closing of the roads in the parks would mean sending motorists out of their way over rough and cobblestone roads coming in and going out of town every day.

An agency has been opened in Boston for the McIntyre truck. E. P. Blake, New England distributor of the Jackson and Fuller cars, has taken it on.

R. R. Ross has taken over the management of the Boston branch of the Fiat, while Simeon R. Baker, whom he succeeded, has moved down the street to the New England Motor Company, where he is now assistant sales manager, handling the Parry and Rainier cars.

W. S. Marsh, Boston agent for the M M motor cycles, has branched out, having taken on the Paige-Detroit for Boston and vicinity.

For the first time in some years motorists going to the south shore, found yesterday that they could go through Hingham, Mass., without having policemen jump out and get their numbers for prosecution, the traps there having been abolished. This was brought about by the newly formed Hingham Motor Club. This town was getting unenviable notoriety for arrests of motorists, and many owners avoided the place all Summer, making wide detours to cut it out.

So the club's executive officials took the matter up with Chief of Police W. I. James. After several conferences he stated that he would abolish the traps if the motorists will keep down to 15 miles in the congested part of the town, slow down and blow a horn at intersecting streets and use judgment in driving through the place.

However, he reserves the right to establish the traps again if necessary, so it is up to the motorists now. Members of the A. L. A., the Bay State A. A., and other organizations will be notified of the conditions and asked to co-operate to keep the traps eliminated.

United States Motor Co. Holds Annual Convention

Officers and representatives of the United States Motor Company and of its affiliated companies held their annual convention at Cedar Point, Ohio., July 11, 12 and 13.

The meeting afforded the first opportunity to bring together the combined sales forces of the Maxwell-Briscoe Motor Company and the Columbia Motor Car Company, although there were representatives from the other United States Motor Company plants and they manifested great interest in the methods and deliberations of the Maxwell and Columbia forces.

During the convention the many phases of activity in large selling organizations were discussed and after due consideration the policies and aims of the United States Motor Company were given emphatic expression. One of the matters which received unusual attention was the sales system and the supervisory organization by which the United States Motor Company will cover the entire country.

Among those present were: Benjamin Briscoe, president of the United States Motor Company; J. D. Maxwell, president of the Maxwell-Briscoe Motor Company; F. D. Dorman, vice-president of the Maxwell-Briscoe Motor Company; H. W. Nuckols, vice-president of the Columbia Motor Car Company; F. E. Dayton, sales manager of the Columbia Motor Car Company; Frank Briscoe, president of the Brush Runabout Company; Morris Grabowsky, general manager, Alden-Sampson Manufacturing Company; F. Harris, sales manager, Brush Runabout Company; J. I. Jameson, sales manager, Stoddard-Dayton Company; Charles E. Stone, commercial vehicle expert, Alden-Sampson Manufacturing Company. There were also the district managers, the branch house managers, and a number of dealers, as well as the advertising men of the United States Motor Company, Maxwell, Stoddard-Dayton, Brush and Columbia.

Officers, department heads and district managers of the United States Motor Company in conference with the officers, branch managers, sales and advertising managers of its affiliated companies, at Cedar Point, Ohio, July 11, 12 and 13

Hoosier Motordom in the Week's News

INDIANAPOLIS, IND., July 18—The next event at the Motor Speedway will be held September 3 and 5, instead of having a three-day meet, as at first planned. Approximately $10,000 in cash prizes will be offered, besides cups and medals, and an effort will be made to attract foreign drivers.

The principal event will be a 200-mile race on September 3. This will be open to all cars under 600 cubic inches piston displacement. First prize will be $1,000, second prize $500 and third prize $300. Other events will be the Remy Grand Brassard and Prest-O-Lite trophy races. E. A. Moross, director of contests, will go to Europe to secure the entries of several famous foreign cars and drivers for the meet.

A company which will manufacture gasoline trucks and other commercial vehicles is being organized in this city and will be incorporated with an authorized capitalization of $1,000,000. The concern will be known as the Great American Automobile, Auto Truck & Aeroplane Company. Temporary officers are: Samuel Quinn, Jr., president; John Feigen, vice-president, and A. J. Bigley, of St. Louis, Mo., secretary and treasurer.

Owing to a shortage of funds, the Indianapolis post office has been obliged to discontinue the 4 p. m. mail delivery in the business district. It is to be resumed immediately, however, and the four automobiles used for collecting mail will be utilized for delivering the mail in question in the business district, thus saving the salaries of several carriers.

Business men have organized the Greenfield Auto Traction Company, at Greenfield, and it has been incorporated with an authorized capitalization of $10,000.

The Fuller and Cutting agencies have been taken by the newly organized Auto Sales Company, which has taken temporary quarters in the Indiana Pythian Building. Douglas Case is president, M. G. Beckner vice-president, and Cass Connaway is secretary and treasurer.

Two Marmon and two Cole cars have been entered in the road race to be conducted by the Chicago Motor Club, August 26 and 27. It is expected other local cars will be entered later.

A. C. Newby, secretary and treasurer of the National Motor Vehicle Company, has gone to Europe for a six weeks' pleasure trip. He was accompanied by Mrs. Newby.

Issues Jersey Tags in Delaware

WILMINGTON, DEL., July 11—Charles G. Guyer, of 826 Market street, Wilmington, has been commissioned deputy motor vehicle commissioner for the State of New Jersey, in Delaware, with authority to receive license money and issue certificates and tags entitling the holders to use New Jersey roads. Mr. Guyer, who is secretary of the Delaware Automobile Association, was appointed by J. B. R. Smith, of Trenton, the motor vehicle commissioner for New Jersey.

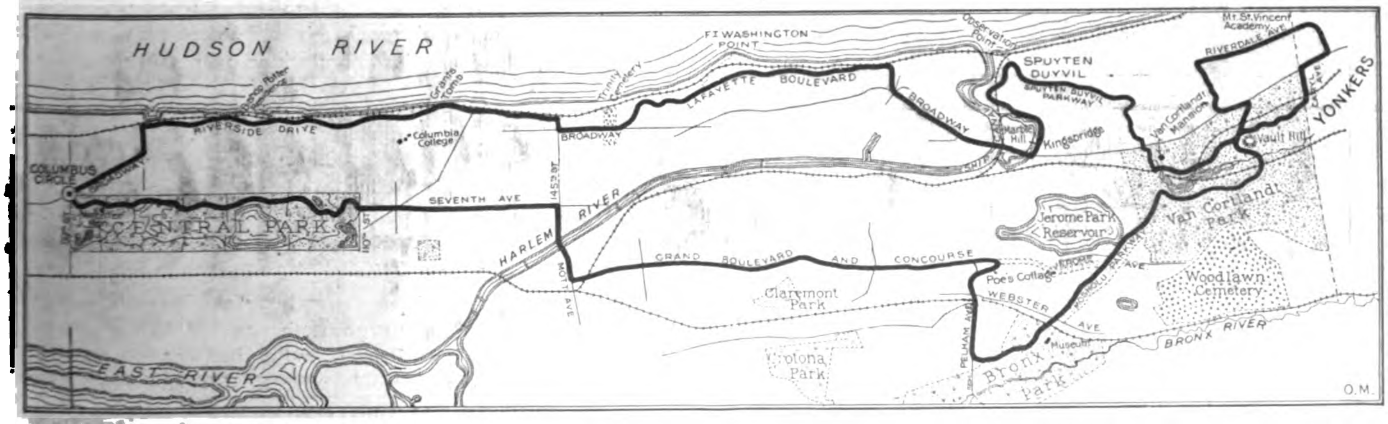
The establishment here of a New Jersey automobile license bureau is a great accommodation, not only to local machine owners and drivers, but also to those from other States passing through New Jersey from the South, as it enables them to pay the license and get the necessary tag and certificate here before crossing the Delaware River. If they were not afforded this accommodation they would have to hunt up a license bureau in Jersey or submit to arrest for failure to do so. In view of the fact that New Jersey requires a State license for every machine going there, this is a matter of interest to all non-residents living south of that State.

Near-by Motor Wanderings—Short in Length, Long in Interest

TO the New Yorker who knows not his New York, to the visiting motorist of an inquiring mind who would learn more of America's most important city and its environs, to the seeker after more than the mere delight of motoring on good roads—the new Metropolitan Automobile Guide will make especial appeal. Through the courtesy of its publishers, who are makers also of the Official Automobile Blue Book, we are enabled to present in full one of the many interesting routes comprised in its hundred round-trips from New York. The trip given below covers 30 miles of Metropolitan Wonderland, and is embellished with photographs of some picturesque spots en route, and a map showing the lay of the land. We make no doubt that many of our readers will avail themselves of the opportunity for trying out in advance the merits of this new Automobile Baedeker, which will be issued about August 10.

An illuminating example of the Baedeker feature of the new Metropolitan Automobile Guide, with special reference to the autoist to whom time is an object, but who is yet sufficiently awake to the interest and beauty of tours to points of historic value or scenic delight as to yearn for something different from the commonplace.

Route No. 211, New York to Yonkers line and return, is one of New York's choicest drives—of great scenic and historic interest, passing many spots of Revolutionary memory, going via Riverside Drive and Riverdale avenue, returning via



Map of a short but interesting near-by route which the motorist whom business bars from long tours may follow with advantage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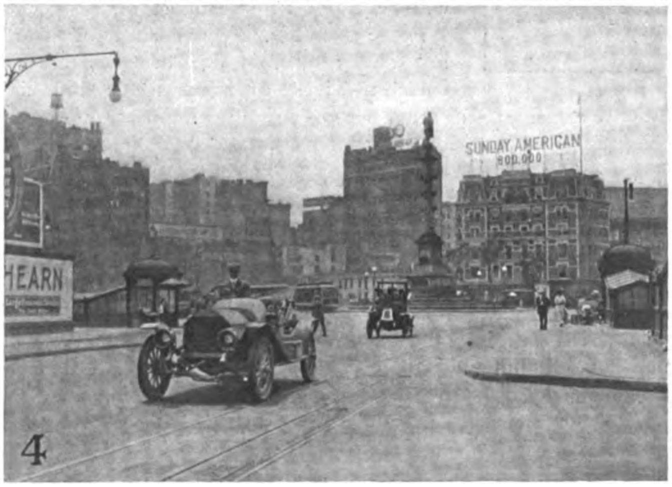
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1—Observation Point on Spuyten Duyvil Parkway

2—Soldiers' and Sailors' Monument, Riverside Drive

3—Entering Central Park from 7th Avenue

4—Starting out—Columbus monument at the Circle

Van Cortlandt Park, Mosholu Parkway and the Grand Boulevard. Fine macadam throughout.

MILEAGES

Total	**Intermediate**	
0.0	0.0	Columbus Circle, Broadway and Fifty-ninth street north on Broadway with trolley; under elevated at Lincoln Square.
0.7	0.7	Keep right of subway entrance and turn left on Seventy-second street.
1.0	0.3	End of street, turn right on Riverside Drive. Pass Schwab residence on right (1.1), Soldiers' and Sailors' Monument on left (1.8) and Bishop Potter's residence on right (corner Eighty-ninth street). Site of Strikers Bay Mansion between Ninety-sixth and Ninety-seventh streets, where Morris in 1837 was inspired to write "Woodman, Spare That Tree." The Carrigan House, with columns, corner 114th street, on site of original Nicholas de Peyster House. On the river bank opposite is the Columbia Boat House—over to the right are seen the buildings of Columbia College.
3.5	2.5	Curve right and left around Grant's Tomb, and cross long viaduct. Grant's Tomb, 1892-7—cost $600,000 by private subscription. Designed by J. H. Duncan; interior decorations by J. Massey Rhind. Trees beyond tomb planted by Li Hung Chang. See the grave of An Amiable Child (1792-97) nearby. The Claremont, now a fashionable restaurant, was built about 1790.
4.1	0.6	Turn right on 135th street one block.
4.2	0.1	Turn left into Broadway. Pass under footway connecting Trinity Cemeteries. Note the tablet on left commemorating the assault of Fort Washington. Within are tombs of J. J. Astor, Stephen Jumel, General Dix and others. In 1807 155th street was made the northern limit of the city. The Audubon Home (Minniesland) lies near the river in Audubon Park. On the left at 156th street is the new home of the American Geographical Society—opposite on 156th street is the Hispanic Museum and the Numismatic Museum.
5.3	1.1	Subway station, bear left into Lafayette Boulevard. Pass the Deaf and Dumb Asylum (on right, 5.9 m.). At 6.7 m. is the entrance (on left) of Fort Washington Park. An old redoubt (1776) lies beyond the deep railroad cut of 1847, the first railroad to enter the city. A hole in a flat rock marks the site of a telegraph mast used to carry wires across the river before the day of the submarine cable. Fort Washington Point (old Jeffreys Hook) is where Washington made crossings of the river, and where barges were sunk to keep back the British fleet (1776). Just beyond the park entrance, high up on a rock, is the castle-like residence of an Italian contractor. A flagpole marking the remains of Old Ft. Washington is visible to right, the highest point of land on Manhattan. At 7.5 a view to the left of Old Fort Tryon, and just beyond a wide sweep of the Hudson.
8.1	2.8	Five-corners, yellow church on left; turn left into Broadway. Cross long iron bridge over ship canal (9.2). At the five-corners is the site of the old Black Horse Tavern—pass on the left at the corner of Hawthorne street the Old Dyckman House of 1787, and ¼ m. beyond the 12 m. stone set into the wall of the Isham estate. The marble arch (8.9 m.) is the entrance to the Drake property. Beyond the ship canal to the left is Marble Hill, where earthworks were thrown up to protect Kings Bridge (1776).
9.5	1.4	Cross small iron bridge over Spuyten Duyvil Creek and immediately turn left, on 230th street. On the left (9.6 m.) is old Kings Bridge, first built 1693, destroyed in 1776 after Washington's retreat. Queens Bridge east of Broadway was built 1759 to avoid tolls on Kings Bridge and was broken down at the same time.

9.8 0.3 End of road, turn square left along creek. Go over railroad bridge (10.3 and 10.4). Caution for sharp right turn (10.5 m.). Note the old houses just before the railroad.

10.5 0.7 Fork, bear right up grade, curving right and left through crossroad.

10.8 0.3 Reverse fork, turn sharp right up grade on Parkway. At this point an unequaled view of the Hudson north and south.

11.0 0.2 Fork, bear right and next left on Spuyten Duyvil Parkway. Pass the Seton Hospital (on left 11.4 m.).

11.8 0.8 Fork, bear left, crossing Riverdale avenue (11.9 m.). Descend narrow winding road to the valley. On the right are the terminal yards of the subway.

12.7 0.9 End of road; turn left under elevated, and immediately right into Van Cortlandt Park. On the left is the old Van Cortlandt Mansion (1749) fronting the "Dutch Garden" with moat. Visit the museum in care of the Colonial Dames, guide book secured from custodian. Near the mansion is the "Rhinelander Sugar House Window" from the building at Rose and Duane streets, and the statue of Gen. Josiah Porter. To the north is the old parade or camping ground, now used for polo.

12.9 0.2 Left-hand road in front of underpass, turn square left.

13.0 0.1 Fork just beyond small wooden bridge, bear right. Pass the old Berrian graveyard (on right), the lake lying just beyond. Caution for sharp right turn under railroad (13.5). Vault Hill, with the old Van Cortlandt burial vault, lies to the left. Here were hidden the records of New York City in 1776.

13.8 0.8 Fork, bear left on parkway.

14.1 0.3 Fork, bear right up grade over winding road.

14.09 0.8 Turn left on Caryl avenue, immediately over railroad bridge.

15.1 0.2 End of street, turn right on Broadway.

15.4 0.3 Real estate office on left, turn left into Valentine Lane.

15.7 0.3 Meet trolley, turn left on Riverdale avenue. Straight ahead on Valentine Lane would take us past the lifeless trunk of an old chestnut, said to have been used by Washington for reconnoitering. At the corner of Hawthorne avenue is the old Lawrence House, once occupied by Washington's guide. On Riverdale avenue we pass the Clara Morris home (15.9), and just beyond the extensive Mt. St. Vincent Academy, in the grounds of which may be seen Font Hill, the former home of Actor Forrest.

16.7 1.0 Turn left on 253d street and descend winding grade.

17.2 0.5 End of road; turn left on Old Post Road. To the south on the Old Post Road are several houses of the eighteenth century, the Van Cortlandt Millers House and the Halley House, partly of stone, being the most interesting.

17.4 0.2 Turn left into Broadway.

17.5 0.1 Turn sharp right on Mosholu Parkway, passing under railroad (17.7).

17.8 0.3 Three-corners; turn right.

17.9 0.1 Fork; bear left. Cross railroad at grade (18.2).

18.4 0.5 Fork; golf links on right. Bear right along lake.

19.2 0.8 Turn sharp left around refreshment station up grade. Cross Jerome avenue (20.0). Bridge over Webster avenue (20.7) and railroad bridge (20.8), immediately curving right. In front is the museum at the entrance of Bronx Park, and we follow the park driveway for ¾ m.

20.9 1.7 Three-corners; curve left, then keep right.

21.3 0.4 Three-corners; curve left, avoiding right fork (21.5).

21.6 0.3 Turn right on Pelham avenue. Pass on the right the Stenton residence, with secret rooms, scene of the 1906 murder. In front stands the old willow; across the street is the Powell farmhouse, the oldest in Fordham. Passing under the Third avenue elevated, just beyond is Nolan's Hotel, where Washington once stopped.

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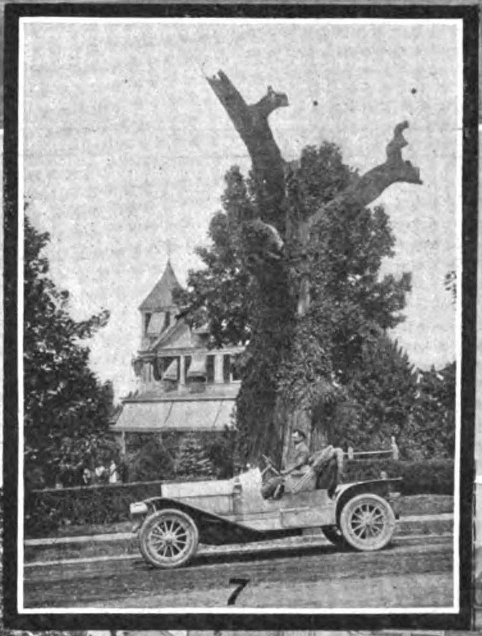

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5—Rounding a curve on Boulevard Lafayette

6—"The Concourse," New York's newest driveway

7—"Washington's Chestnut," on Valentine Avenue, Yonkers

8—Poe's cottage opposite Poe's Park on Kingsbridge r

22.4 0.8 Three-corners; bear right on Kingsbridge Road. On the right (22.5) is Poe's cottage, where he lived (1846-9), and wrote many poems, and where his wife, Virginia, died. A monument across the street in Poe's Park indicates the original location of the cottage.

22.7 0.3 Four-corners; turn sharp left into the "Concourse" wide boulevard.

25.8 3.1 Sigel Monument in fork; keep left on Concourse across 161st street (26.2 m.). Bear slightly right into Mott avenue.

26.4 0.6 Four-corners top of grade, subway station ahead on right; turn square across long iron bridge over Harlem River, curving slightly right beyond into 145th street.

27.0 0.6 Turn square left into Seventh avenue; straight ahead across St. Nicholas avenue and 116th street (28.5 m.).

28.7 1.7 Central Park at 110th street. Enter park, curving immediately right and shortly left. Caution for sharp right curve (29.0 m.).

29.3 0.6 Fork; just beyond stone bridge, bear right past Croton Reservoir (on left).

30.4 1.1 Fork; keep left on main driveway.

31.1 0.7 Webster Monument at fork of three roads; curve right.

31.6 0.5 Small statue in fork; bear right out of park into

31.7 0.1 Columbus Circle, 59th street and Central Park West.

The Enriching of Automobile Fuel

By JAMES S. MADISON

THE substances that have been most frequently used have been picric acid, containing 48 per cent. of oxygen, and ammonium nitrate, with 60 per cent. of oxygen. The use of these has not been attended with wholly satisfactory results, owing to their limited solubility in gasoline. The suggestion has been made that picric acid be dissolved in alcohol and then this solution added to the gasoline, but, unfortunately, gasoline and alcohol will not mix, the liquids separating into two layers, the gasoline being the upper one. There is another objection to the use of the two substances named above: they contain nitrogen, which, under the conditions existing in the cylinder at the instant of combustion, might form one of the oxides of nitrogen—substances that would tend to cause a rapid pitting and corrosion of the exhaust valves. Another method that has been employed to render the fuel more combustible depends for its effectiveness upon rendering the gasoline more volatile than it is under normal conditions. This is accomplished by adding to it some combustible substance of a considerably lower boiling point. The substances most commonly used are ligroin and petroleum ether. Sulphuric ether (ordinary ether) has also been used for the same purpose. The disadvantage of employing the latter is that it is only very slightly soluble in gasoline, and hence, if they be mixed, they soon separate into two layers.

The use of these and similar substances to increase the power has not been markedly successful. The result sought for may be easily attained by a slight modification of the method. Since the object desired is to introduce a larger proportion of oxygen into the mixture of gasoline vapor and air, this may be accomplished by using pure oxygen in its natural form—a gas—and introducing it directly into the cylinder along with the gasoline vapor.

So many improvements have been made in the manufacture of oxygen that it is now an article of commerce, and the compressed gas may be obtained in the market in steel cylinders of various sizes. A cylinder measuring 3 1-2 inches by 13 inches contains about 14 gallons of the gas.

The cylinder may be secured to the run-board, or other convenient place, and then connected with the air intake by means of ordinary rubber tubing. By opening the valve of the oxygen cylinder a fraction of a turn a small, steady stream of the oxygen gas will flow into the air-intake along with the air, thus increasing the proportion of oxygen in the mixture. This will cause the combustion in the cylinder of the engine to be more complete and more rapid, and the impulse delivered to the piston more powerful. The beginner should be content with mixing the oxygen with the air in very small quantities at first, or he may get explosions that are too powerful. He should not cut off the air supply entirely and attempt to substitute pure, undiluted oxygen.

This method will give better and more uniform results than the employment of such enrichers as mentioned above.

The cost of the oxygen is small. The cylinder is the only expensive part of the apparatus, but it is redeemed at its full value upon return to the dealer or factory.

Motor Notes from North Star State

MINNEAPOLIS, July 18—The annual tour of the Minnesota State A. A. will start from St. Paul Friday, and it is estimated that 60 or more cars will take part in the run to Sioux Falls, S. D., and return. The tour will finish at Minneapolis.

The Northland Motor Car Company has been reorganized. Details were completed last week, when George G. Ackley, a banker at Ramona, S. D., purchased an interest in the concern and will actively engage in the business. Mr. Ackley has been chosen vice-president of the company and will assume the general management during the coming week. Asa Paine still retains his interest as a co-partner, as does W. D. Rightmire, who will continue in the capacity of sales manager.

H. A. Peterson, of the Barclay Auto Company, spent the week in Detroit making arrangements for Chalmers and Hudson demonstrators for 1911. It is expected that the first of the new models of the former make will reach the Minneapolis distributors about the last of this week. The Hudson cars are expected a few days later.

John H. Shields, who is now in Los Angeles in the interests of the H. E. Wilcox Motor Car Company, will hereafter have a broader field to work, for his duties as sales manager will take him to practically every large city in the country. An active campaign for truck business has been inaugurated in California, and the concern at present has demonstrators at work in that state.

The Regal Motor Company, of Detroit, Mich., will soon establish a branch in Minneapolis. Articles of incorporation have been filed by the Minneapolis Regal Auto Company, with a capital of $25,000, the incorporators being C. W. Reynolds, H. S. Haynes, J. P. McGuire, E. C. Noyes, T. L. Myhra and C. H. Dickson.

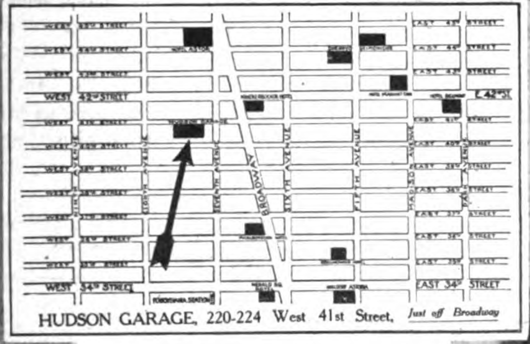
Messrs. Haynes, W. H. Grower and J. P. McGuire have also filed papers for another corporation, to be known as the Motor Equipment Company, with $50,000 capital.

Inter-State Used Reverse Gear to Win

At the hill climb, conducted July 10 on Mount Morris hill, near Denver, Col., the chief prize was won by an Inter-State "40," driven by F. A. King and R. Berry. The course is 1¼ miles long, and the ascent is slightly over 1,000 feet. The maximum grade is 35 per cent., and the course tortuous in the extreme. The winner covered this course in 5:35 3-5. Most of the way the Inter-State used its intermediate gear, but there was one place where it was necessary to use the reverse gear to back up one of the stiff-graded curves.

Among Modern Garages---The Hudson

Door to the Repair Shop



HUDSON GARAGE, 220-224 West 41st Street, *Just off Broadway*

Wash Stand

RECOGNIZING the sweeping character of the demand for specific reforms in garage work, the better class of establishments of this character in New York City are organizing and equipping to meet the class of competition which has merit for its basis. The illustrations as here presented are of the Hudson Garage, located at 220-244 West Forty-first street, New York City. This establishment strikes one as having a peculiar merit in that there is a large, well-lighted floor area for the proper storage of cars, plenty of maneuvering room, so that they may be driven in or out without loss of time, or without endangering the mud-guards, and the arrangements provided for maintaining the automobiles in good working order have the virtue of being adequate for the purpose, and ingeniously installed.

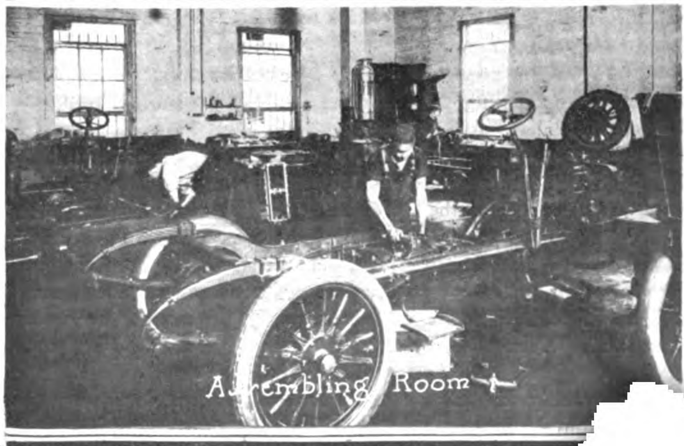
One idea that could be very well copied by up-to-date garage owners is shown in the form of a diagram of the streets of New York. It indicates the locations of the principal hostelries and how to get from them to the Hudson Garage. There is another point that strikes a keen observer, which takes the form of a locked and barred entrance to the assembling room. One of the most annoying situations from an autoist's point of view is represented by having his car disassembled in a room which is accessible to every one who happens to come around for any purpose whatsoever. In the Hudson Garage the assembling room is a well-lighted and substantially equipped place, where cars are disassembled for purposes of repair, and after the repair parts are completed in the machine shop they are transferred to the repair shop, and are kept in an orderly array, with no chance of being lost, strayed or stolen, for the very good reason that the room is not accessible to outsiders, and the artisans who have access thereto are enabled to do so by properly approaching a locked and barred door.

A corner of the machine shop is shown. It is not large, but the equipment is designed to facilitate work.

In conclusion, the most striking feature of this garage will be given the barest mention. The repair shop, in proportion to the storage room and the number of cars handled, is actually diminutive, and yet it is large enough to do all the work that has to be done in the maintenance of the cars therein kept. There are probably two reasons for this, one of which is due to the fact that the better class of cars are handled, and the other reason is that the monthly rate for storage is regarded by the management as sufficient for its ends, and it prefers to acquire a reputation which will support it in the garage business rather than to operate a large repair shop as an annex, and by neglecting the cars, and in other ways, make work for the repair shop. This example is an excellent illustration of the fact that a large monthly repair bill is not a necessary adjunct to an automobile kept in a public garage.

Paint Shop

Machine Shop



Assembling Room

In the Realm of the Makers

The Keystone Sheet Metal Company, of Ambridge, Pa., will start at once to manufacture mud guards and shields for automobiles at its plant down the Ohio River.

The Badger Tire Repair Company, of Milwaukee, Wis., has been incorporated with a capital stock of $5,000 by B. A. Massee, W. L. Baumbach and William A. McMillan.

The F. A. L. Motor Car Company, of Chicago, which sought a location at Kenosha, Wis., is now negotiating with the commercial organizations at Waukegan, Ill., for a site.

The Banker Wind Shield Company has just placed on the market its 1911 Model Wind Shield. The new model has an improved automatic ball ratchet hinge which allows the upper half of the shield to be placed at any desired angle.

The Holbrook-Armstrong Iron Company, of Racine, Wis., is completing the work of installing $40,000 worth of new machinery for the production of motors and car parts which will be used by the Racine-Sattley Company of Racine.

The McGraw Tire and Rubber Company has broken ground for a large addition to its present plant in East Palestine, O. It will add many new tire-building machines so that the output will be doubled, and it will employ 200 men.

Hopewell Brothers, makers of auto fabric specialties, Boston, have entered suit in the Federal Circuit Court against two alleged infringers of their patent on a certain type of tire case. Notice of the suit has been given to the members of the trade.

Three big companies allied with the automobile manufacturing industry have been secured for Pontiac. They are the Michigan Stamping Company, capital, $150,000; the Vulcan Gear Works, capital, $100,000, and the Pontiac Foundry Company, capital $80,000.

The C. A. Shaler Company, of Waupun, Wis., manufacturer of the Shaler vulcanizer, has awarded contracts for the construction of a new factory. The main building will be of reinforced concrete construction, 30 by 130 feet in ground dimensions, 90 feet to be two stories and the remainder one story high. The present plant will be used as a warehouse and storage.

The Badger Four-Wheel Drive Motor Company, of Clintonville, Wis., has procured subscriptions for $30,000 worth of stock, and it is now being permanently organized. Most of the stock was taken by business men at Clintonville. Both pleasure cars and commercial cars will be built, and it is intended to market the car for the 1911 season.

The Gaeth Automobile Company, capital $500,000, has been formed at Pittsburg by George S. Patterson, W. J. Harvey and George Protzman, of that city. It is backed by Cleveland capital and has secured a site in the Turtle Creek Valley, where a plant will be erected.

Omaha auto dealers are the principal promoters of the aviation meet to be held in Omaha July 23. The Midwest Aviation Meet Company has been incorporated with these officers: President, J. J. Deright; vice-president, R. R. Kimball; secretary and manager, Clarke Powell; treasurer, Gould Dietz.

The Ball Multi-Spark Plug Company has opened a factory at 917 Hennepin avenue, Minneapolis, for the manufacture of a newly patented spark plug. The company, which comes from Aberdeen, S. D., is headed by A. H. Pease and W. M. Pease, and has a capitalization of $100,000, of which $50,000 is paid up.

Several finished taxicab bodies and tops owned by the E. R. Thomas Motor Company were destroyed by a fire in the shipping room of the Buffalo plant recently. The flames caused a loss of about $10,000. The shipping room is situated a considerable distance from the main plant of the Thomas company, which was in no danger at any time.

The Omaha Motor Club, which was organized to promote a new mile auto racing track for Omaha, has incorporated with a capital stock of $10,000. The officers are: Ole Hibner, president; C. L. Gould, first vice-president; W. J. Kirkland, secretary; Eugene Silver, treasurer; directors, W. D. Hosford, W. L. Huffman, George F. Rheim, L. E. Doty and Otto P. Nestman.

Martin L. Pulcher has resigned his position as secretary and treasurer for the Oakland Motor Car Company at Pontiac, Mich. The resignation was to take effect July 1, but he will remain with the company until his successor is appointed from the general office of the General Motors Company in New York. He announces that he is leaving the Oakland company to turn his attention to the manufacture of commercial trucks.

Jesse Froelich, of the Benz Auto Import Company, has sailed for a business trip through Europe. At Mannheim, Germany, he will meet Prince Henry. Mr. Froelich will consult Fritz Erle, one of the Benz staff of mechanical engineers, who drove in the Savannah Grand Prize race, in reference to the Benz entries in the American contests next Fall, including the Vanderbilt Cup race, the Grand Prize race on the Motor Parkway, and the Fairmount Park race.

R. E. Glass, who early this year was made a director of the Michelin Tire Company, Milltown, N. J., has just been elected treasurer, succeeding E. Fontaine, who resigned recently.

The Millersburg (Ohio) Automobile Club has been formed, with W. W. Adams, president; B. S. Bontrager, secretary, and W. N. Crowe, W. S. Hanna and C. R. Carey as directors.

Contract to build the new home of the Automobile Club of Buffalo at Clarence Hollow, near that city, has been given to Metz Bros., Buffalo. It is expected that the clubhouse will be finished this Summer. It is to cost $50,000.

The Pittsburgh Automobile Dealers' Association is holding very successful monthly meetings the first Thursday of each month at its headquarters on Baum street, East End. The association held its regular annual outing Saturday, June 25.

The Superior Rubber and Manufacturing Company, of Akron, was incorporated with a capital stock of $10,000 to manufacture automobile tires. The incorporators were J. M. Hyatt, R. E. Nicol, W. J. Holtenstine, A. B. McAllister, and others.

The New Castle Automobile Club is offering prizes ranging from $50 to $5 for the percentage of improvements made this summer in the roads of each township in Lawrence County, 30 miles north of Pittsburg. Prizes will also be offered to farmers for the use of road drags.

Automobilists of Allegheny County are complaining severely about the careless manner in which the roads of this county are being oiled. They say that the Road Commissioner is not only allowing much oil to be wasted, but that by the present system of sprinkling the roads become like skating rinks, so that automobiles are constantly skidding.

That the R. M. Owen Company, of New York, which has the contract for the sale of the Reo pleasure cars, also will have charge of the selling end of the new truck business which the Reo company is about to enter, is the announcement made at the office of the Reo company following a visit from R. M. Owen. It is probable that the manufacture of trucks will be begun about September 1.

Directors of the Portland Automobile Club have decided to co-operate with the newly organized Vancouver, Wash., Automobile Club for the improvement of the highway between Vancouver and Kelso. Automobile owners are directly interested in the improvement of this road for the reason that it leads to Seattle and the Puget Sound country. The Vancouver club has only been organized a few weeks, with Thomas P. Clark, president; Will B. Dubois, secretary; C. N. Quanberg, vice-president; and Charles B. Sears, treasurer.

At Norwalk, La., on July 4, the Westcott "40," owned by Dyson & Son, won two firsts in the hill climb from a standing start.

T. E. Adams has been elected president and treasurer of the Hol-Tan Company, handling the Lancia. The offices of the company are at 1741 Broadway, New York.

Jack L. Straub, secretary and treasurer of the J. S. Bretz Company, sailed for a five-weeks business trip to Europe, on the American-line steamer St. Louis.

At Dallas, Texas, on the Fourth of July, the Kissel "30" won the three-mile stock car event. The Kissel L. D. "10" baby tonneau finished ahead of five standard makes in this event.

Wallace and De Wild, of Newark, N. J., have taken the agency of the Cole "30" for Newark and Essex County for 1911, and will soon open a garage and salesroom in vicinity of Halsey street.

Louis C. Marburg, secretary and treasurer of Marburg Bros., Inc., sailed on the Celtic to attend a meeting of the Society of Mechanical Engineers at Birmingham. He is going from there to the Continent.

The Champion Company, formerly of 36 Whittier street, Boston, Mass., manufacturers of Champion spark plugs, have recently moved to Toledo, O. For the Eastern trade it will still maintain an office at 394 Atlantic avenue, Boston, Mass.

Weldon A. Fosdick, formerly salesmanager of the Moline Automobile Company of Texas, has associated himself with the Roberts Motor Car Company, at Dallas, Tex., as its salesmanager and secretary. This company is the State agent for the Thomas flyers.

At a recent test conducted at Columbia University, the half-inch size "Motorope" handled by B. M. Asch, 1777 Broadway, showed a breaking strength of 2910 pounds. The three-quarter inch size broke at 5019 pounds. It is made for an emergency aid for automobilists. It is light and of small bulk.

L. B. Williams, veteran English motorist, who drove in the preliminary trials of the Vanderbilt Cup Race in 1906 and who was also a contender in the Gordon Bennett road race in Ireland and the Grand Prix at Ardennes, France, has joined the selling force of the Westcott Motor Car Company, of Richmond, Ind., and will be located in New York city with the Dunlop-Taylor Motor Co., of 1876 Broadway.

The Saxon Lamp Company of New York City, manufacturers of headlights, tail lamps, generators, electric lamps, etc., has increased its capital stock to an authorized capital of $50,000 and elected the following officers: H. Saxon, Pres.; Smalley Daniels, Vice-Pres.; J. S. Taylor, Sec., and J. C. Nichols, Treas. The above constituting the Board of Directors. The company may move to Michigan or Indiana.

Agency and Garage News

The Maytag automobile is now established in Spokane, and is in the hands of Ed. A. Leach and W. G. Carr.

The Brush Auto Company has opened a Portland agency at 608-610 Washington street. William Wilzinski is in charge.

The Goodrich Rubber Company has opened a branch in Spokane at 151 Post street under the management of W. J. Rooper.

Jones & Gardner, of Union City, Pa., are building a fine garage 38 by 75 feet, and will start an automobile repair shop at once.

Eddie Bald, Pittsburgh agent for the Everett car, was referee in the Fourth of July hill climbing contest at New Castle, Pa.

C. W. Cain has taken the agency for the Croxton-Keeton cars in Ohio, Indiana, Kentucky and West Virginia. He is now busy establishing local agencies.

The Palmer-Singer Distributing Company, handling the Palmer-Singer cars, have opened a new garage at Ninth street and Tacoma avenue, Tacoma, and are exhibiting a number of the 1911 models.

The Pittsburgh Automobile Company has secured the exclusive agency for Oakland automobiles for Pittsburgh and towns within a radius of 200 miles. The sales will be managed by Julian Howe, and the line will consist of touring cars, roadsters and runabouts.

G. C. Murray, representing the Northwest Buick Company in Spokane, recently established an agency in Sandpoint, Idaho. On account of the number of new cars recently purchased in that territory the roads are being improved in the vicinity of Lake Pend Oreille.

William A. Ryan, who for the past three years has represented the E. R. Thomas Motor Company as district sales manager in the middle West, with headquarters at Chicago, has resigned, and will enter the retail field at Des Moines, Iowa, beginning with the 1911 season, on July 1. He has incorporated a company to be known as the Ryan Motors Company, and has contracted for a large lot of Chalmers cars.

The Buick Motor Company this week moved into its new rooms at 509-513 Erie street, where it now has one of the best garages and repair departments in Toledo. Three floors and basement are used by the concern, a huge elevator serving to hoist cars to any part of the building. The first floor is devoted to the storing of cars, the second floor to the repair work. A complete parts department will be maintained, where every piece entering a Buick or Reliance truck can be secured.

Peter S. Steenstrup and wife recently made the trip by auto from Portland to Medford, Ore. Mr. Steenstrup reports a most enjoyable outing.

Harry Fosdick has resigned as vice-president and general manager of the Hol-Tan Company, of New York, American agent for the Lancia car.

H. N. Sankey, one of the best known automobilists in Pennsylvania, has been elected treasurer and general manager of the Kittanning Automobile Company at Kittanning, Pa.

Charles E. J. Lang, secretary-treasurer of the Rauch & Lang Carriage Company, of Pittsburgh, is starting for an extended tour around the world. He will visit all the big vehicle-manufacturing plants across the water.

H. F. Fulton, who has been with the Citizens' Motor Car Company, Cincinnati, for a number of years, has severed his connection with that company and will be in the future identified with the Charles Hanauer Auto Company, having in his charge the line of Pierce cars.

The Hoffman Automobile Company has opened a garage at Bedford, Pa. This company has been in business six years, with main offices at Meyersdale, Pa. The Bedford plant will be in charge of C. J. Rowe, of Meyersdale, and H. W. Cunard, of Everett, Pa., and will handle the Maxwell, Columbia and Stoddard-Dayton cars.

Work on the new building which the B. F. Goodrich Tire Company is having erected in Race street, south of Twelfth, Cincinnati, is progressing. It will be two stories in height, of brick, and will cost about $20,000. The interior is to be handsomely finished. J. B. Blake, new manager of the company's branch here, arrived from Detroit recently.

The Pittsburgh-Chalmers Company has been organized, with Ralph G. Kennedy as manager, to handle the Chalmers line in that city. It will be located on Negley avenue near Centre. Mr. Kennedy has been in the automobile business in Pittsburgh 15 years, and was for a long time manager of the local branch of the Morgan-Wright Lumber Company.

The contract between the Cadillac company and Alvan T. Fuller as its Boston agent expired a few days ago and Alfred Measure who recently formed the Cadillac Automobile Company of Boston to handle this car took full charge of the agency. He has a salesroom on Boylston street, and Louis J. Sackett, who had charge of the Cadillac department for Mr. Fuller, has joined the new concern. A section of the Motor Mart has been secured for a repair department.

Accessories Occupy a Prominent Place

AN AUTOMATIC OIL CLEANSER AND COOLER

The importance of proper lubrication to the life of the motor and to the continued rotundity of the pocketbook is, or should be, appreciated by every motorist. Even the best of oils, after being in use in a crankcase for some time, becomes hot, dirty and gritty; dust is taken in through the "breathers," remnants of core sand from the castings, and carbon, which leaks past the cylinders, collect in relatively large quantities until the oil becomes, in a measure, a grinding compound that cannot fail to act deleteriously on the surfaces it is designed to lubricate. Hot oil, in addition to the readiness with which it leaks through bearings, does not possess the lubricating qualities of cool, heavy oil, which increases the compression, and, therefore, the power.

A system of automatically filtering and cooling the lubricating oil of automobile engines has been designed and patented by H. F. Maranville, a pioneer in this line of work. It is absolutely meddler-proof, and requires no more attention than the radiator or the gasoline tank. The hot, thin and dirty oil is pumped automatically to a filter placed sufficiently high to secure gravity feed on the return. The oil flows through, first, a cylindrical strainer fitted with a removable sediment pan, then through a cylinder filled with bone black, after which it passes through a single ply of specially woven filtering cloth, and then to the bottom of the filter, rising again through a water compartment, where it is washed and cooled, passing through the water separator into the pure oil reservoir, flowing thence by gravity to the crankcase—repeating this operation continuously as long as the motor is running. A clean-out plug is placed at the bottom of the filter to facilitate the removal of accumulations, while on the opposite side there is a filler where the supply of water may be replenished when necessary.

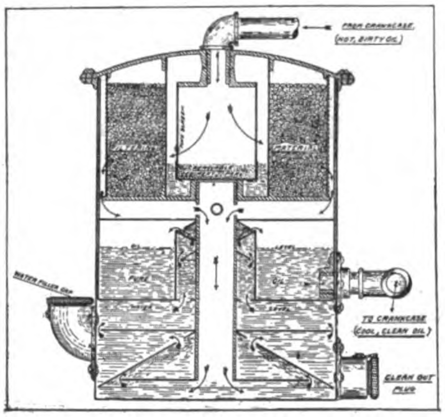
The principle can be applied to almost any present-day motor by making slight changes in the design and pattern of the crankcase.

The same device, with a few minor changes necessitated by the use of the flush system of lubrication, has been in successful use for many months in the rail and billet rolling mills of the Indiana Steel Company's works at Gary, Ind. The filter equipment here is, however, on an immense scale, being designed to cleanse 20,000 gallons of lubricating oil every 24 hours.

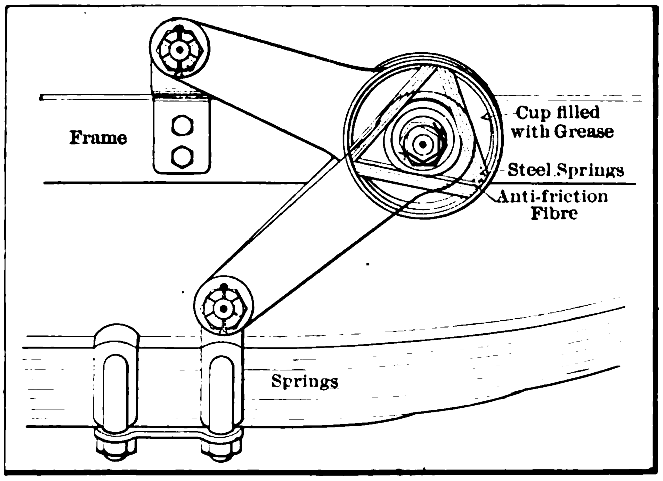
AN EFFECTIVE SHOCK ABSORBER

In the accompanying illustration is shown the Connecticut Shock Absorber, manufactured by the company of the same name at its factory in Meriden, Conn. The working parts of this device consist of a three-face cam working between three sets of springs of suitable tension to give the necessary resistance for the different weights of cars. These springs are located in a triangular position inside the retaining shell or cup with a piece of special bone fiber inserted between the face of the cam and the spring, so as to eliminate any possible wear. The case is packed with non-fluid oil, which surrounds the cam and springs, keeping them well lubricated at all times. The case is made grease-tight, and it is therefore impossible for the grease to leak out, or for water or dirt to get in.

The triangular arrangement of the springs and cam insures the placing of the strain on the cams, the bearings for the cam hubs in the shell of the shock absorber receiving practically no wear at all.



The H-F-M automatic oil filter and cooler



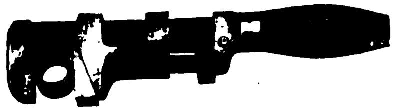
The Connecticut Shock Absorber in position

To insure proper adjustment of these absorbers they are provided with a serrated disk in order to secure the proper distance between the arms to obtain the neutral position.

During normal movement the absorber does not exert a braking effect, the springs not being brought into action until there is an excessive up-and-down movement of the car body, when the cam rides on the springs, exerting a braking effect and holding the body where it belongs. An added advantage is that in passing over smooth roads the device allows the full flexibility of the springs.

A HIGH-CLASS, POWERFUL TOOL

The pipe wrench here shown is made by the Brosnihan Wrench Company, 31 Hermon street, Worcester, Mass. The movable wedge or sleeve jaw is held against a pipe by a spring, and, grasping it instantly on the downward movement of the handle, does away with all lost motion. The jaws are made of hardened tool steel, tempered in oil.

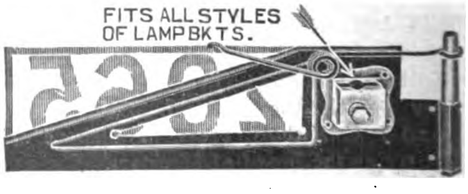


The Brosnihan pipe wrench

BALZER LICENSE PLATE HOLDER

This device is of very great convenience when passing from one State to another, for the plate can be removed and another put in its place by simply lifting a spring. It also holds the plate so it will not swing, which is an important feature, as many States now enforce this regulation.

This holder is so arranged that the rays of the white light from the rear lamp fall on the number plate. It is attached by removing the rear lamp and placing the socket of the license holder on the lamp bracket, already on the car; the lamp is then placed on a bracket provided on one end of the license plate holder. The other end of the spring which holds the plate down keeps the lamp on the bracket. The Gus Balzer Company, Inc., is located at 1777 Broadway, New York.



Rear view of Balzer license plate holder

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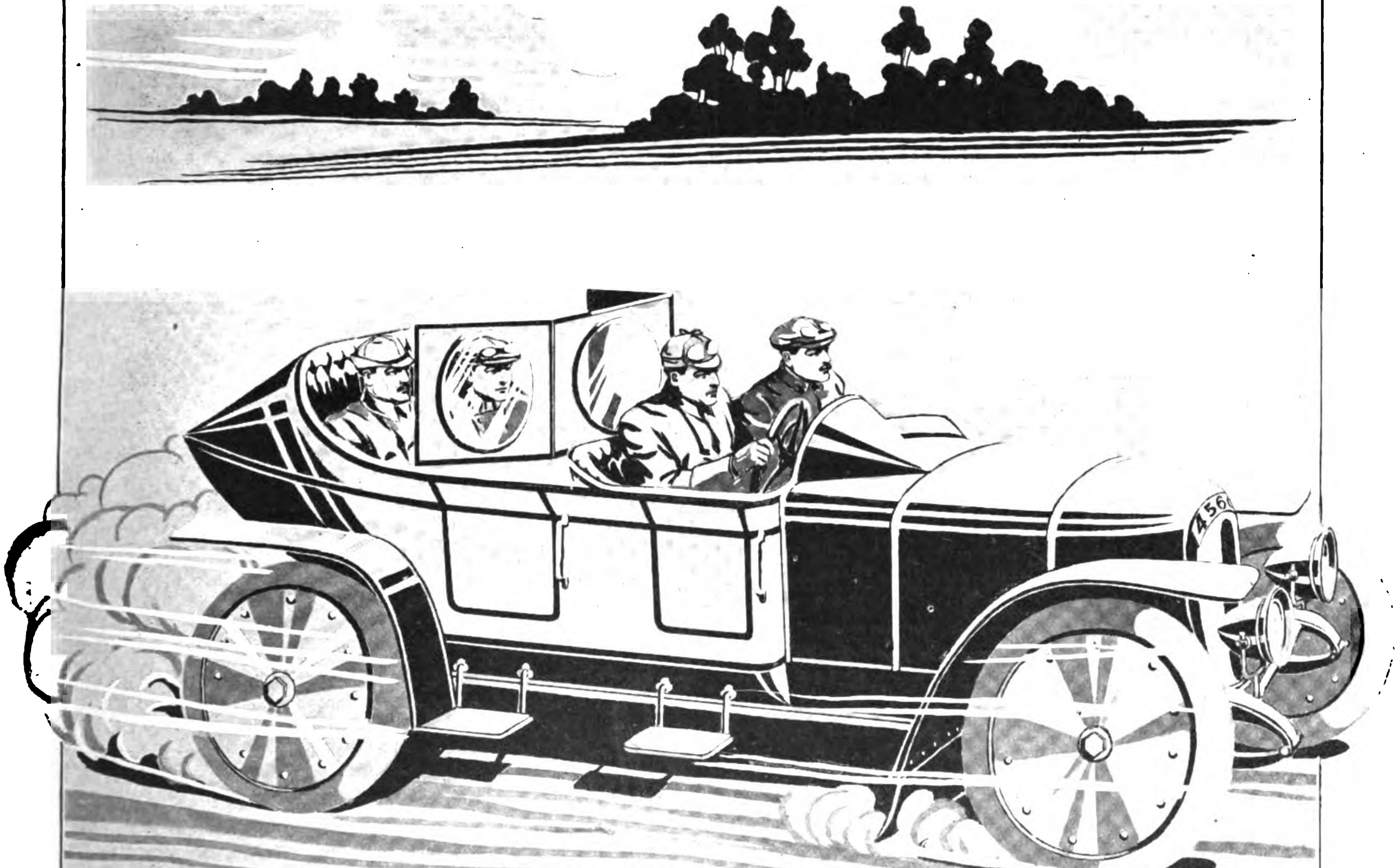
THE AUTOMOBILE

STANDARDIZATION IS THE NEED OF THE HOUR



STANDARDIZATION is the goal to which the automobile is traveling. The journey is a long one. Headway is beset by impediments at every hand, and, unfortunately, this giant benefactor of every art, with the silence of winged time, passes up and down the highway of progress, bowing to all who have lifted the veil of ignorance, unseen, however, by the scattered mob.

If it is admitted that a steering wheel should be fitted with a gear that will require a certain angular displacement in order to cant the front road wheels from the straight-ahead position to the angle of locking, and granting that this condition is not adhered to in every automobile made, viewing the whole situation in perspective, does it not represent incoherence of design?

Memory permitting, ancestry is lauded; the fair pages of history are scanned for a glimpse of a situation which reflects honor upon the individual and nations of individuals. As in a looking-glass, man contemplates the past, hoping, perchance, that grandfather carried a gun or spiked a cannon in a bygone fray. Discovering that glory of history casts its beam upon the family tree, the members thereof shoulder the burden of standardization as it is thus emanated.

Darwin traced the ancestry of man back to the time when he hung by his tail to the limb of a tree. This brave ancestor pushed ahead to go ahead, pushed to the right to go right, pushed to the left to go left, pushed to the rear to go back, and held back to stop. If the fair pages of history are to serve as the mirror to guide the faltering steps, is there any justification for gazing at that part of the mirror which discloses the "spiker of a gun" to the exclusion of the other precedents?

Habit is strong; it is the product of two schools. Nature is the "Master" of one, and man acquires the other by directly imbibing. If a yellow streak can be transmitted for seven generations, allowing that Nature does not discriminate, is it not also true that man naturally performs certain acts in the certain ways that were handed down from the dusty pages of the past? If so, is it not right to suppose that the driver of an automobile will subconsciously pull upon the emergency brakes to stop a car?

Piano-forte keyboards are universal. A musician from Hungary who sojourns in Bombay approaches the piano there, knowing full well that it is similar to the one in his own drawing room at home. Why should it be any different? Does it not represent the embodiment of all experience? An autoist, after using his automobile until it is no longer fit for service, goes to the maker for a new one; why should he have to unlearn all that he has acquired? Is there any excuse for asking him to learn to play on a newly arranged set of keys?

Automobile makers, doing big business, have well-appointed business offices. What have they there? Stenographers! Why? Is it not because they are deft, efficient, accurate, and reliable? When one retires, and a new one is engaged, does the manager think to inquire whether or not the new aspirant knows the keyboard of the type of machine that is used in that particular office? Is this silence due to the fact that the manager thinks that the new stenographer is so experienced as to know everything? No. The great "head" is alive to the fact that the keyboard is standard; he would not have purchased a machine excepting with a standard keyboard.

Ships that sail the "high seas," that make the "Grand Round" in a year and a day, that take departure with a full crew, that could not possibly survive a single storm of magnitude without men who know every rope in the whole make-up, rarely complete the homeward voyage with the men in the folks-hold who ship for the voyage. Why is it that a ship can sail from Liverpool, journey to Calcutta, lose a man overboard, replace him at the port of entry, and never give a thought as to the capability of the seaman?

Similarity of arrangement and fixed locations of the belaying pins to which the seamen make fast the clewlines, leechlines, bunt lines, fore braces, main braces, mizzen braces, staysail halliards, jib halliards, and the numerous other gear which puzzle the land-lubber, are at the bottom of it all. When the "braces" are made shipshape, the ensign is dipped in salute as the good ship noses the narrows passing the "fort," as the yards are squared to the passing breeze, as the inhabitants of the lowland hear but faintly the mellowed sound as the officer of the watch in bold confidence gives commands in quick succession: "Haul around the crossjack yard! Hard down the wheel!" As the gamut is run, as the ship responds to the trim of the sails, as the seamen bend with alacrity, is there any sign of confusion, any indication of uncertainty? No. Why? Standardization!

Come, let us join the fashionable audience at the Metropolitan Opera. It is a gala night. Gathered from the capitals of nations, there to entrance with art, are the prime donne and a galaxy. The text of the opera is but a detail, and the plot is scarcely noticed. It is the silver tongue, the song of the oriole, and the blandishment of the thrush that casts a spell o'er the audience. The mingling of the thousand-voiced chorus brings bliss to the refined ear, and when the situation is properly explained, it will be numbered among the normal expectations, the fact that little effort was demanded of the great impresario to weld this aggregation from separate units, gathered from many lands, into a homogeneous unit. What is the secret? Standardization—all the voices are pitched to the "International" key.

Railroads Were Standardized After a Long Struggle

It is well within the memory of the present generation when railroads were on the same more or less heterogeneous basis as now confronts the users of automobiles. The gauge of trackage varied from 21 1-2 inches to 3 feet 3 3-8 inches, and upwards to 4 feet 8 1-2 inches, stopping at 60 inches, excepting in one or two isolated cases. It requires no stretch of the imagination to arrive at the conclusion that a freight car built to travel on a 4-foot 8 1-2-inch gauge track would have to stop going at the end of its own line. A connecting line with a meter gauge (3 feet 3 3-8 inches) could only co-operate with the line of differing gauge to the extent that the freight cars would have to be unloaded from the meter-gauge line, and the freight would have to be transferred to the cars standing upon the other line. This handling and rehandling of freight resulted in a loss to the roads, and ultimately a loss to the public at large, it being the case that quasi-public institutions must thrive and prosper, or the public must share in the loss.

In the course of time it dawned upon the heads of railroads that it was cheaper to transport goods through to destination without rehandling, than it was to be the sole owner of a short line and incur the cost of rehandling freight. The early history of railroading was that of the "big frog in the little pond." The history, in fine, of the character of men who headed these disjointed railroads was that of efforts which ultimately led to the writing of an epitaph, always of the men, but, unfortunately, frequently of the efforts they misdirected.

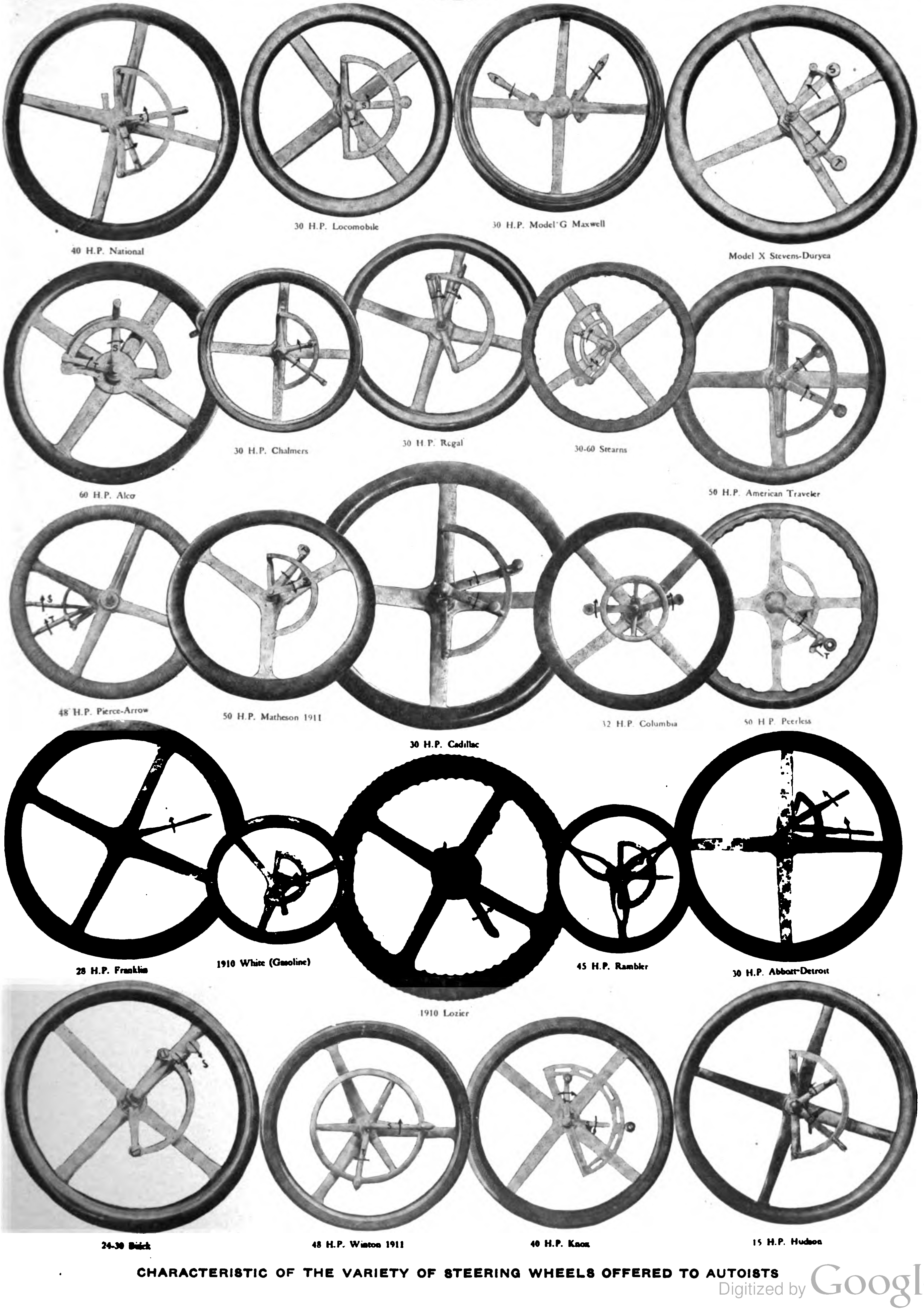
The time arrived in the history of railroads when the car builders assembled in conclave and contrived what is known as the M. C. B. (Master Car Builders' Specifications). As the result of the labors of the great minds which undertook this work every dimension of each part which enters into railroading in any way is standardized, and a wheel or an axle or what not may be had from any shop in the land and it will fit into place in any car made.

Standardization Is the Next Mile-Stone Ahead

Every industry traverses the road called progress; it has its inception in the fertile brain of the inventor whose ability to think twice in the same direction is always in question. The breath of commercialism instills life in the invention, emanating from the infected thorax of the "promoter," who, as a matter of course, "tries it on the dog."

With a sufficient amount of merit residing in the main idea, despite the imperfections of the promoter's method, invention survives, and art grows. The next step in the life of an invention takes its departure at the instant of capitalizing merit with the expectation of trading off a dollar's worth of value per dollar expended, figuring in a return on the property for the investor. It makes no difference whether the investor is he who furnishes the capital for the building of the device, or whether he is in the guise of a purchaser who expects to use the same and profit thereby.

Since it is true that the standardizing process has proven of unquestionable benefit in the arts thus far enumerated, it only remains to call attention to some of the advantages, applying them to the automobile, discussing them from the two points of view. Activity may now be noticed among makers and work which is being done by the Society of Automobile Engineers, with a



40 H.P. National

30 H.P. Locomobile

30 H.P. Model G Maxwell

Model X Stevens-Duryea

60 H.P. Alco

30 H.P. Chalmers

30 H.P. Regal

30-60 Stearns

50 H.P. American Traveler

48 H.P. Pierce-Arrow

50 H.P. Matheson 1911

30 H.P. Cadillac

32 H.P. Columbia

50 H.P. Peerless

28 H.P. Franklin

1910 White (Gasoline)

1910 Lozier

45 H.P. Rambler

30 H.P. Abbott-Detroit

24-30 Buick

48 H.P. Winton 1911

40 H.P. Knox

15 H.P. Hudson

CHARACTERISTIC OF THE VARIETY OF STEERING WHEELS OFFERED TO AUTOISTS

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are made it alloy steel
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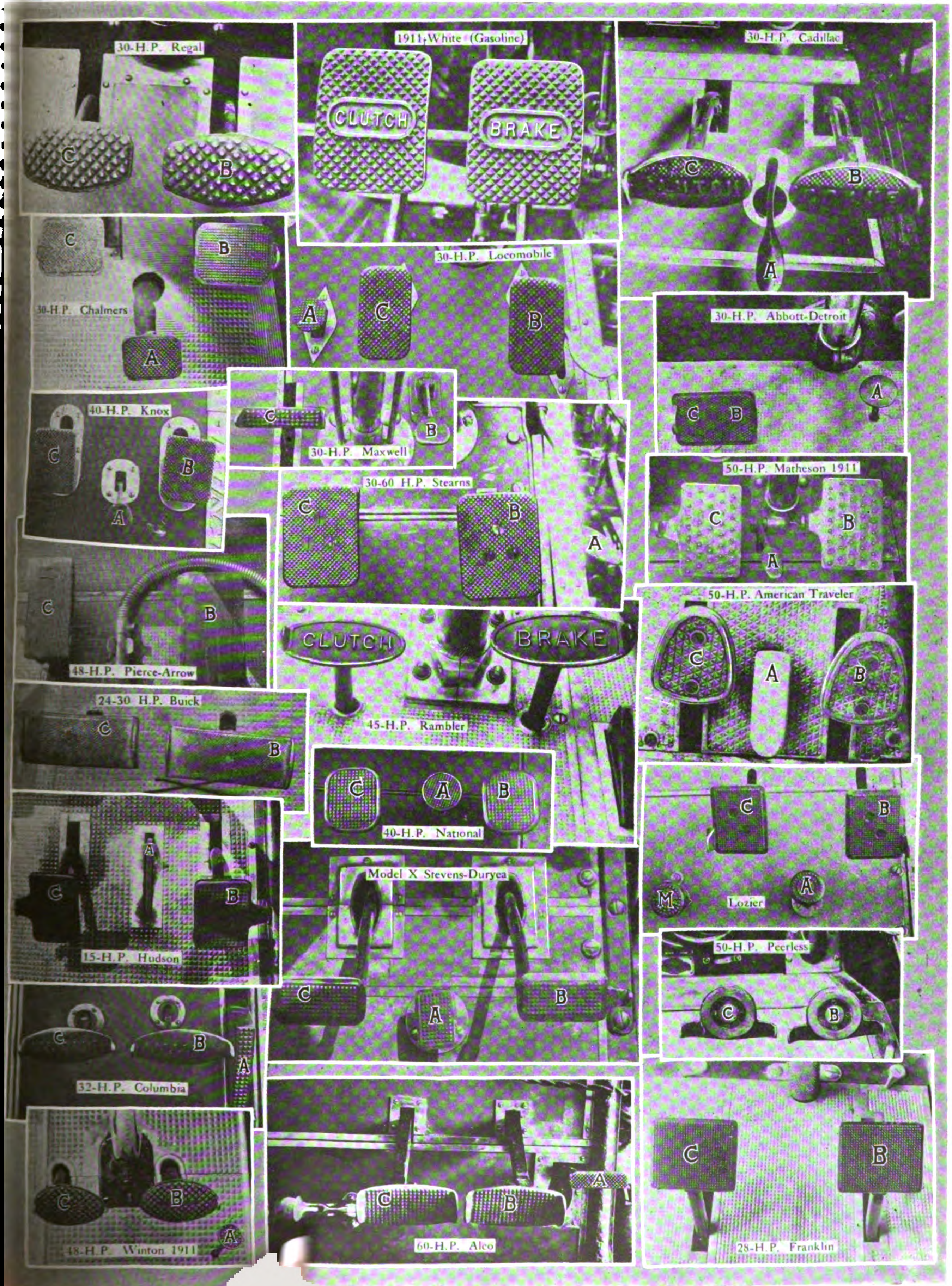


PEDALS A[illegible] STRIKING DISTANCE OF A STANDARDIZED CONDITION view to the standardization of the materials for use in the manufacture of cars.

Properly Classified Materials Represent First Requisite

Users of automobiles, with a limited vision, based wholly upon their own needs and influenced by the shortcomings of the cars they employ, reach the hasty conclusion that the question of standardization is no greater than the one they see. It is a gross injustice to the great problem involved to assume for a moment that a standardization product can be evolved from a mere aggregation of a kindred form of materials. It is first necessary to classify and standardize the materials which are to be used, and only then will it be feasible to place the stamp of standardization upon the finished product.

It may be taken for granted that the companies, severally and collectively, will find ways and means to cope with the standardization problem as it refers to the materials used, but it remains to be seen how the plans will be so unified that drivers of automobiles will not have to unlearn what they acquire with one car when they take up another and different make.

Habit Becomes an Asset to a Driver of a Car

When an aspiring autoist purchases his first car he assumes the position and prerogative of a juvenile in the primary grade at school, and he learns the A B C of the automobile. If it is a good school (automobile) the basis of his future education will be well founded, and as he progresses from grade to grade he will acquire habits which to him will be an asset for all the time to come, and he will thereafter subconsciously direct his efforts in precisely the right channel in every emergency, so that accidents, as the result of false moves, will scarcely be chargeable to him.

When the autoist graduates from this school (automobile) and he elects to transfer his affection to another, if there is no standard plan between them, the poor autoist will be in a most unfortunate position. Force of the habit, acquired under the conditions of his previous training, will be as a handicap to him in his every move. He will be in the position of the piano-forte artist who is suddenly confronted with a keyboard that is not built in accordance with the customary standard, and instead of moving under the force of acquired habit, effort will be conscious, more or less studied, but always retarded by subconscious influence as dictated by the habits previously acquired.

It is not the intention here, at this time, to offer any suggestion leading up to the struggle for unification of the control systems of automobiles. Perhaps the state of the art is not as yet such that the various makers of automobiles would be content to send delegates to a convention empowering them to agree upon a standard set of control units, such as might be written in indelible ink and hung up in front of every draftsman in every shop, telling him in precise language how every part should be made and the relations of parts, so that an autoist would be able to get into any car and drive away with the assurance to himself that the habits previously acquired in the process of driving other cars would stand him in good stead in the face of a new emergency.

It is not believed that all the accidents that we hear of from time to time are due to mistakes made by drivers, but it must be appreciated that well-drilled men are more capable of conducting themselves on a basis of precision of movement than is possible otherwise; but this thought leads up to the really serious situation, and it is worth repeating here: Drill a man to proficiency in one way and suddenly require him to act against the habit acquired and he will go wrong.

Present Situation as It Confronts the Autoist

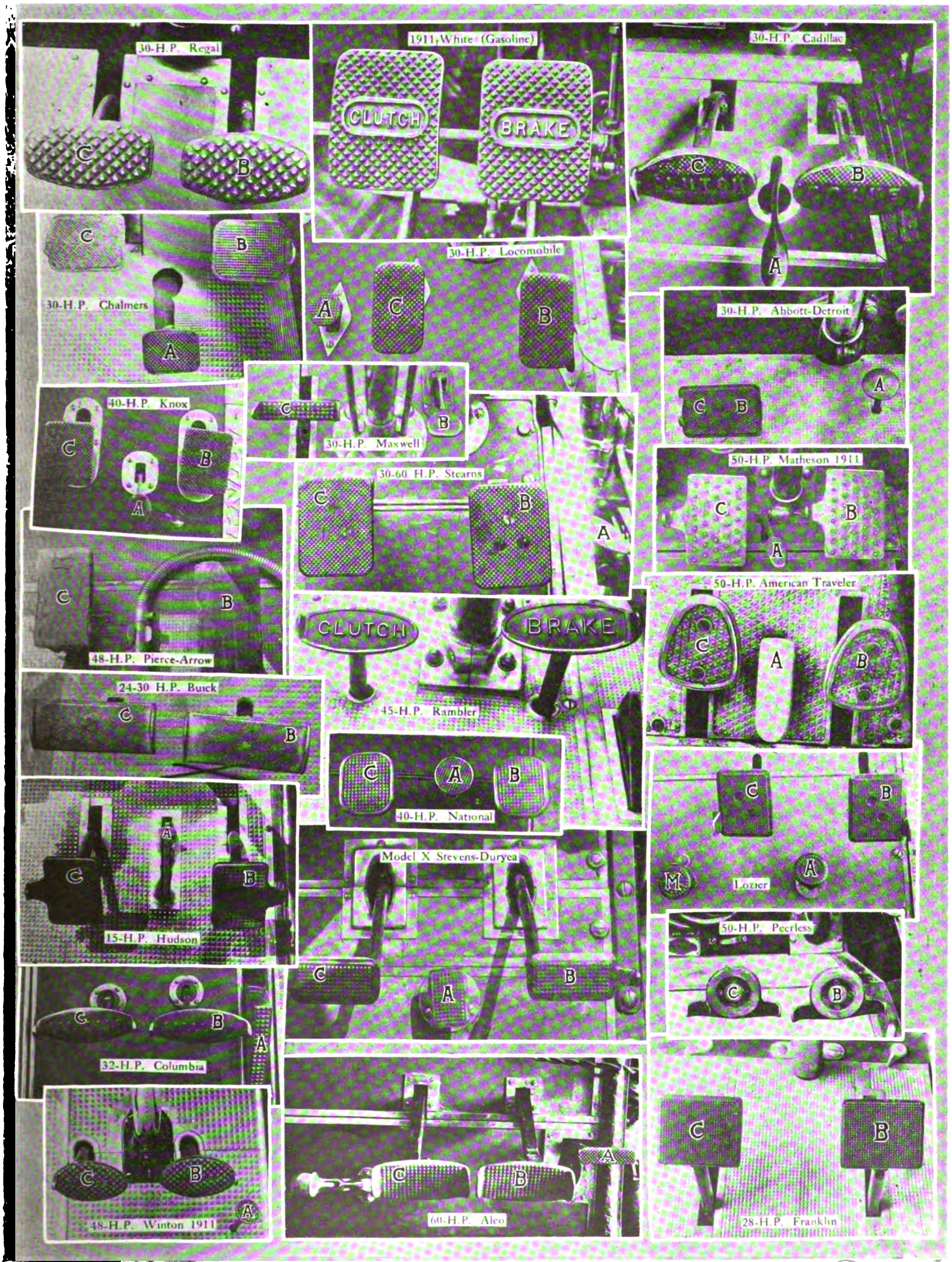
For the purpose of showing that there is no approach to standardization in the cars as they are now made, the staff photographer of The Automobile called at the sales agencies of makers indiscriminately, and with few exceptions succeeded in taking photographs of the latest and most up-to-date cars from three points of view: (a) Showing the side levers, which include the emergency brake lever and the sliding gear lever; (b) the steering wheel with spark and throttle levers thereon; (c) the pedals, comprising clutch, service brake and accelerator control. In each case the direction of motion is shown by arrows, and it will be seen at a glance that there is a wide divergence between them, if indeed it may not be said that there are no two alike.

It would be the height of folly at this time to proclaim in favor of any of the methods illustrated. It is even a question if any coterie of men are mentally equipped to dispose of this broad and important matter on a basis of merit. In a sense, the worst one of the lot, as a standard for all, would have a masterly advantage over the present arrangement, and the chances are that a "compromise" is all that will ever be arrived at as a final disposition of this problem.

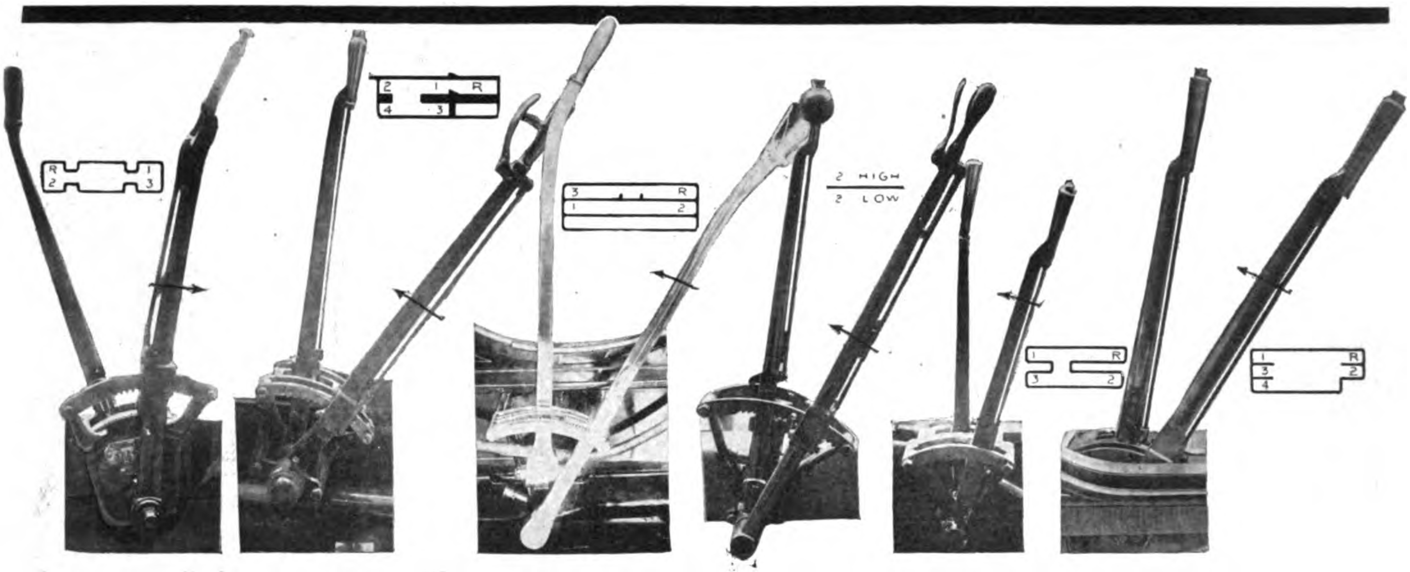
Just to indicate that it is not feasible for designers to make a "Chinese copy" of all the good points in the several examples of automobiles with a view to the production of one superlative car, it will suffice to say that this plan was brilliantly executed on a few occasions, but the mess of junk evolved failed to please those who were expected to support such a brilliantly conceived scheme. When a designer trades off his individuality for a mess of spineless pottage, his inharmonious aggregation ceases to find favor. One of the dangers encountered in the advocacy of a plan of standardization is represented in the influence against individuality, a price is put upon the head of the advanced designer, and the influence is against the highest obtainable average result. But the horizon, from the point of view of the standardization of the automobile, is no darker than it was when railway standards were brought to the fore. The men who will have to agree upon standards are no less capable than the master car builders of former days, but the necessity for action is possibly more acute than it was in connection with railways, one reason for which lies in the fact that railway trains were guided by bands of steel and railway locomotive drivers were men of skill, born of definite training. It is a far more serious matter to place an automobile at the disposal of a man of comparatively little training, and permit him to travel where he will, unrestrained by aught but his own inclination, and it is a self-evident fact that the risk can only be reduced to a minimum if the training which he receives at the start becomes the basis of habits which will stand him in good stead when the emergency arises.

Grading of Materials Rapidly Going On

When the Mechanical Branch of the A. L. A. M. was organized, it was then recognized that nothing could be profitably undertaken in the direction of the standardization of automobiles without having standardized materials to work up. The makers, in getting together and forming a mechanical branch, indicated in this act that many reforms were necessary, and they recognized the difficulties at every hand that beset the purchasing agents of the respective companies. Of the materials that demanded first attention, it is likely that steel was the most conspicuous, and it did not take long to find out that alloy steel, while it offered excellent possibilities, was not wholly to be relied upon in every emergency. When alloy steel first came out, and it found lodgment in many foreign automobiles, they, as they were used in America, proved to be most unreliable in many ways. Broken crankshafts were quite common, and observation did not have to be penetrating to allow of the conclusion that the harder grades of steel had limitations. The modulus of elasticity is probably no higher in alloy steel than it is in ordinary grades, and, when crankshafts are made of alloy steel, they have to be of the same diameter as though they are made of carbon steel. The price of alloy steel is six times higher, and it becomes a question as to whether or not it fills the bill under all conditions—the engineers of the companies, in meeting, settled this matter.



PEDALS ARE WITHIN STRIKING DISTANCE OF A STANDARDIZED CONDITION



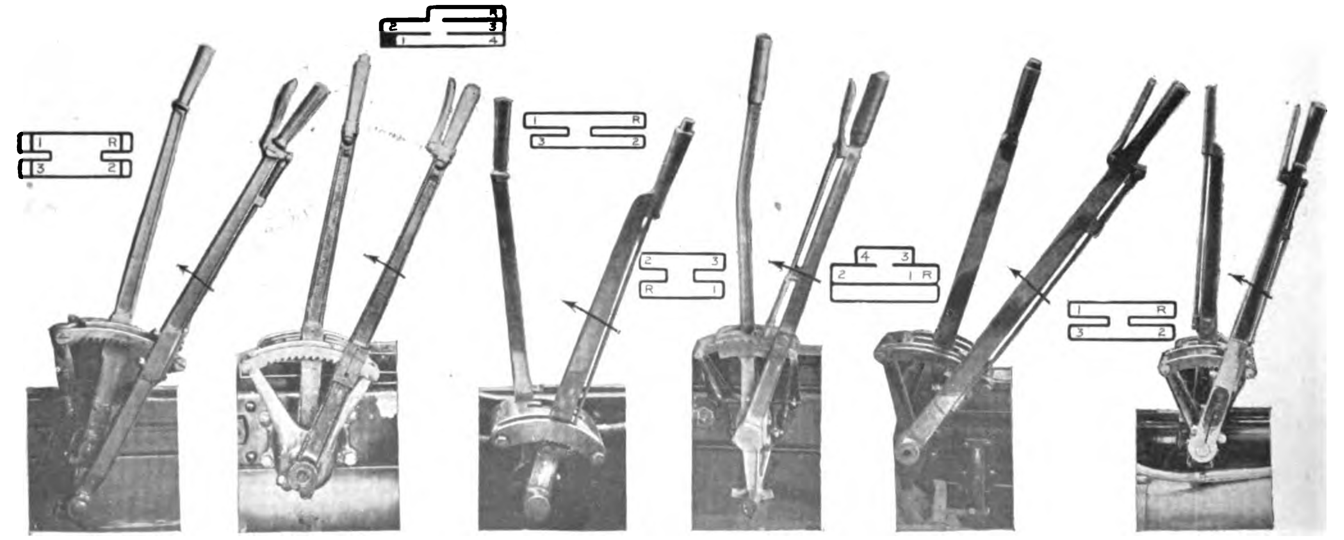
Rambler 45 H.P. 1910 Pierce-Arrow 48 H.P. 1910 Franklin 28 H.P. 1910 White (Gasoline), 1910 Hudson, 1910 Winton 48 H.P. 1911

DOUBTLESS the growth of the automobile industry in America represents a mode of procedure that has no precedent. Other arts, while they attain conspicuous proportions in time, do not compare favorably with the situation as it obtains with the automobile, which, in a decade, revolutionized methods of transportation. That merit is the basis of automobile success is never questioned, but it must be remembered that the vast amount of work done in the evolutionary process required an unusual array of facilities, and in the final sum-up from an historical point of view accessory makers must be given credit for a large proportion of the good work done.

The enormous output of automobiles comes from the combined efforts of the makers of cars and the makers of accessories. The acknowledged superlative quality of American automobiles is traced back to quantity production on a jig basis, favored by specialization at the hands of those who devote themselves to some one phase of the problem. As a general rule a machine reaches its highest state of perfection if all its components are made under the eye and direction of some one competent head, but when the undertaking passes beyond the domain of a single individual the same principle for success can only be perpetuated if the units of the machine are separated out and the influence of the specialist is brought to bear upon them respectively.

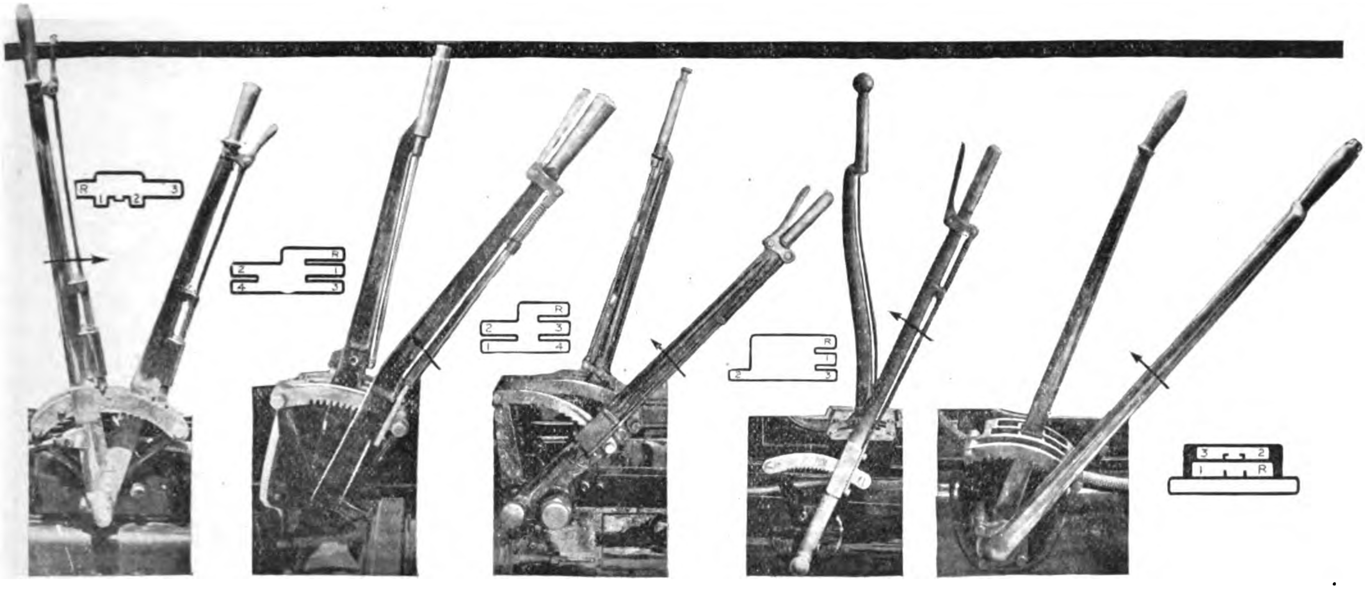
That the making of automobiles has passed beyond the point where any one man can know of all the things that are being done is a self-evident fact, but it is reasonable to accept the version that is presented by the advanced accessory maker in which the claim is made that the work is on a specialized basis and the details are executed under direct command or as the result of an intimate understanding.

To what extent the output of automobile plants was increased by calling upon the accessory makers to anticipate is difficult to fix, but it is a fair claim that there is not a single make of automobile turned out that is entirely free of accessories of one kind or another. True, some makes of cars are almost completely produced in the makers' plants, but even they rely upon outside sources of supply for magnetos, tires, perhaps carbureters, and



Cadillac "Thirty," 1910 Alco "Sixty," 1910 Regal "Thirty," 1910 Columbia 32 H.P., 1910 Stearns 30-60, 1910 Matheson 50 H.P., 1911.

SIDE-LEVERS ARE GREATEST OFFENDERS IN THE SCHEME OF STANDARDIZATION



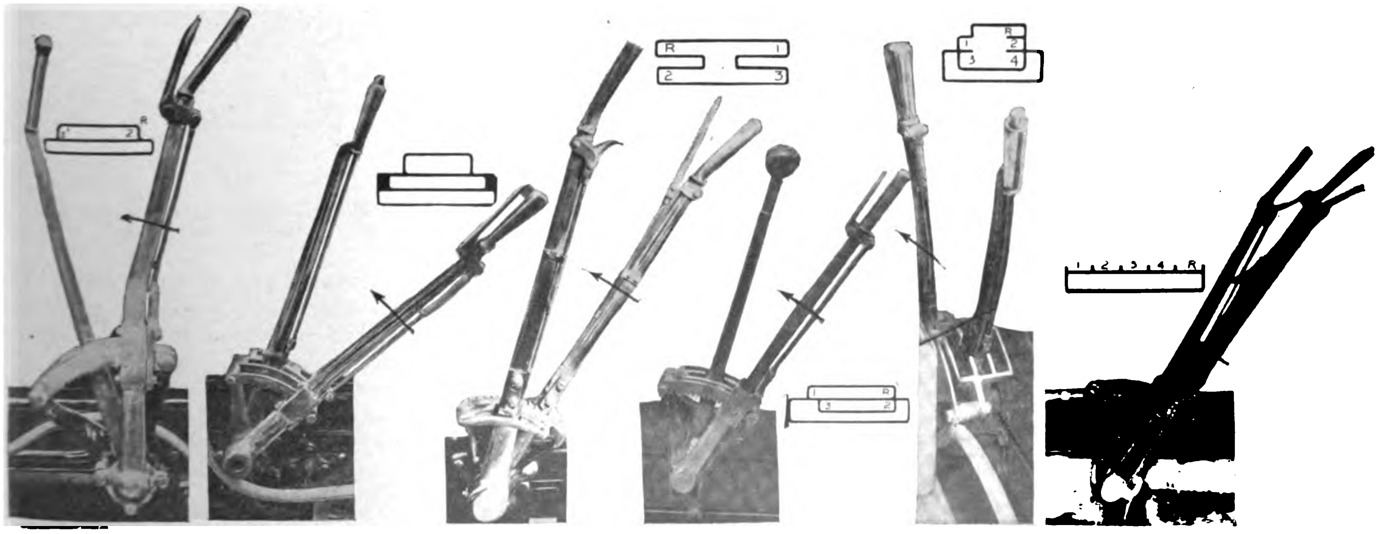
Stevens-Duryea Model X, 1910 Peerless 50 H.P., 1910 Lozier, 1910 Knox 40 H.P., 1910 Buick 24-30, 1910

not infrequently bodies. Other manufacturers of automobiles resort to the co-operation of accessory makers on an increasing basis, and finally there are products which rank as mere assemblages in which accessory makers furnish the units and parts complete.

Not infrequently arguments are presented, mostly by those who have but a passing acquaintance with the intricacies of the situation, which have for their basis the idea that automobiles are perfect in proportion as they are built without the aid of the accessory plant. Obviously, the maker of an automobile gets what he pays for, and if he selects the highest grade of accessories for use on the type of car he puts out, the car will reflect the high quality of the accessories so produced. If, on the other hand, the car is not to be a good one, and the accessories are purchased because they are low-priced, they will no doubt conform to the requirement.

In the process of standardization accessory makers are doing more perhaps than they are given credit for. As an illustration of the influence of the accessory maker on standardization, it is only necessary to call attention to the fact that in so far as some one make of live rear axle is adopted by 10, 20, 30 or 50 makers of cars, the process of standardization is advanced; likewise, if a given make of motor is adopted by many makers of cars, the process of standardization will be present to whatever extent the given make of motor is put into circulation.

The great underlying question comes with the consideration of the raw materials used by the respective accessory makers, it being the case that if there is no standard to go by, each accessory maker independent of the other will suit his own convenience or consult his personal ideas, under which conditions the materials will vary over the wide limits of the market, and to some extent price will be the governing factor, whereas when a standardized condition is recognized the question of the cost per unit of the material ordered will be reduced to a mere matter of bookkeeping, for if there is a standard set for the quality of the material there will be a standard price as well.



Chalmers "Thirty," 1910 Locomobile "Thirty," 1910 National 40 H.P., 1910 Abbott-Detroit "Thirty," 1910 American Traveler, 1910 Maxwell Model G-4

DESPITE THE DESIRABILITY OF UNIFORMITY IN CONTROL SYSTEMS

COUNCIL OF S. A. E.

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History, Growth and

WITH its absorption of the Mechanical Branch of the Association of Licensed Automobile Manufacturers the Society of Automobile Engineers came into its proper sphere of usefulness and importance with relation to the development of the automobile.

This great step in a progressive way was not accomplished in a day or a year. It followed after the Society of Automobile Engineers had been in existence for over five years, and it resulted from conditions that had been changed by its efforts. These changes took place gradually, but with a cock-sure certainty that made a forecast of the actual happening something more than guesswork.

The Mechanical Branch of the A. L. A. M., composed of engineers employed by members of the association in the building of automobiles, did a great work, and had a distinct purpose in life, but the time eventually came when its purposes would best be served by a disinterested association such as the Society of Automobile Engineers, to whom the work was turned over.

To-day the society, as it stands, represents the soul of the automobile business in the United States. From it come the impulses that make for advancement along structural and mechanical lines. With a membership a little short of 300, it includes the most advanced thinkers and workers in its field of endeavor, which covers the greatest and most important item in modern commerce—the automobile.

As a single example of the work already performed by the society, attention may be directed to the earnest, painstaking labor which resulted in the introduction of alloy steels into the manufacture of American automobiles. If the only claim of the society upon fame was bound up in this single item its results have been sufficiently important to justify the society in living indefinitely.

In a score of different ways it has proved its value and its practical availability. Founded upon a creed of the highest ethical character; trammeled by no stringent commercial limitations, the society is free to delve into research; to experiment, theorize, discuss, and with the utmost latitude, to reach conclusions.

The engineering problems that arise in manufacturing: the basic development of the automobile and the fundamental principles of mechanical art, all come under the scrutiny of the society. The theses read at its meetings and the discussion that arises from them, go clear to foundation axioms of mathematics and the structures built upon these foundations extend far and away beyond the lines of present practice.

As an illustration: Several years ago, during the period when ordinary steel was being used freely in the manufacture of automobiles, in America, the society kept a watchful eye upon experimental work with alloyed steel in Europe. Detailed experiments were made and the value of the alloys was demonstrated by the work of the scientists. There was sharp protest from the manufacturers of steel in the United States, and much opposition was developed against the introduction of the improved metals in the making of American automobiles.

It was difficult to arrange for the first importation of fifty tons of this material, and when the shipments became so large that they could not be ignored by the foundrymen, the American steel trade bowed to the dictum that had been pronounced in favor of the alloyed steels and the effect upon manufacture of motor cars to-day is emphatically felt throughout the country.

The history of the Society of Automobile Engineers covers a little more than five years. Along in the Spring of 1905 a

PROGRAMME

THURSDAY—9 A. M.

The Society of Automobile Engineers—the lines along which the organization may be made of the greatest value to its members individually and to the motor car industry.

The Society Constitution and Its Limitations.

Suggested amendments to the Constitution, which may facilitate the practical work of the Society.

The Publication of a Digest of Technical Literature.

The Conduct of a Reference Library.

2 P. M.

The Specification and Heat Treatment of Automobile Materials. Address by Mr. Henry Souther.

The Test of a 20-Horsepower Franklin Air-Cooled Motor. Conclusion of paper by L. R. Evans and R. P. Lay. By Prof. R. C. Carpenter.

Variation of Current Practice in Anti-Friction Bearings. Paper by D. F. Graham.

The Pyrometer—Its Development and Use. Paper by W. H. Bristol.

Hardness of Metals. A. F. Shore and H. G. McComb.

Lessons to be Learned from the Motor Car Contest.

Drive-Shaft versus Rear-Wheel Brakes.

Three-Point versus Four-Point Suspension.

AFTER SOCIETY DINNER

Report of Committee on Tire Efficiency. By F. J. Newman, Chairman.

Report of Committee on Gear Steels. Dr. G. W. Sargent, Chairman.

The Basis for Motor Car Taxation. Charles Thaddeus Terry.

The Establishment of a Court of Patent Appeals. By E. J. Stoddard.

How to Make Gears Quiet by Grinding. Frederick A. Ward.

The Responsibility of the Motor Car Engineer to his Company and to the Public.

FRIDAY—Afternoon (on Shipboard)

Seamless Steel Tubes and the Necessity for Standardization in Their Specifications. By H. S. White.

Slide, Rotary and Piston Valves versus Poppet Valves for Gas Engines. By Eugene P. Batzell.

Ill-Smelling and Smoky Exhausts. Paper by F. D. Howe.

Wheel Alignments—Camber and Foregather.

Hot Rolled Gears (Teeth Rolled in) for Transmission and Differential Purposes.

Best Tooth Form for Quiet Gears.

Valve Seat Angles.

THURSDAY

9 A. M.

Business session, President's address and reading of reports, followed by a general discussion of announced subjects.

2 P. M.

Professional session.

7 P. M.

Society dinner, followed by a professional session and general discussion.

Subjects not scheduled will come up during the dinner, at which time it is expected that all the members will be present, and in a receptive mood.

Midsummer Meeting

Work of the S. A. E.

handful of progressive scientific men recognized the utility of an organization of automobile engineers, in which nothing but the advancement of practical science should have any weight or influence. These men, among whom were H. M. Swetland, president of the Class Journal Publishing Company; A. L. Riker, vice-president of the Locomobile Company of America; Henry Ford, president of the Ford Motor Company; E. T. Birdsall, A. H. Whiting, L. T. Gibbs, H. P. Maxim, H. F. Donaldson and Henri G. Chatain, representative engineers, attended a preliminary meeting which eventually resulted in the formation of the Society of Automobile Engineers.

PROGRAMME

SATURDAY—9 A. M.

Motor Trucks for Railroad Service. Paper by T. V. Buckwalter.

Test Data Upon Sheet Metal Frame Sections. By L. R. Smith.

Proper Power and Speed for Gasoline Motors for Truck Purposes, and Proper Road Speeds for Vehicles of Different Capacities.

Location of Motor for Commercial Vehicle Work—in Front Under Bonnet or Under Seat.

Long-Stroke versus Short-Stroke Motor—Advantages and Disadvantages of Each.

Driver's Seat on Left versus Driver's Seat on Right for Commercial Car Purposes.

The Edison Battery in Practical Vehicle Service.

Electric Vehicle Mileage.

Foolproofing the Commercial Car Mechanism and Its Control.

Standardization Possibilities Within the Commercial Car Field.

A Proper Nomenclature in the Distinction of Freight and Passenger Vehicles.

Tire Mileage and Costs.

1 P. M.

Nomenclature of Motor Car Parts. Paper by F. E. Watts.

Driver's Seat on Left versus Driver's Seat on Right for Pleasure Car Purposes.

Leaf Springs, Methods of Mounting and the Treatment of Springs by the Manufacturer and in the Hands of the Motor Car Owner.

Magneto Efficiency.

Current Practices in Lubrication and the Practical Results Obtained.

Standardization Problems. Those matters which deserve the united attention of the motor car engineers in an effort to simplify the purchasing department and deliveries problem. Also matters affecting the car-user.

Cork Insert Pulleys as Applied to Motor Vehicle Manufacturing Machinery. Lawrence Whitcomb.

The Carrying of Tools and Spare Tires on the Car. By H. H. Brown.

LOCAL ENTERTAINMENT COMMITTEE

Howard E. Coffin (ex-off.)
H. W. Alden, Chairman
George W. Dunham
Russell Huff
H. M. Leland
F. E. Watts
E. T. Birdsall
A. P. Brush
F. H. Floyd
G. M. Holley
G. E. Merryweather

The object of the society, as set out in its constitution, was to promote the arts and sciences connected with engineering and mechanical construction of automobile vehicles.

The method by which this object was to be attained was to hold meetings for the reading and discussion of professional papers, for social intercourse, the publication and distribution of its papers and discussions and the maintenance of an engineering library.

The industry was emerging from its swaddling clothes when the society was brought into existence, and the keynote that was sounded at its early meetings found a protesting echo from the infant industry. Up to that time it had been the practice to take several European models and strike a kind of mean average in the building of motors, the construction of running parts and the general architecture. The result was not much more than a mean average, and pretty mean at that, although even in that early day of the industry some creditable advances were made along structural lines.

FRIDAY

9 A. M.

Visits to various manufacturing plants (members to elect three plants which they individually desire to visit; Parties will be grouped accordingly).

1 P. M.

Boat trip as guests of the Timken-Detroit Axle Company, during which there will be a professional session on shipboard, followed by a general discussion of several subjects.

EVENING

Social session, with dinner at Light House Inn for those attending the convention and the ladies accompanying them.

The early activity of the society was marked by no splurge and noise, but a vast amount of conscientious work was done by its members. Its growth was steady from the first, and it soon gave evidences of its permanency. Mr. Riker was chosen first president, and under his administration the foundation was marked out for the great structure that now stands upon it. During the first year a considerable portion of the effort of the society was devoted to perfecting its organization and preparing for its work. At the end of the first year of formal operation Mr. Riker was re-elected as presiding officer, with Henry Ford, vice-president; John Wilkinson, second vice-president, and E. T. Birdsall, secretary-treasurer. A. H. Whiting, L. T. Gibbs, H. M. Swetland, H. P. Maxim, W. H. Alden and H. Vanderbeek were selected as its Board of Managers.

The society had now grown to nearly 100 members, and at its second annual meeting, which was held in New York, January 17, 1907, papers were read by Thos. J. Fay, E. E., on "Some Features of Construction"; by Thomas L. White, on "Alcohol as a Fuel for the Automobile Motor"; by Henry Hess, on "Automobile Change Gears and Their Journals," and by Henri G. Chatain, on "Some Facts Pertaining to Electrical Ignition."

Mr. Fay's address outlined the purpose of the society with much clarity. In introducing his subject, he said: "In attempting to elaborate upon features of construction of motor cars, the dominant idea will be to discriminate as between things tried out and found wanting, things tried out and found satisfactory, and things in the air, so to speak.

"It is believed a society of engineers, to serve a useful end, should act as a 'clearing-house' for engineering practices, rather with the expectation of ultimately fixing upon standards to go by. It is not the purpose here to advocate any scheme likely to limit the zone of activity of inventors, or place one in the position of having to conform to narrow conventions.

SATURDAY

9 A. M.

Professional session, at which Commercial Vehicles will be the main topic, followed by the reading and discussion of several papers.

1 P. M.

Professional session and general discussion of subjects.

ADDITIONAL SUBJECTS FOR DISCUSSION

Cylinders; crankshaft bearings; cylinder heads; valves; piston-rings; cooling; gasoline; noises; brakes; gear-box forms; number of cylinders; fixed ignition; multiple sparking; gear ratios; rear axles; stock cars; worm drives; relation of power to demands.

"On the other hand, it is feasible to aid invention and broaden the range of vision by limiting the amount of details to be mastered, as well as decreasing the repetition of errors, costing, as they do, lives and money."

Mr. Fay then pointed out the supreme advantages of critical consideration and discussion in their relation to condemnation of bad practice and unsound theory.

He presented an advanced view of the use of alloyed steel, recounting his conclusions from a series of exhaustive experiments with nickel-chrome steel. He called attention to the dangers of excessive phosphorus and sulphur in certain varieties of metal used in the composition of this sort of alloyed steel, and gave the figures of his tests in great detail.

After showing the advantages of chrome-nickel steel, Mr. Fay concluded that the price of steel is no sign of its quality, and that good carbon steel at 2 cents a pound was better than bad chrome-nickel steel at 20 cents a pound. He also said that nickel steel, while holding some good qualities, was too uncertain in the stage of development that obtained at that time for use in cars of pretension.

He cited a particularly interesting incident where the carbon steel shaft of an expensive foreign car under his observation twisted in service and said that the engineer, figuring on a much higher elastic limit than was justified, had used carbon steel instead of chrome-nickel steel of the type used by a competitive maker.

He sounded a note of warning against the use of too light aluminum in crank cases and transmission cases, and pointed out the advantages of bronze for those purposes.

"Alcohol as a Fuel for the Automobile Motor," a subject close to the automobile craft, and one that will probably occupy much attention in the years to come, was treated by Thomas L. White.

In introducing his subject, Mr. White said that the economic conditions which must eventually obtain in motordom as to the use of alcohol for fuel, must be considered independently of technical considerations. He pointed out that gasoline is a by-product of a geographically limited and monopolistically controlled industry, and that the whole available and prospective supply is more than mortgaged by the wide demand.

He showed that alcohol could be manufactured almost anywhere for 5 cents a gallon, and that in the view of supply, the conditions were more promising than those that obtained in the gasoline line. He called attention to the fact that if the technical difficulties that stand in the way of using alcohol in place of gasoline could be removed, the demand created for alcohol will be satisfactorily met as to quantity, quality and price.

Mr. White showed by a series of experiments that alcohol requires 6 per cent. of its caloric value to complete its evaporation; that with ordinary compression the inflammation rate of the motor alcohol is sluggish as compared with gasoline; that a 10 per cent. addition of water lends itself to a compression of 150 pounds and upward; that in process of inflammation it does not radiate heat so rapidly as gasoline; that it is most efficient when the walls of the cylinder are maintained at 200 degrees Fahrenheit, and that the penalty for incomplete combustion is corrosion and destruction of valve seats and exposed parts, as well as loss of power.

He pointed out that the aim of the engineer should be toward perfect carburetion with the aid of exhaust heat; acceleration of the inflammation in the cylinder and the maintenance of the heat of the cylinder walls at 200 degrees. He said that in slow-going motors the use of fuel alcohol had proved a success, and suggested that future work in this line should be to carburate air with alcohol, instantly, and to promote approximately instant inflammation at maximum compression. He proposed that air containing partly atomized and partly vaporized alcohol be passed through a layer of calcium carbide before the mixture enters the cylinder. The 10 per cent. of water in the alcohol mixture would generate acetylene gas and the heat thus generated would evaporate the alcohol. He expressed the hope that the future would demonstrate in practice the utility of the idea.

The paper of Henry Hess, on "Automobile Change Gears and Their Journals" was another important address. Mr. Hess went clear to the roots of the problems involving ball bearings. He outlined the best practice of the day, and showed the trend that development must take both here and abroad. How thoroughly justified were the conclusions of Mr. Hess may be realized when it is considered that the ideas he advanced then seem almost like the regular specifications of to-day.

Mr. Chatain's address on "Some Facts Pertaining to Electrical Ignition" detailed a series of tests with the low-tension magneto and high-tension coils, which was an authoritative statement of the most advanced ideas of that day.

At the next quarterly meeting of the society, which was held at Buffalo, a series of papers was read by J. M. Ellsworth and Thos. J. Fay, on "Some Micro-Structural Considerations," on "Pointers on the Equipment of a Hardening Room," by J. G. Schaeffers, on "Construction of Motor Vehicle Springs," by J. G. Rumney, on "Influence of Acid and Rust on Ball-Bearings," by Henry Hess, and on "The Carbureter and Its Functions," by Charles E. Duryea.

The program was composed of strictly technical presentations, and marked a distinct step in the life and progress of the society.

The next meeting was the third annual convention of the society, and was held in New York. The program included addresses by Henry Hess, on "Automobile Hub Bearings"; H. W. Alden, "Some Notes on Taper Roller-Bearings"; J. M. Ellsworth and Thos. J. Fay, on "Usually Unobserved Refinements of Construction," and by Thos. J. Fay, on "Nature Hard Gears."

The following officers were elected: President, Thos. J. Fay; first vice-president, Henry Ford; second vice-president, E. T. Birdsall; and treasurer, Henry Hess.

The transactions of the society began to broaden in scope and influence, and during the year that followed a vast number of important subjects were considered, presented and discussed. The quarterly meetings were held in various cities, the first being called to order in Boston, second at Detroit and the third at Cleveland. The speakers and their subjects at these meetings were as follows: J. O. Heinze, on "Perfecting Automobile Ignition"; P. M. Heldt, on "The Design and Construction of Crankshafts"; Joseph A. Anglada, on "A Multiple Unit System as a Solution of the Heavy Goods Transportation Problem"; Richard W. Funk, on "Forgings for Automobile Work"; E. S. Foljambe, on "Autogenous Welding and Its Application to Automobile Construction"; Otto Heins, on "Some Recent Developments in Magneto Ignition"; Bruce Ford, on "The Storage Battery in Automobile Work"; Frank Beemer, on "The Unit System of Power Transmission in Automobiles"; A. L. Dixon, on "Increased Efficiency of Single Motor Drive"; H. Vanderbeek, on "The Limitations of the Universal Joint"; Thos. J. Fay, on "What Carbon Does to Automobile Steel," and Leon Lacon, on "What Is the Best Timing."

The breadth of thought included in the foregoing subjects is a measure of the activity of the Society of Automobile Engineers, and shows better than any mere comment the value of such an organization as a moving force in the development of the American automobile.

At the next annual meeting of the society Henry Hess was chosen president, with Russell Huff, first vice-president; B. D. Gray, second vice-president; A. H. Whiting, treasurer, and Alex. Churchward, secretary.

The work started and accomplished during the earlier period of its life was continued and expanded under the administration of Mr. Hess. The deliberations of the society had attracted attention, not only of motordom in America and Europe, but of scientists everywhere, and proposals of a flattering nature were made to the society to join forces with other scientific organizations that were only interested in the automobile from an academic viewpoint. These were declined with thanks and appreciation of their complimentary nature, and the S. A. E., now come to commanding size and influence, stepped forth full grown into the glare of focal interest.

The program for the year included the following speakers and subjects: Lawrence Whitcomb and Thos. J. Fay, on "The Trend of Brake Design"; A. Atwater-Kent, on "What Constitutes Ignition Reliability"; F. D. Howe, "The Economics of Weight Reduction"; William S. Noyes, "An Improved Type of Compression Coupling"; S. W. Rushmore and Herbert L. Towle, "An Indicator with Continuously Rotating Drum"; S. P. Wetherell, Jr., "Standardizing Motor Bearings"; Henry Cave, "Some Practical Considerations in Autogenous Welding." The Summer convention was held at Chicago, with the following program: R. C. Carpenter, on "Test of a Pierce Six-Cylinder Motor"; Edward Sokal, on "Possible Increases of the Weight Efficiency of Storage Batteries"; H. M. Beck, on "Some Points in the Operation and Care of Vehicle Batteries"; Frank H. Floyd, on "Notes on Lubricating Oils"; Alexander Churchward, on "Energy Consumption of Commercial Vehicles"; H. S. Baldwin, on "Electric Cradle Dynamometer—Method for Test of Gasoline Engines."

Thus may be traced the expansion of the society's field of work from first principles to the ultimate refinements and back to first principles again. Each meeting marked a step in advance; each successive consideration of a certain subject carried along the line of thought first laid down and when the limitations had been reached the conclusions were used either to break down what had been deemed a fundamental principle or to strengthen its position as a cornerstone of the great engineering fabric.

At the last annual meeting of the society H. E. Coffin, president of the Hudson Motor Car Company, was elected president; Henri C. Chatain, one of the charter members of the society, was honored with the first vice-presidency, and R. C. Carpenter succeeded to the second vice-presidency. A. H. Whiting was re-elected treasurer and Coker F. Clarkson was named acting secretary.

There was another field of usefulness in view for Mr. Clarkson, who at the time was assistant general manager of the Association of Licensed Automobile Manufacturers, and coincidentally with the absorption of the Mechanical Branch of that association by the society, Mr. Clarkson was made general manager of the society. Permanent offices were secured at 1451 Broadway, New York, and a program of still greater activity is being outlined.

Bound by no commercial or financial limitations, and moved only by the considerations that aim to improve and develop automobile engineering, the future stretches away into pleasant vistas of teeming activity.

Members, Associates, and Junior Members

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Midsummer S A E Meeting

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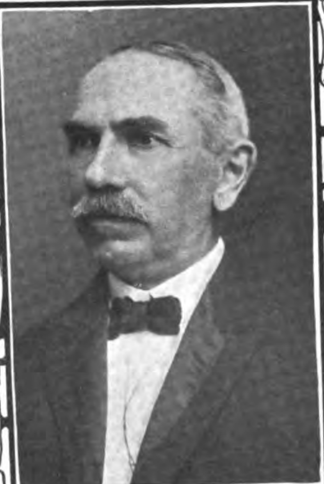
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Midsummer S·A·E Meeting

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Study Depicting the Trend in Torpedo Body Designing

INDICATIONS point in the direction of the torpedo type of body with four doors, thus affording access to the driver's seat on either side as well as access to the tonneau. To accomplish this it is necessary to place the emergency brake and sliding-gear lever amidship in the car, and the steering wheel must be placed on the left side. In addition to an arrangement such as this, the illustrations are of a new design which is intended to serve as a "study" in which will be found a definite interpretation of the trend in its various aspects of the automobile body designing situation.

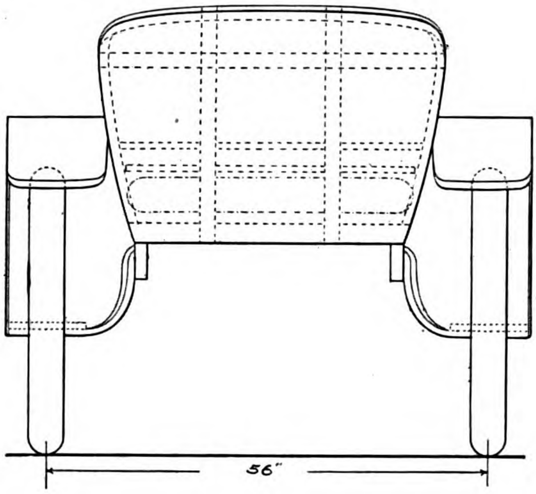
Among the important refinements indicated is the one which protects the radiator from splashes of mud without in any way interfering with the working qualities of the radiator, nor can it be said that the appearance is otherwise than enhanced. As a further suggestion which will carry weight among veteran tourists, is the idea of making a tire "cellar" beneath the floor of the tonneau, with means of access, which is quick and convenient, possessing the added virtue of a secure lock against the wiles of those who want tires but are reluctant to pay for them.

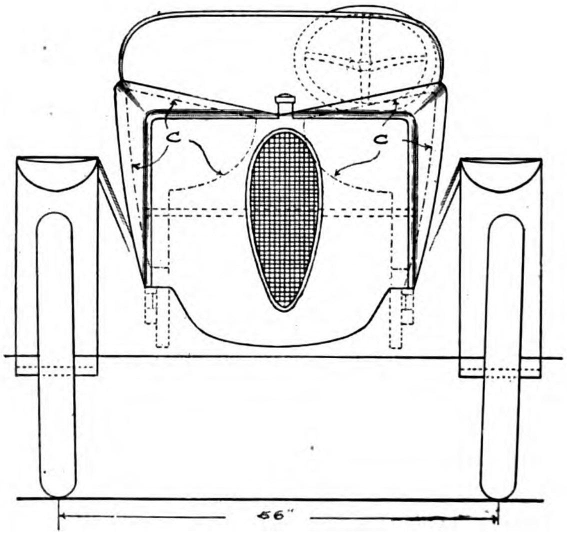
Arguing in favor of the elimination of appended accessories to the glistening surface of a highly finished body makes it necessary to find a place for each of them. If it is desirable to build a tire cellar for the pneumatics, primarily to get them out of the way, at the same time affording protection against thievery, and the further fact that the direct rays of the sun are intense destroyers of tire life, it is equally desirable to place the gas tank in its own compartment, thus removing an unsightly appendage from the running board, and placing the gas tank where the direct rays of the sun will not shine upon it and add to the risk of an explosion, which is always a possibility if heat is applied to the tank.

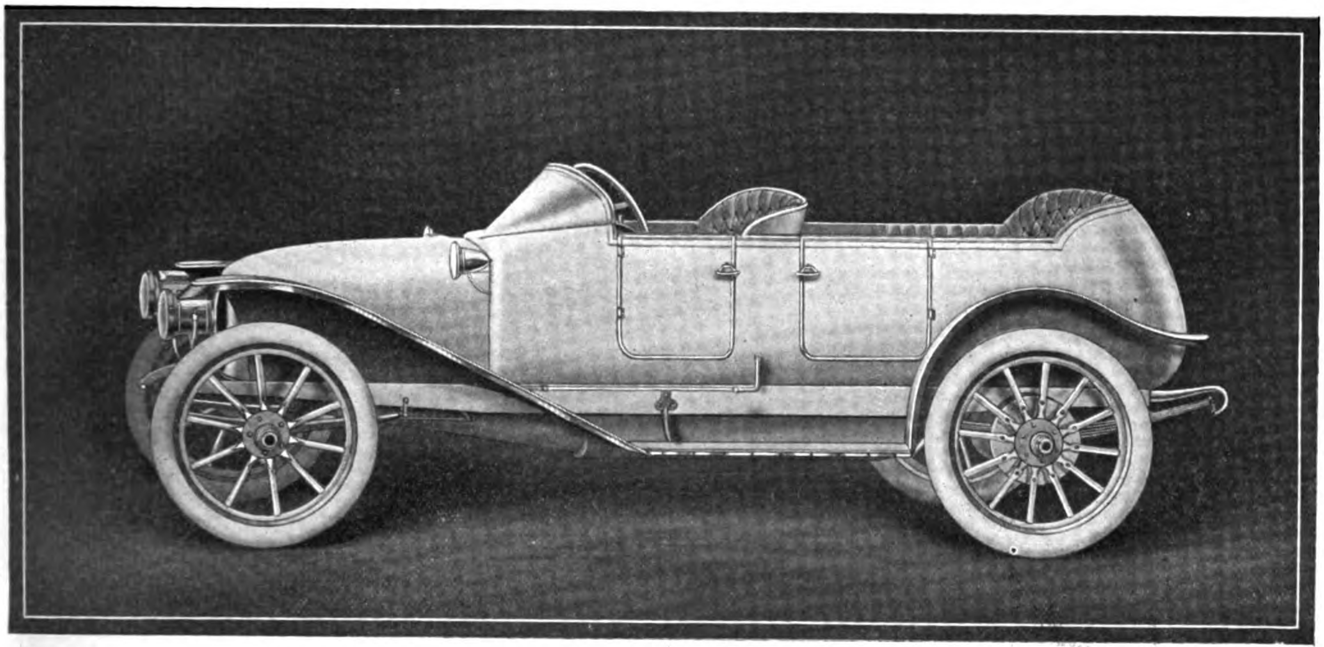
A second look at this new design will carry the conviction that the occupants of the front seat are afforded the same protection against the wiles of inclement weather as that available to the occupants of the seats in the tonneau. The front entrances were placed so far back that it was necessary to design the seats so that they could be tilted sufficiently to admit of entering, but this plan permits of overhanging the dash sufficiently to house in the occupants of the seats, and by a special shape of the overhang, even the hands of the driver are protected from drafts of wind, thus permitting him to grasp the steering wheel firmly and to enjoy driving even in zero weather. The shape of the overhang is such that the wind is given an upward trend, and it sweeps away over the heads of the occupants of the front seat, thus giving to them all the protection of a glass windshield with none of the disadvantages, as dimming the vision, when mist forms on the glass.

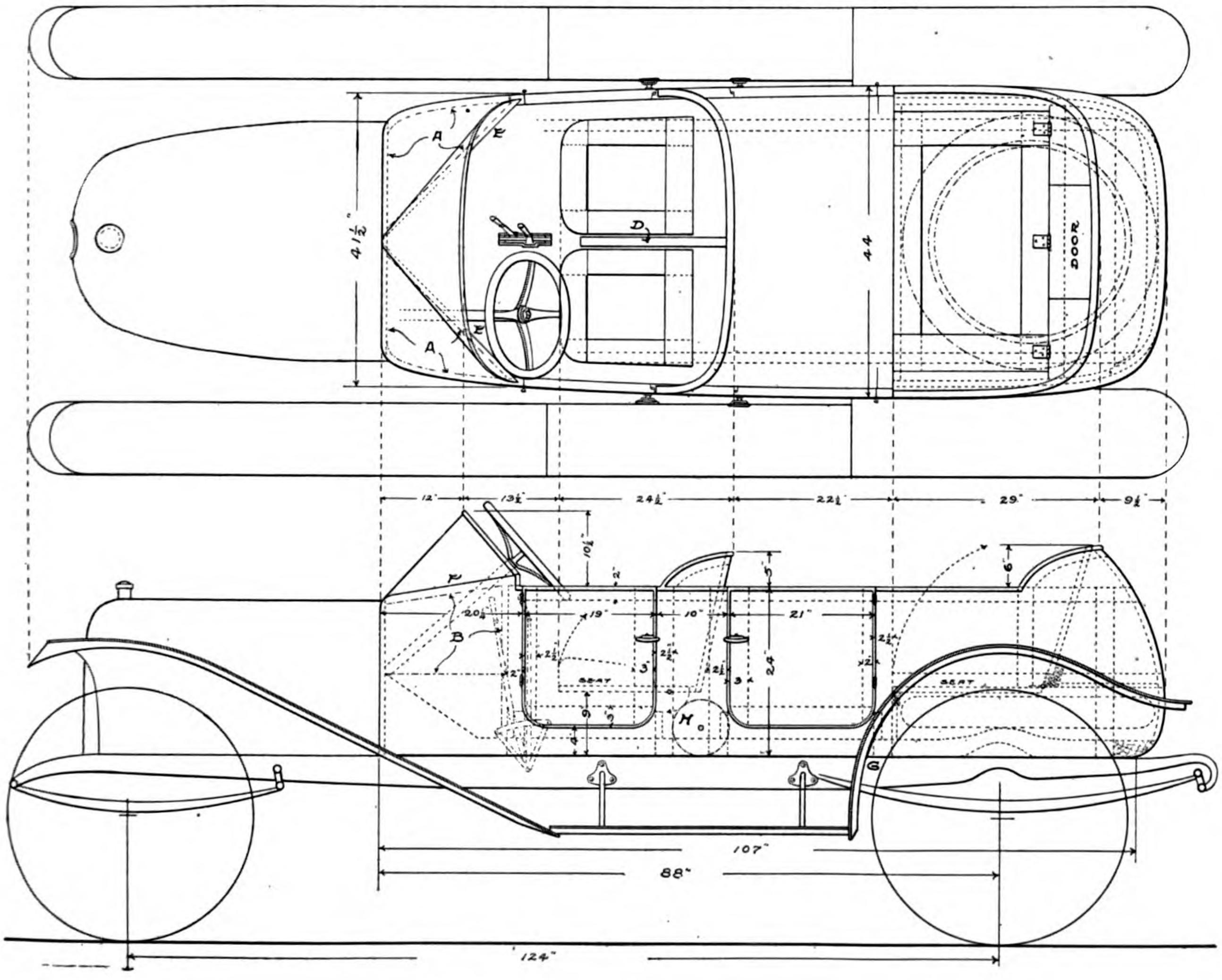
The fuel problem is solved on a simple basis. It is assumed that an autoist who travels from his place of abode to the point of his destination will desire to come back again. It is also assumed that the best automobile is the one which has the least number of intricate parts, so that gravity feed is resorted to, thus eliminating the pressure regulator. Two tanks are shown.

Progress was made when the torpedo scheme took root in body designing. The idea of affording protection to the occupants of the front seats is one that is appreciated by every autoist of experience, and the shaping of the overhang of the dash so that the "dodger" improvement is incorporated, lends favor to the plan. Then, the scheme which eliminates dust accumulations from the person of the passengers in the rear seats gains a measure of appreciation, but it remains for designers of bodies to devise some plan for storing the tires, acetylene tank, and the other accessories, so that they will not continue to detract from the appearance of the car. Pilferers, who go about purloining accessories from automobiles, are ever favored by the ease with which the accessories can be gotten at, and certainly it is worth while to give them more work if they must be dealt with at all. The body, as here presented, is designed to afford protection in the several ways. The shaping of the front of the hood is protective with an opening just large enough to allow of the passage of the requisite amount of cooling air, and the baffling influence necessary to prevent splashes of mud from entering the radiator and passing back to the machinery.



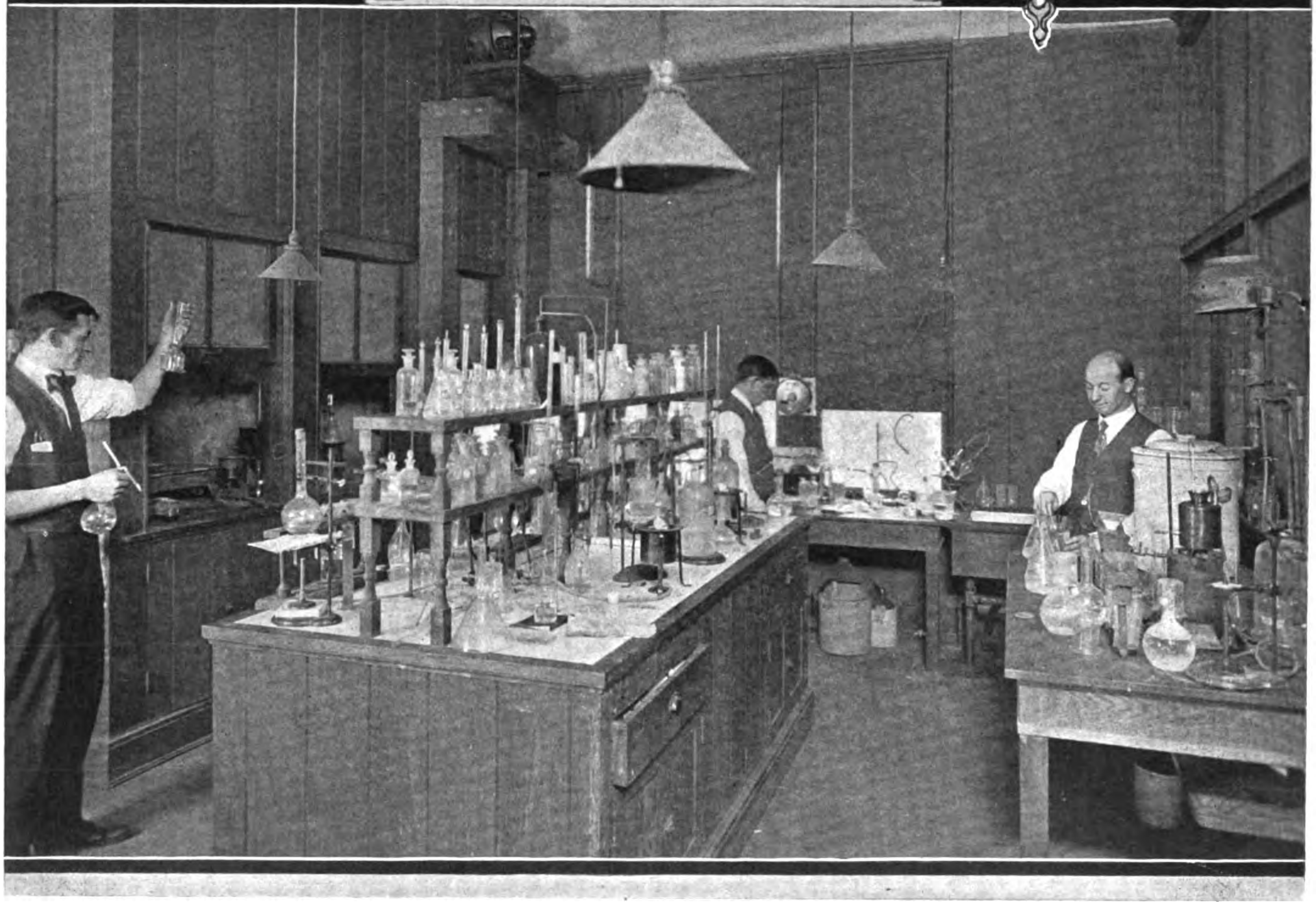





A
E
A
E
D
DOOR
41½"
44
12"
13½"
24½"
22½"
29"
9½"
10½"
2"
5"
6"
F
20½
19"
10"
21"
B
2"
2½
3"
2½
2½
3
24
2½
2
SEAT
9
3"
4
H
SEAT
G
107"
88"
124"

ENGINEERING SECTION

AUTOMOBILE STABILITY STARTS IN THE LABORATORY



NEVER before, in the history of the doings of men, was the time ripe to balance the efforts of the workers in the vineyard of human endeavor. The men whose feet have contact with the "cash box," holding a certain temporary potential standing, were never slow to take advantage of the fact. "Business reasons" were ever at the bottom of loose statements of position, so that engineers, bound down by high aims, and with a proper regard for truth, were kept at the foundation of the structure, there to take the weight of all, with never a chance of correcting the ills which creep in, excepting by primary means reduced to a low state of efficiency as interpreted by business men who are wont to claim that an engineer is not practical.

With the coming of the automobile, and the broadening of the scope of the work that engineers have to do, business men have been compelled to lean more heavily upon the technically trained, and the closer contact has brought about a better understanding and a more healthy combination. The elimination of ruinous competition has had a wider influence upon the newer movement than most economists are ready to admit. As business is now done, it is not necessary to engage a "confidence man" to represent a company, and merit is the most prized stock in trade. Companies are fast learning that merit is not a companion to "sharp practice"; they also find that engineers are not to be depended upon to do a task excepting in the right way.

In the old days men were prized as they showed capabilities in the direction of making purchasers believe that black was white if the exigency demanded. Under the new conditions it only remains to deal with purchasers who are not color blind. Merchandise is produced and sold for what it is, and customers are relied upon to order what they want, so that misrepresentation is no longer necessary. This newer condition, however, has introduced a demand for more skill on the part of the men who do the work just in proportion as the demand for "slick talking" is falling off.

When it comes to doing things as they should be accomplished, there is no chance of being able to improve upon the methods that engineers learn, not only at the universities, but in the shops also. When a man starts out to build a machine of any sort he must be sure of his ground and design all the parts so that they will fit together. This necessity is so pressing that every man engaged in this character of undertaking fully appreciates the advantage of being honest with himself, knowing that if he neglects to take every factor into account the machine will fail to go together and he will have to pay the price of his disregard of first principles.

This drilling along lines that bespeak accuracy has a wide influence on the men and they are continually baited along the paths of honesty of habit and good intention. That this character of man is venturesome enough to suit the type of financier who wants to succeed on a basis of merit is too plain to be denied, and that the engineer will be of any use to the dishonest business man is impossible to believe.

The idea, then, that engineers have to be kept out of the business office because they are not "cute" is being given up. They are wanted there for the very reason that they know better than to deceive themselves, and a man who has this quality as a fundamental basis is the character of man who will not stoop to the point of deceiving his employer or the patrons of that employer.

The claim that the engineer is not progressive enough for business is refuted by the large amount of profitable business that is being done in the many walks of life, nearly all of which is based upon engineering effort. If a company must engage an engineer to design its product, and if the company admits that the engineer succeeds in doing so, he must be held responsible for the result of his handiwork, but he must be given credit for the good that comes therefrom. All the epoch-making advances along constructive lines, of which our form of civilization has any knowledge, are based upon engineering. The workmen who construct machines, whatever they may be, as locomotives, etc., follow the specific instructions of engineers, but this point is frequently overlooked, owing to the fact that the instructions are given in the form of drawings, specifications, rules and regulations.

All the careful work involved in bringing out an equipment is done under the direction of a competent engineer if the equipment is to perform in a proper and satisfactory manner. Just at this point the business office, not being able to discriminate between careful and systematic work as compared with spectacular executional manoeuvres, allows the initial painstaking effort to sink out of mind, but being unable to get away from the loud talk of the man who merely directs the execution of the work in the manner as laid down by the engineer, the conclusion is soon reached that all the push and energy and business acumen emanates from the character of the man who is keen enough to see that he must use the engineer's basis, but who makes enough fuss in the process of doing the work to swing the limelight so that it casts its beam upon his favored brow.

The coming of the automobile, while it is not to be held wholly responsible for the many reforms that are being made, has had much to do with the process of crystallization, and business men of the class who make a success of their endeavors are reaching the conclusion that there is nothing to be gained by traversing the road which is said to be the short cut to victory. When a business is traveling in the wrong direction, the shorter the road the quicker it goes to ruin. When a business is in the hands of the character of man who cares nothing about merit, the more energy he puts into the enterprise, and the more vim he offers as a fair exchange for his stipend, the greater will be the splash the wreck will make when it lands in the sea of oblivion.

The elimination of competition, then, is a step in the right direction. When a man faces ruin, let it be from competition or from any other cause, he is compelled to either throw up his hands or surround himself with the character of talent that is willing to rise to the occasion by stooping low enough to hold an advantage over his competitors who also pride themselves on their ability to stoop. It was called "business expediency;" it was not very different from a rather sad piece of business known as "political expediency," and in these days of straight business the right name is well understood—it is called "dishonesty."

The modern trend leads to the recognition of the man who depends upon his skill to produce results. The greatest step toward this fitting situation was made when it was decided that competition is dishonest because it demands dishonest methods to make it possible to survive, but in substituting a merit basis, which was bound to follow when the selling price was based on the cost plus a profit, it became necessary to employ men who are capable of performing an excellent service, in other words, engineers, it being the case that the word "engineer," viewing it broadly, is descriptive of a man of skill; nor does it make any difference whether he devotes himself to the building of a pyramid, battleship, bridge, an act of congress, or an automobile. The man of skill is in contrast with the character of man who was relied upon under the old conditions in just proportion to the lack of skill of the latter, he relying upon his high disregard of fair dealings, having in view the one idea, "get there."

During the early days of automobile building there were a large number of failures, owing to the lack of appreciation of the facts as herein roughly submitted. The engineering staff was overshadowed by the sales department and the business office, the questions of competition took precedence over the matters of quality, and the heads of these companies, lacking in keenness of vision, failed to appreciate the new spirit and fell by the wayside enmeshed in the warp of cleverness, disregarding the woof of substantiality.

Under the old conditions, the engineers beggared along, made the best showing they could in the face of little encouragement, were honest with themselves in that they performed their part of the service in the light of their high ideals, saved cost wherever it was possible to do so without reducing quality, and kept before them, in so far as they could, the main point of view. Failure came when the purchasing departments disregarded the specifications for materials, and bought cheaper stuff. If anything but disaster can follow after such an act it must be by accident. If an engineer decides that the extreme fiber strain, for instance, of a crankshaft will leave a factor of safety of four if chrome nickel steel is used, but if the purchasing agent substitutes an ill-contrived forging out of a Bessemer bar, the latter can only be charged with having listened to the wiles of the vender's "slick Sam" who had a surfeit of Bessemer forgings to get rid of, and knew enough to go to a company whose management lacked in sense, thus permitting an ignorant purchasing agent to abort the efficient labor of an intelligent engineer by a process no more intricate than the deliberate purchase of the materials which are not wanted, for no better reason than that the vendor wants to get rid of them and is willing to name a low price.

These evils have been largely corrected. To-day the purchasing agent is not infrequently a skilled metallurgist; he studies the engineer's specifications, has the drawings before him when he takes up the matter for consideration, and while he acts on his own initiative, he nevertheless appreciates the reasons why the engineering office puts out specifications and works over designs until they are perfected. The modern purchasing agent, having an engineering training, tells the vendor what he wants, using fitting language in his description, and ascertains the price of the product which will suit his purpose, with never a thought of stocking up on "white elephants." This new way of conducting the automobile business is the cheapest in the long run; it eliminates wasters, shrinks the junk pile to insignificance, hastens the delivery of the finished product, commands a higher price, and makes every customer a willing, animated advertisement.

The Prediction of Efficiency in Internal Combustion Engines

By WILLIAM D. ENNIS, Professor of Mechanical Engineering in the Polytechnic Institute of Brooklyn.

The efficiency of the internal combustion motors is predicted rather than to design and build the motor, and then find out how good it is. Comparison is made with the idealized Otto cycle. Basic formulæ are given and the workings of the same are exposed. Application to the design of the automobile type of motor is made.

An advance estimate of the probable economy of a steam engine may usually be made on the basis of experimental data. Of these there are an abundance, for all sizes, types and forms of engine. A computation of probable efficiency on theoretical grounds is usually less satisfactory. The factor of cylinder condensation is so uncertain that in this respect alone the method must be based upon bold assumptions, the only justification for which is found in the records of those very tests which should enable us to form a more direct prediction.

With the internal-combustion engine the case differs. Here we have not only a comparatively insignificant number of test records, but with a few exceptions designs are so far from standardized that it is impracticable as yet to systematically classify those results which we do possess. Fortunately, a purely theoretical estimate is possible. In this, it is true, certain assumptions must be made; but the accuracy of our knowledge of these factors surpasses that which we have of the quantitative effect of such matters as condensation in the steam cylinder. Moreover, the error in the final result is of inferior order to those involved in most of the necessary assumptions.

Let an internal-combustion engine have a piston displacement of D cubic feet per minute; let it be supplied with a mixture of fuel and air in the proportions A and B, by volume, parts in 100. Then the volume of fuel supplied per minute is, in cubic feet,

$$0.01\,AD.$$

Referring to Fig. 1, which represents the idealized Otto cycle with the suction and exhaust strokes omitted, the cylinder is full of the mixture only along the line 4 1. We may readily calculate the specific volume of this mixture if the temperature and pressure at either 4 or 1 be given. We may also find, from the same data, the specific volume of the fuel, separately considered, at the pressure and temperature existing at any instant when the piston is at the outer dead center and the cylinder is filled with fluid. Let this specific volume (cubic feet occupied by 1 pound of vaporized fuel) be C.

In Fig. 2, let the stroke of the piston be from B to A and let the engine make E strokes per minute. If the piston displacement per stroke be F cubic feet, then

$$EF = D.$$

During each stroke the cylinder is filled with mixture of volume F, and of this mixture the vaporized fuel has the volume

$$0.01\,AF.$$

The weight of fuel trapped in the cylinder at each stroke is then

$$\frac{0.01\,AF}{C};$$

and the total weight of fuel supplied per minute is, in pounds,

$$\frac{0.01\,AFE}{C} = \frac{0.01\,AD}{C}. \qquad (1)$$

Let the heat of combustion of the fuel, per pound, be G, B.t.u.; then the heat chargeable to the engine, per minute, is

$$\frac{0.01\,ADG}{C}, \text{ B.t.u.} \qquad (2)$$

The next step is to find the amount of power exerted by reason of this supply of heat. The diagram of Fig. 1 may serve to represent the indicator diagram obtained from the engine, somewhat idealized. The lines 2 3 and 4 1 may be regarded as vertical, while 3 4 and 2 1 are of a form which may be represented by the equation

$$PV^n = \text{a constant},$$

in which the value of n varies with the piston speed, jacketing and other factors, but is, roughly, about 1.3. Taking the value of n the same for the curve 3 4 as for 2 1, the mean effective pressure of the diagram (average height of the area 1 2 3 4) is, in usual notation,

$$\frac{P_3V_3 - P_4V_4 - P_2V_2 + P_1V_1}{(V_1 - V_2)\ (n - 1)} = H. \qquad (3)$$

Let the engine give E diagrams per minute. The work done, in foot-pounds, per minute, is

Mean effective pressure × *piston area* × *length of stroke* × *number of strokes.*

But *piston area* × *length of stroke* $= V_1 - V_2$, and $V_1 - V_2 \times$ *number of strokes* $= D$; while 778 foot-pounds = 1 B.t.u.; so that the work done per minute, in B.t.u., is

$$HD = \frac{D}{778\ (n - 1)\ (V_1 - V_2)}\ (P_3V_3 - P_4V_4 - P_2V_2 + P_1V_1),$$

and the thermal efficiency, equal to the ratio of work done to heat supplied, is

$$I = \frac{DC}{7.78\,ADG\ (n - 1)\ (V_1 - V_2)}\ (P_3V_3 - P_4V_4 - P_2V_2 + P_1V_1),$$

$$= \frac{C}{7.78\,AG\ (n - 1)\ (V_1 - V_2)} \left\{ (P_1 - P_4)\ V_1 + (P_3 - P_2)\ V_2 \right\}$$

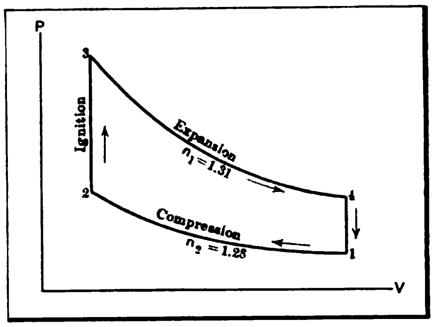


Fig. 1—Indicator diagram representing idealized Otto cycle

Thus far the steps are almost exactly correct: a slight corrective factor to include the effect of irregularities in the actual diagram being all that is necessary to make them strictly accurate. From this point, some assumptions must be made. For a given type of engine there is ample data to permit of fixing the probable value of P_1, the pre-compression pressure. For a given fuel, P_2 is also determined in the design, with considerable exactness. The only serious uncertainty has to do with the value of P_3. We have no complete data as to variations in maximum pressure attained with various forms of engine. So far as is known, the jacketing arrangements are the only controlling factors, and when these are such as to satisfy mechanical operative requirements, the temperature at the point 3 is not far from constant for all engines using hydrocarbon fuels other than producer gas or blast-furnace gas. The pressure P_3 then depends solely on the pressure and temperature at 2, in accordance with the law

$$\frac{P_3}{P_2} = \frac{T_3}{T_2},$$

temperatures being absolute temperatures and ignition instantaneous. With P_2 and P_1 given, T_2, of course, depends upon the values of T_1 and the exponent n. Knowing P_3, we may find P_4 from the relation

$$\frac{P_4}{P_1} = \frac{P_3}{P_2},$$

an equation which holds only when the exponent n is the same for both the curves 3 4 and 2 1. But if $P_3V_3^m = P_4V_4^m$, we readily find

$$P_4 = P_3\left(\frac{V_3}{V_4}\right)^m.$$

In order to find the volumes, we note that $P_1V_1^n = P_2V_2^n$, whence $\frac{V_1}{V_2} = \left(\frac{P_2}{P_1}\right)^{\frac{1}{n}}$.

Then $V_1 - V_2 = V_2\left(\frac{P_2}{P_1}\right)^{\frac{1}{n}} - V_2 = V_2\left\{\left(\frac{P_2}{P_1}\right)^{\frac{1}{n}} - 1\right\}$. This yields

$$I = \frac{C}{7.78\,AG\,(n-1)\,(V_1 - V_2)}\left[(P_1 - P_4)\,V_2\left\{\left(\frac{P_2}{P_1}\right)^{\frac{1}{n}} - 1\right\} + (P_3 - P_2)\,V_2\right]$$

$$= \frac{CV_2}{7.78\,AG\,(n-1)\,(V_1 - V_2)}\left[P_2P_1^{\frac{n-1}{n}} - P_1 - P_4\left(\frac{P_2}{P_1}\right)^{\frac{1}{n}} + P_4 + P_3 - P_2\right].$$

It is usually more convenient to find the numerical ratio of V_1 to V_2;

$$V_1 = \left(\frac{P_2}{P_1}\right)^{\frac{1}{n}} V_2 = \text{say } JV_2.$$

Then by substitution in the first formula for I, we find

$$I = \frac{CV_2}{7.78\,AG\,(n-1)\,(V_1 - V_2)}\left\{J\,(P_1 - P_4) + P_3 - P_2\right\}$$

$$= \frac{CK}{7.78\,AG\,(n-1)}\; J\,(P_1 - P_4) + P_3 - P_2\},$$

in which $K = \frac{V_2}{V_1 - V_2}$ is the *clearance*, expressed in proportion of the piston displacement. The analysis may be extended to cases in which the exponents of the expansion and compression curves have different values. A specimen calculation will show that the method is simpler when handled arithmetically than in symbols.

Application to an Automobile Engine

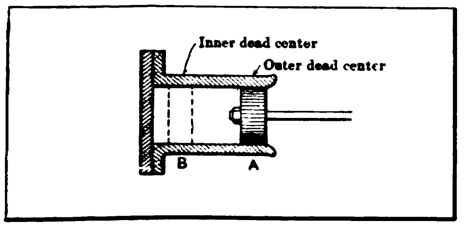


Fig. 2—Sketch indicating position of piston in cylinder at various stages of stroke

Let the fuel be gasoline, its composition being assumed to be C_6H_{14}, and its heat of combustion 22,000 B.t.u. per pound. Let the mixture consist of 38 parts of air to one of gasoline vapor, by volume (the theoretically correct amount of air would be about 46.7 parts), so that $A = \frac{100}{38 + 1} = 2.564$, $B = 97.436$. Let the engine be of the four-cycle, single-acting type; then P_1 may be assumed at about 12 pounds absolute, while T_1 in this class of service may be about 100 deg. F. or 560 deg. absolute. The pressure assumed is in pounds per square *inch*; all pressures will later be converted to pounds per square *foot*. The specific volume of air at any pressure and temperature is given by the formula

$$V = \frac{53.36\,T}{P},$$

which in this instance becomes

$$\frac{53.36 \times 560}{144 \times 12} = 17.29 \text{ cubic feet.}$$

Gasoline vapor is 3.05 times as heavy as air; its specific volume, at the moment when the mixture completely fills the cylinder, is then

$$17.29 \div 3.05 = 5.669 \text{ cubic feet.}$$

The weight of gasoline fed per cubic foot of pistón displacement is then

$$\frac{0.01 \times 2.564}{5.669} = 0.004523 \text{ pound,} \qquad \text{(Equation 1)}$$

and its heat of combustion is (Equation 2)

$$0.004523 \times 22{,}000 = 99.506 \text{ B.t.u.}$$

Tests have shown for the type of engine in question that the value of n for the compression curve 1 2, Fig. 1, may be taken at about 1.28; that for the expansion curve 3 4 may be taken at 1.31. Calling these values n_2 and n_1, the mean effective pressure is given by an expanded form of Equation 3 as

$$H = \left\{\frac{P_3V_3 - P_4V_4}{n_1 - 1} - \frac{P_2V_2 - P_1V_1}{n_2 - 1}\right\} \div (V_1 - V_2).$$

Since $P_1 = 12$, and P_2 in a gasoline automobile engine may be fixed at 75, we find

$$P_1V_1^{n_2} = P_2V_2^{n_2}\ V_2 = \left(\frac{P_1}{P_2}\right)^{\frac{1}{n_2}} V_1 = \left(\frac{12}{75}\right)^{0.781} V_1 = 0.239\,V_1.$$

We then reduce Equation 3 as follows:

$$H = \left\{\frac{P_3V_2 - P_4V_1}{n_1 - 1} - \frac{P_2V_2 - P_1V_1}{n_2 - 1}\right\} \div (V_1 - V_2)$$

$$= \left\{\frac{0.239\,P_3V_1 - P_4V_1}{n_1 - 1} - \frac{0.239\,P_2V_1 - P_1V_1}{n_2 - 1}\right\} \div (0.761\,V_1).$$

To evaluate this, we may assume the maximum temperature T_3 to be about 3,000 deg. absolute (2540 deg. F.). Then

$$\frac{P_3}{P_2} = \frac{T_3}{T_2} \text{ and } P_3 = 75 \times \frac{3{,}000}{T_2}.$$

But by a common law of gases,

$$P_2V_2T_1 = P_1V_1T_2;$$

also

$$P_2V_2^{n_1} = P_1V_1^{n_1}.$$

Combining these two forms,

$$V_2^{1-n_1}T_1 = V_1^{1-n_1}T_2$$

$$\left(\frac{V_2}{V_1}\right)^{1-n_1} = \frac{T_2}{T_1}$$

$$T_2 = T_1\left(\frac{V_2}{V_1}\right)^{1-n_1} = 560\,(0.239)^{-0.28} = 836 \text{ deg. absolute.}$$

Substituting, we find

$$P_3 = 75 \times \frac{3{,}000}{836} = 269.5 \text{ pounds per square inch.}$$

Again,

$$\frac{P_4}{P_1} = \frac{P_3}{P_2},\ P_4 = P_1\frac{P_3}{P_2} = 12 \times \frac{269.5}{75} = 43 \text{ pounds per square inch.}$$

The numerical value of H, the mean effective pressure, is then

$$\left\{\frac{(0.239 \times 269.5) - 43}{0.31} - \frac{(0.239 \times 75) - 12}{0.28}\right\} \div 0.761$$

$$= 62.2 \text{ pounds per square inch.}$$

The same value multiplied by 144 (to reduce to pounds per square *foot*) represents the work done by the engine, in foot-pounds, per cubic foot of piston displacement, and the thermal efficiency is consequently

$$I = \frac{62.2 \times 144}{778 \times 99.506} = 0.1157.$$

Suppose the automobile to be developing an average continuously of 20 horsepower at the cylinder and to be moving at a speed of 22 miles per hour, its rate of work performance will then be $\frac{20}{22} = 0.91$ horsepower-hours per mile. One horsepower-hour is equivalent to

$$\frac{33{,}000 \times 60}{778} = 2{,}545 \text{ B.t.u.}$$

The heat equivalent of the power exerted is then

$$2{,}545 \times 0.91 = 2{,}316 \text{ B.t.u. per mile,}$$

and the consumption of gasoline should be

$$\frac{2{,}316 \div 0.1157}{22{,}000} = 0.91 \text{ pound per mile;}$$

or the machine should travel, with one gallon (5 5-8 pounds) of gasoline,

$$\frac{5\ 5\text{-}8}{0.91} = 6.23 \text{ miles.}$$

Changing the Mixture

Suppose now that by adjustment of the carbureter the engine were given a more nearly correct mixture, say, 44 parts of air to one of gas, so that

$$A = \frac{100}{44 + 1} = 2.213, \quad B = 97.787.$$

The weight of gasoline fed per cubic foot of piston displacement is, then,

$$\frac{0.01 \times 2.213}{5.669} = 0.00391 \text{ pound,} \qquad \text{(Equation 1)}$$

and the heat of combustion chargeable is

$$0.00391 \times 22{,}000 = 86.1 \text{ B.t.u.} \qquad \text{(Equation 2)}$$

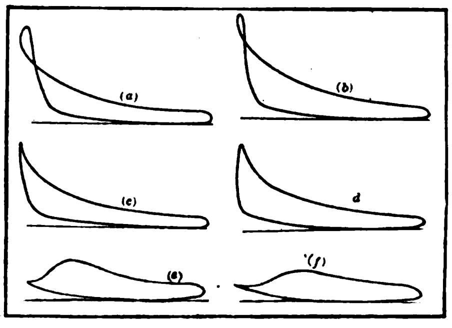


Fig. 3—a, ignition 25 per cent. early; b, ignition 20 per cent. early; c, ignition 16 per cent. early; d, ignition 12 per cent. early; e, ignition 5 per cent. early; f, ignition 10 per cent. late*

If no change be made in our assumption as to maximum pressure, P_3, the mean effective pressure is as before 62.2 pounds per square inch. Theory would warrant the assumption of a higher pressure, P_3, when the air supply is more nearly correct, but in the absence of data in verification of this, we may take the mean effective pressure as certainly not less than 62.2, and the thermal efficiency becomes

$$> \left[\frac{62.2 \times 144}{778 \times 86.1} = 0.134\right].$$

This would make the miles run per gallon of gasoline, under the assumed speed and load conditions, 7.2 instead of 6.23; the efficiency varying directly, and the gasoline consumption inversely, as the proportion of gas in the mixture. As has been stated, this is within the fact.

Altering the Spark

The wastefulness arising from an incorrect spark position is suggested in Fig. 3, which represents the indicator diagrams obtained for various points of ignition. In a, ignition occurs when the piston has only three-fourths completed its return stroke (from A toward B, Fig. 2). In b the spark is a little later, and in c later still. The correct position seems to be attained in d. Here ignition occurs when the return stroke is seven-eighths completed. In e, and more notably in f, ignition is too late; the spark passes after the piston has passed the inner dead center. The area of the indicator diagram is thus much reduced, and since this area represents the work done by the engine, a serious loss of power results. If the engine, when giving the diagram d, with the spark properly adjusted, develops 20 horsepower, it will, when giving the diagram a, develop only 16 horsepower, and the horsepower for diagram f will be only 15. Every variation of the spark from position d decreases the amount of power developed. These decreases, moreover, are *unaccompanied by any decrease in the amount of fuel supplied.* Moving the spark from the ideally correct position is, therefore, always wasteful. Suppose the spark is shifted from position d to position a. The car will no longer make 6.23 miles per gallon of gasoline, but only

$$6.23 \times \frac{16}{20} = 4.86 \text{ miles,}$$

a decrease of 22 per cent.

Throttling

In the ideal cycle of an internal-combustion engine the curves 3 4 and 2 1, Fig. 1, are *adiabatic,* i. e., there is no transfer of heat to or from the mixture while it is working along those curves. In such case, the ideal efficiency is, l standing for the specific heat at constant volume,

$$\frac{l\,(T_3 - T_2) - l\,(T_4 - T_1)}{l\,(T_3 - T_2)} = 1 - \frac{T_4 - T_1}{T_3 - T_2}.$$

But $\frac{T_4}{T_3} = \frac{T_1}{T_2}$, as already found; hence, $\frac{T_4}{T_1} = \frac{T_3}{T_2}$, $\frac{T_4}{T_1} - 1 = \frac{T_3}{T_2} - 1$, $\frac{T_4 - T_1}{T_3 - T_2} = \frac{T_1}{T_2}$, and the efficiency is

$$1 - \frac{T_1}{T_2} = \frac{T_2 - T_1}{T_2}.$$

Since $\frac{P_2V_2}{T_2} = \frac{P_1V_1}{T_1}$, while $P_2V_2^n = P_1V_1^n$ and $P_2^{\frac{1}{n}}V_2 = P_1^{\frac{1}{n}}V_1$, we may write

$$\frac{\frac{P_2V_2}{T_2}}{P_2^{\frac{1}{n}}V_2} = \frac{\frac{P_1V_1}{T_1}}{P_1^{\frac{1}{n}}V_1} \text{ and } \frac{P_2^{1-\frac{1}{n}}}{T_2} = \frac{P_1^{1-\frac{1}{n}}}{T_1}, \text{ or } \frac{T_1}{T_2} = \left(\frac{P_1}{P_2}\right)^{\frac{n-1}{n}}.$$

Also,

$$\frac{\frac{P_2V_2}{T_2}}{P_2V_2^n} = \frac{\frac{P_1V_1}{T_1}}{P_1V_1^n} \text{ and } \frac{V_2^{1-n}}{T_2} = \frac{V_1^{1-n}}{T_1}, \text{ or } \frac{T_1}{T_2} = \left(\frac{V_1}{V_2}\right)^{1-n}.$$

The efficiency may then be written

$$1 - \left(\frac{P_1}{P_2}\right)^{\frac{n-1}{n}} \text{ or } 1 - \left(\frac{V_1}{V_2}\right)^{1-n}$$

It thus depends upon the range of pressure or of volumes during compression and on the value of n.

Now in the actual engine, the curves 3 4 and 2 1 are not adiabatic; the mixture is giving up or receiving heat to the cylinder walls at a rate which is determined by the values of n and the temperature ranges. The heat received along 3 4, in spite of a higher value of n, exceeds that rejected along 1 2, because the temperature range is two or three times greater. The efficiency is thus less than that of the ideal cycle, but the following analysis for the ideal cycle is found to correspond with the results actually attained.

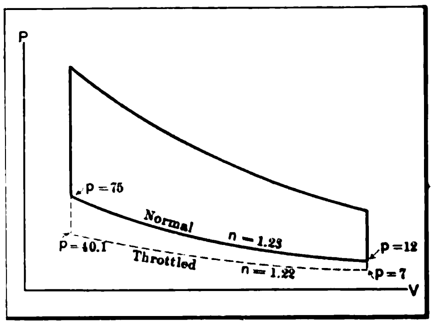


Fig. 4—Normal diagram with dotted lines showing effect of throttling

In an engine once constructed,

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* From Poole's "The Gas Engine," by permission of the Hill Publishing Company.

the value of $\frac{V_1}{V_2}$ is for all time fixed, and if the value of n were also fixed, the efficiency would be constant for all mixtures and pre-compression pressures. It would be independent of the load. But in practice we find the efficiency to decrease at light loads. There is trapped in the cylinder clearance space (which may be as much as 50 per cent. of the piston displacement) at all times a volume of mixture which at each stroke mingles with the fresh charge. This clearance mixture is hot, hotter not only than the fresh charge, but also hotter than the jacketed cylinder walls. When the suction is throttled, the proportion of fresh charge to clearance gas (by weight) is decreased. The whole mixture is, therefore, hotter than it otherwise would be. It consequently loses more heat to the cylinder walls during the compression stroke than it otherwise would lose. Its pressure and temperature at any moment are then less than they otherwise would be; the compression curve is, therefore, a flatter curve, i. e., the value of n is reduced. In the expressions,

$$\frac{T_2 - T_1}{T_2},\ 1 - \left(\frac{P_1}{P_2}\right)^{\frac{n-1}{n}},\ 1 - \left(\frac{V_1}{V_2}\right)^{1-n},$$

the effect of throttling is to decrease the efficiency. Fig. 4 shows the normal and part of the throttled indicator diagrams superimposed, the latter being dotted. Without considering, for the present, the modifications which might arise as the result of throttling on the upper part of the diagram, let us examine the cases in which (a), as in our former illustration, $n = 1.28$, $P_1 = 12$, $\frac{V_2}{V_1} = 0.239$; and (b) $n = 1.22$, $P_1 = 7$, $\frac{V_2}{V_1} = 0.239$. In the former case we have found that $P_2 = 75$, and the ideal efficiency is

$$\frac{836 - 560}{836} = 0.33;\ 1 - \left(\frac{12}{75}\right)^{0.239} = 0.33;\ 1 - (4.19)^{-0.28} = 0.33.$$

In the latter case, the efficiency becomes

$$1 - (4.19)^{-0.22} = 0.27;$$

or, since

$P_2 = P_1\left(\frac{V_1}{V_2}\right)^{n} = 7\ (4.19)^{1.22} = 40.1$, we may also write the efficiency as

$$1 - \left(\frac{P_1}{P_2}\right)^{\frac{n-1}{n}} = 1 - \left(\frac{7}{40.1}\right)^{0.18} = 0.27.$$

The ideal efficiency is thus decreased 6 per cent. by throttling; the miles run per gallon of gasoline, assuming that the actual efficiency is correspondingly decreased, would drop from 6.23 to

$$6.23 \times \frac{94}{100} = 5.85.$$

Summary

It is thus possible to predict not only the normal efficiency, but also that attained under modified conditions of mixture, spark position and throttle opening. The importance of a proper mixture and the economy of a wide-open throttle are shown, and the wastefulness resulting from unnecessary adjustment of the spark is clearly illustrated.

Vogue of Small Automobiles in Europe

By W. F. BRADLEY

The economical figure for automobiles in Europe seems to be $500; the commercial traveler and the doctor use the diminutive car; single-cylinder motors are preferred; the stroke is relatively long; belt-drive shown in one instance; simplicity is regarded as a companion to convenience of location in these types of cars.

WITH a view to bringing out the trend of the industry in France and England, resort has been had to the camera, and among the illustrations here afforded is ample evidence of the manner in which the question of economy is coupled with utility.

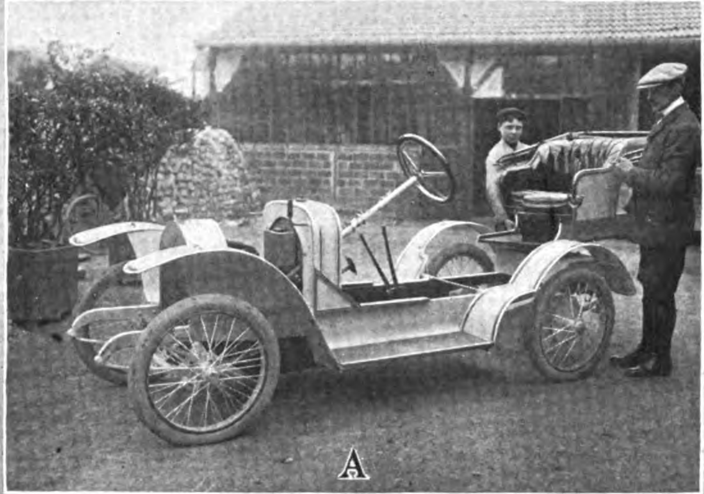
Both France and England are keenly interested in the economical automobile. The economical figure for the European is $500, or not more than $600, all complete for the road. And for this moderate price the Easterner wants something more than a toy; his automobile must be capable of carrying two persons at a fair clip; it must be simple, reliable, cost little to maintain, and, in externals, at any rate, conform to established big car lines. There have been numerous attempts to fill the difficult position, and although some of the designs have been good, they have generally failed through indifferent construction, or by inattention to details.

One of the most promising of these diminutive automobiles intended for the commercial traveller, the doctor, and the man who cannot afford to run a big car, is the Forster, produced by an Englishman resident in France. The automobile, which can be marketed complete for a fraction over $500, has an armored wood frame giving a wheelbase of 84 inches and a track of 40 inches. It is mounted on wire wheels, shod with 700 by 85 tires, has semi-elliptic springs all round, the motor is carried under a bonnet forward, with the gilled tube radiator directly over the front axle, the gasoline tank is on the dash, oil tank under the bonnet, and, so far as its external appearance is concerned, is as graceful a vehicle as any large car yet produced.

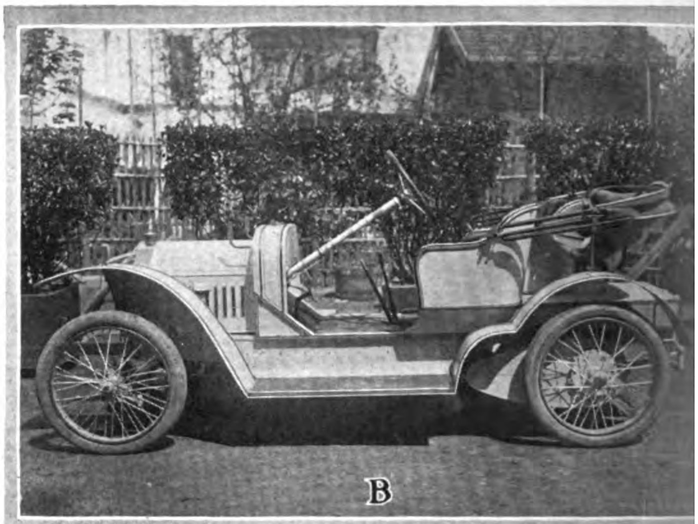
There is nothing distinctive about the power plant: on the ordinary models it is a single-cylinder 7-horsepower Anzani or Aster, and on the semi-racing type a two-cylinder Anzani of 15-horsepower. The motor is placed across the chassis, thus making it necessary to crank from one side; the cranking handle is entirely hidden from view. This disposition of the motor is necessary on account of transmission by belt. A broad pulley is carried on the motor shaft and connection made by a long belt with the countershaft, providing two forward speeds and neutral, with final drive taken by single side chain running in an oil-tight casing. There is no clutch, no differential and no gearbox, as that organ is generally understood.

The driver declutches by means of the usual type of pedal, but this operation results in sliding forward the whole of the rear axle, thus slackening off the belt. The necessary movement of the axle is obtained by the use of long spring shackles hanging from a transverse tube projecting from each side of the chassis frame. This length of shackle allows the whole of the axle to be moved ahead far enough to free the belt. Naturally the countershaft has to move with the axle, so that the tension of the chain is never varied, and for further facility the change-speed lever and brake lever are also carried ahead, being mounted on the same frame as the countershaft. As the brake lever operates the rear-wheel brakes through cables it does not become inoperative with the changing position of the axle, the same relative distance always being maintained. Advantage is taken of this movement of the rear axle and countershaft to obtain a very simple brake. Immediately ahead of the driven pulley is a wooden brake block mounted to two transverse frame members. As it is moved forward, still driven by the road wheels and single chain, the pulley is brought in contact with this block and a braking effort obtained in proportion to the pressure exerted on the pedal.

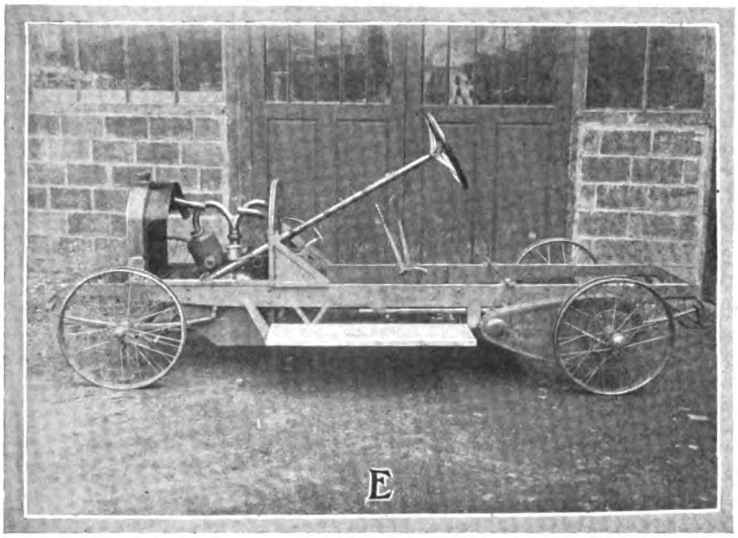
A complete under-pan assures the belt working under ideal conditions; a plank placed immediately under its upper length causes it to drop away from the pulleys on "declutching," and the absolutely oil and dust-proof chain case gives complete protec-



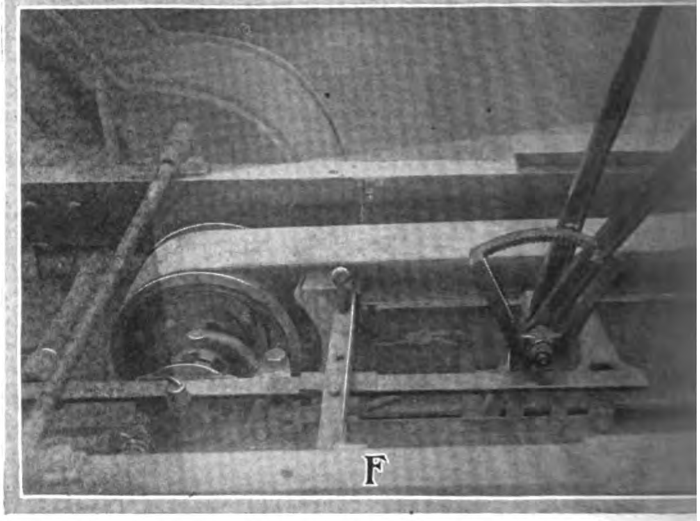
A—Forster light car. Body can be lifted off in 10 seconds without any tools



B—Forster light car, in complete touring trim, as delivered to a Paris doctor



E—Racing type of Forster light car. Stripped chassis. Capable of 50 miles an hour.



F—Forster light car. Belt drive and two-speed gear. Final drive by single side chain

tion to all moving parts. As a matter of fact, there is less exposure to dust and moisture on this cheap little car than on many a $5,000 production. There are only two speeds, obtained by two dog clutches on the countershaft, the high gear giving a direct drive through from the motor to the locked countershaft, and the second clutch giving a suitable reduction. Ball bearings are used everywhere except in the motor; that is to say, on the four road wheels and in the countershaft, the only moving parts. There is no reverse, this not being required under the French law for a car weighing not more than 770 pounds; but in view of the added convenience the designer is about to fit one, to be worked off the same lever.

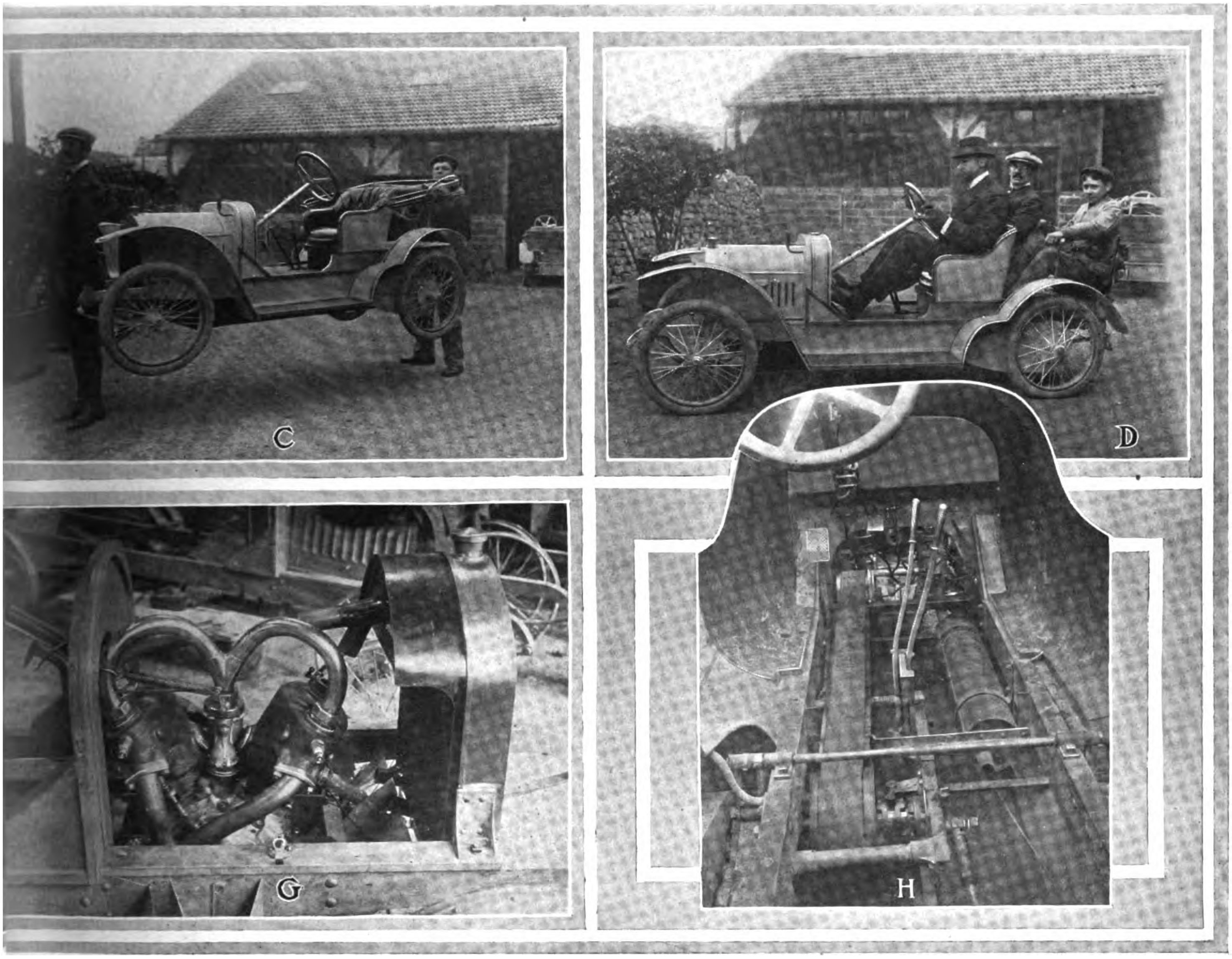
Speed is only a question of the motor and the most suitable gearing, the belt being able to take care of any power. On the standard model, with the 7-horsepower one-lunger, 30 miles an hour can be maintained on the level. With the two-cylinder Anzani and a change of the driving sprocket, the car can do well over 50 miles an hour on the level. For this fast work the bonnet is made lower than usual, the steering column is more inclined and longer, with a very large wheel, for there is no gearing between steering wheel and road wheels.

A 40-inch track leaves little room for two seats side by side, and with a view to comfort the designer of the car has placed the passenger's seat a little to the rear of that occupied by the driver; thus the elbows of the one do not interfere with the other. There is even a third folding seat in the rear, but as this is not intended to be regarded as such by the French fiscal authorities, it is folded away except when wanted for emergency passenger carrying. As a try-out of his car, the designer undertook a three weeks' trip through Algeria, which might be considered as the European equivalent of a coast-to-coast run. He came back convinced that he had got hold of the right idea for a light, speedy, and economical car.

Two models are produced, one with the steering wheel on the left and levers in the center, for countries where the rule of the road is the same as in America, and another one with the wheel on the right, for use under the English rule of the road.

Large Flywheel Used on Small Motors

It will be understood that flywheel effect is as necessary as the motor from a certain point of view. Not so long ago it was the choice of a certain class of designers to reduce weight of the flywheel to the greatest possible extent, and in six-cylinder motors it was claimed that almost no flywheel effect is necessary. Experience has shown that a large flywheel is efficacious as a power storage medium, and that it has a value over and above the mere matter of helping the motor to complete its cycle.



C—Forster light car. Weighs about 770 pounds, all included

G—Forster light car, with this two-cylinder Anzani motor, can do 50 miles an hour

D—Forster light car. Room for a third person at the rear

H—Forster light car, showing belt transmission and final drive by single side chain

Valve Action and Other Influences for Efficiency

MANY autoists find that the cars they drive after they run for a time become mysteriously unruly, and, despite their earnest effort, fail to respond to the remedies applied. When a motor shows evidence of weakening, the autoist immediately arrives at the conclusion that his ignition system is out of order, because to him there is more mystery in an ignition system than in anything else, and his reasoning power becomes befogged by the weight of negative evidence thus afforded. If, in the course of investigation, the autoist is able to determine to his own satisfaction that the ignition system is in good working order, his attention next lights on the carbureter, and if after "tickling" the same to make it spew an excess of gasoline, the process does no good, it is in order to tamper with the adjustments long enough to make sure that the automobile will not run at all.

Strength of Valve Springs Must Be Watched

It would be more to the point to find out if the parts are all present, and if they are properly related to each other. A wobbling joint, or a nut lost off of a bolt head, or a dozen and one other mechanical derangements, including a plugged-up passage-way, might account for all the trouble, but there are other possibilities that are harder to find, hence the mystery in many cases.

Few indeed are the problems that have to be solved that are more troublesome to the operator of a car than the one involving the strength of the valve springs. If they are too strong, the cams and lifts will be damaged too soon, but if they are not strong enough, the timing will get out of order. It is not generally recognized that timing a motor is only a partial process, on account of the fact that the mechanism is only positive in one direction. True, the cam lifts the valve off of its seat at a set time, but the spring placed to close the valve is not positive. If the spring is "lazy" the angular rotation of the camshaft will be increased to excess before the valve will be pressed against the seat. On account of the structural changes that springs undergo it is impossible to so design them that they will be just right for the work to be done all the time, and it is the practice among makers to employ over-strong springs in new motors, with the expectation that they will never weaken to a point where they will fail to serve for the purpose.

The chances are that the pressure should be about 40 pounds per square inch between the valve and the seat, and that it will remain so at all times is highly improbable. If the spring is strong enough to withstand the work without mechanical or structural deterioration independent of the effect of heat, it only remains to so place the same that its temper will not be drawn by the heat. Unfortunately springs are required to work up to the limit of their fiber ability, and they are likely to undergo some change from this account. Then the heat is enough in many examples to anneal the metal so that some weakening is to be expected from this cause.

It would be good work were the springs placed to close valves capable of doing so within a rotation of 20 degrees of the camshaft. The angular travel of the camshaft is frequently more than 40 degrees. The method of calculating for this angle is given as follows:

Let,

θ — Angle of camshaft rotation during the closing of the valve under the action of the valve spring.

S — Speed of the camshaft in revolutions per minute.

W — Weight of valve in pounds.

P — Mean pressure of the spring in pounds.

1 — Lift of the valve in inches.

When,

$$\theta = \sqrt{\frac{.1\,(S\,W)^2\,W}{0.67\,P}}$$

While noise is the normal expectation if the spring does not work properly, it is believed that the most noise comes from weak springs rather than when the pressure is excessive. To withstand the pressure the parts, as the roller, pin, cam-face and ends of the rods, must be of close-grained metal and well hardened—this is not always the case.

Altitude Influences Radiator Action a Little

The factor of safety required in a radiator for an automobile must be subdivided (a) from the mechanical strength point of view, and (b) considering the capacity of the radiator to do the work required of it. The condition (a) is not easy to settle; experience will have to be the guide to a large extent. That the radiator should be flexibly mounted is one of the settled conditions. The question of capacity and the margin to allow against unusual demands, is capable of being disposed of to quite some extent. Altitude, for illustration, has its effect as follows:

BOILING POINT OF WATER AT VARIOUS ALTITUDES.

Feet Above Sea Level	Boiling Point in Deg. F.
Sea Level	212
1,025	210
2,063	208
3,115	206
4,169	204
5,225	202
6,304	200
7,381	198
8,431	196
9,579	194
10,685	192

Sediment and incrustation also have to be allowed for, and the chances are that radiators will depreciate in ability about 33 per cent. within a single year. This depreciation will probably reach a maximum within the stated time, excepting in the cases where lack of attention is at the bottom of the trouble. There is no way of determining what to allow for such cases. Radiators that do not "steam" will surely reach a stable level if the water used is reasonably free from foreign substances. So little water will have to be added in a year that all the sediment that can get into them will be very limited. Unfortunately, a very slight coating of sediment or scale will have a large effect, and 33 per cent is a fair allowance.

In filling a radiator it is wrong to supply so much water that there will be no free space; water swells when it is heated in a cooling system, owing in part to the increase in the temperature, but for the most part owing to the presence of steam.

New Two-Cycle Motor with Rotary Intake Valve

By W. F. BRADLEY

A prominent French engineer, Georges Deloche, is responsible for the design of the two-cycle motor here illustrated; it has four vertical cylinders with copper water jackets; ignition is by high tension magneto; the crankshaft has five bearings; exhaust ports are uncovered by the piston on the down stroke; the peculiarity of the motor is due to the use of rotary valves carried in the position usually occupied by the camshaft.

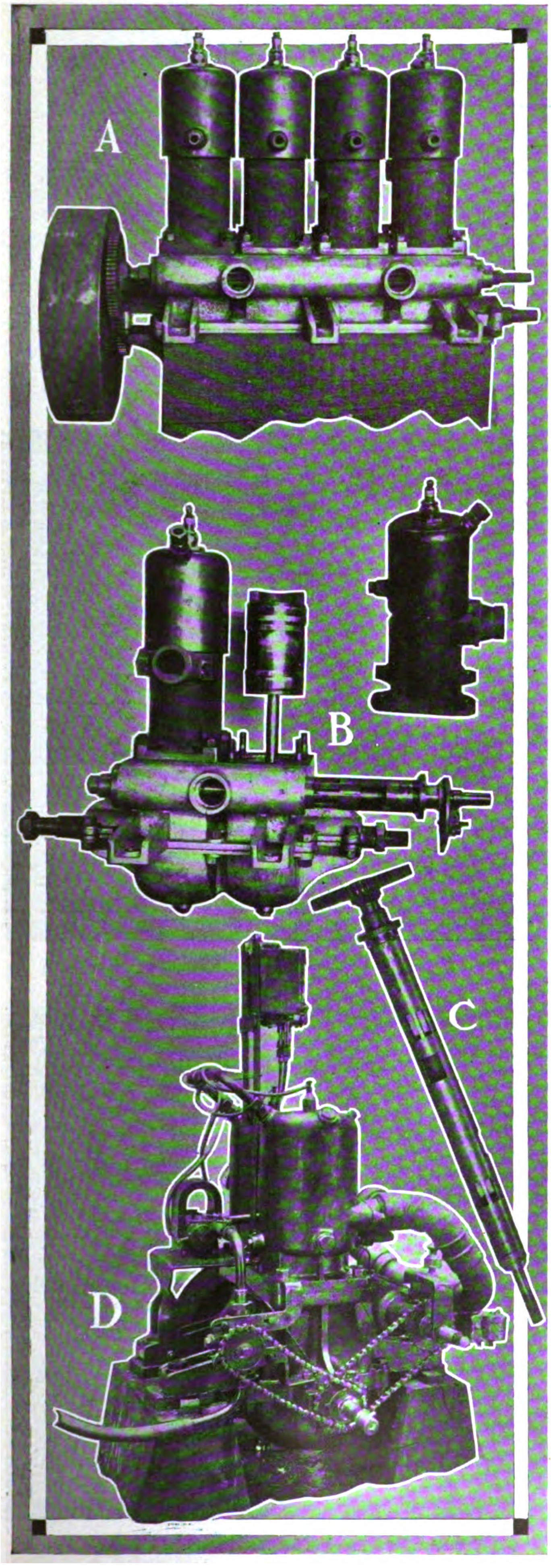
INTEREST in two-cycle motors, while it has been tame at times, persists, nevertheless, and the impetus which has been given rotary types of valves of late is having its influence upon the two-cycle motor quite as much as it modifies the ideas which are dominant in connection with four-cycle efforts. A two-cycle motor with a rotary intake valve has been placed on the market by the French engineer, Georges Deloche. In all but one feature the motor conforms to standard practice. It has four vertical cylinders of 3.9 inches bore and 5.5 inches stroke, with copper water jackets, pump circulation, ignition by high-tension magneto, a five-bearing crankshaft and exhaust through a port uncovered by the piston at the end of its downward course.

The peculiarity of the motor is that a rotary valve is carried in the position usually occupied by the camshaft on a four-stroke motor, and like this, is driven by spur gears from the main shaft. The rotary valve is a rather large-diameter hollow shaft, provided with six openings or ports. Two of these extend entirely round the circumference of the shaft, leaving just the necessary amount of metal required for strength, while the four others are of smaller dimensions. The two large openings communicate with the intake piping and at all times provide a free opening from the carbureter to the interior of the shaft. The four smaller openings each correspond with an intake port, admitting to the interior of the four separate crankcase divisions. On the upstroke of the piston the openings in the rotary valve correspond with the intake ports, allowing a charge to be drawn in through the hollow shaft and compressed within the crankcase against the closed valve, on the downward course of the piston. As in the majority of two-stroke motors, a by-pass is provided, by which the charge already compressed in the crankcase can be passed into the combustion chamber on the port being uncovered as the piston nears the end of its stroke.

The same principle applies to a two-cylinder model, the rotary valve in this case, however, having but three openings, one in constant communication with the carbureter, and the two others giving admission into the crankcase division at each revolution. On the single cylinder model the inventor makes the crankshaft fulfill the functions of rotary valve. The shaft is hollow, and is cut away for a portion of its circumference to give a free opening from the intake pipe; the charge passes through an intake port in the crankcase, to the interior of the case, where compression takes place on the downward stroke of the piston.

In the illustrations on the opposite page, A shows the Deloche 4-cylinder, 2-cycle motor, with intake ports and rotary valve; B, the same, with cylinder dismounted and rotary valve partially withdrawn; C, rotary valve; D, 2-cylinder, 2-cycle motor of same make; E, 4-cylinder, 2-cycle motor, exhaust side; F, cylinder and piston of same; G, crankshaft; H, connecting rod; I, side elevation of the 2-cycle motor.

There is no doubt about the desire on the part of French designers to travel in the direction of simplicity, and the great aim beyond the matter of ease of repair lies in the high cost of fuel. Small motors, then, are looked upon with a longing eye, and they favor the two-cycle plan.


A
B
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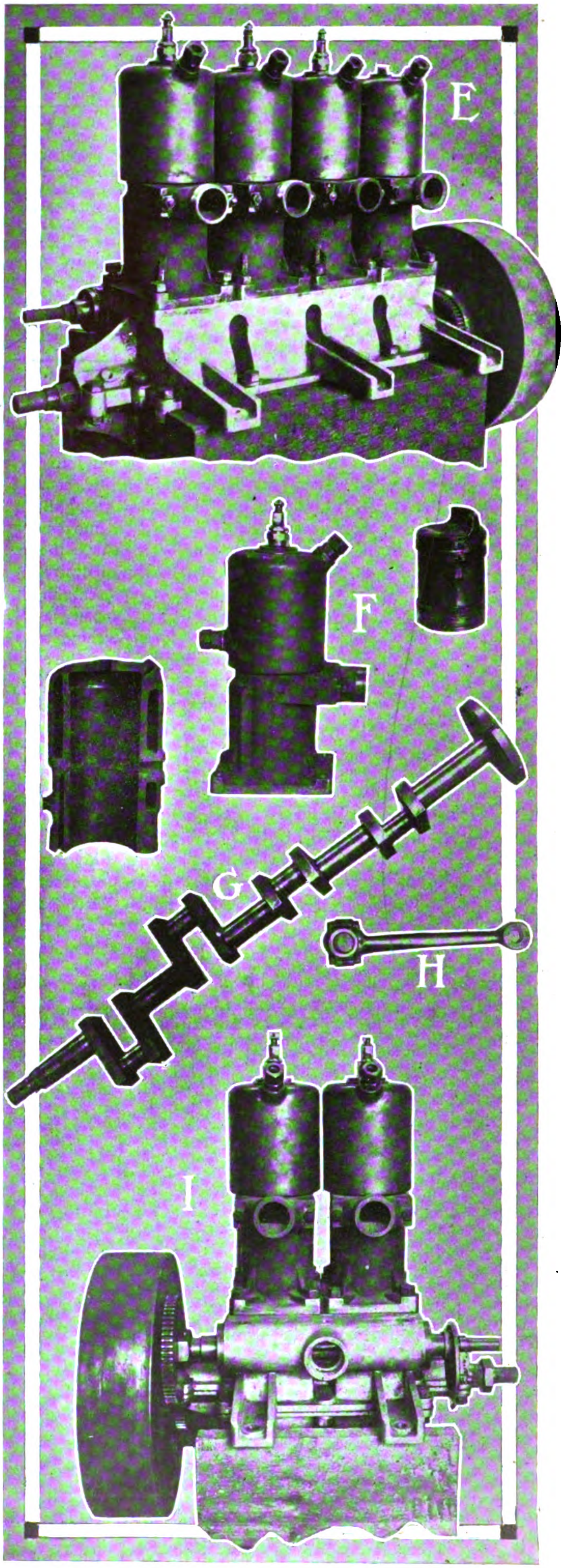
D


E
F
G
H
I

Foreign Armies Quitting the Horse

By W. F. BRADLEY

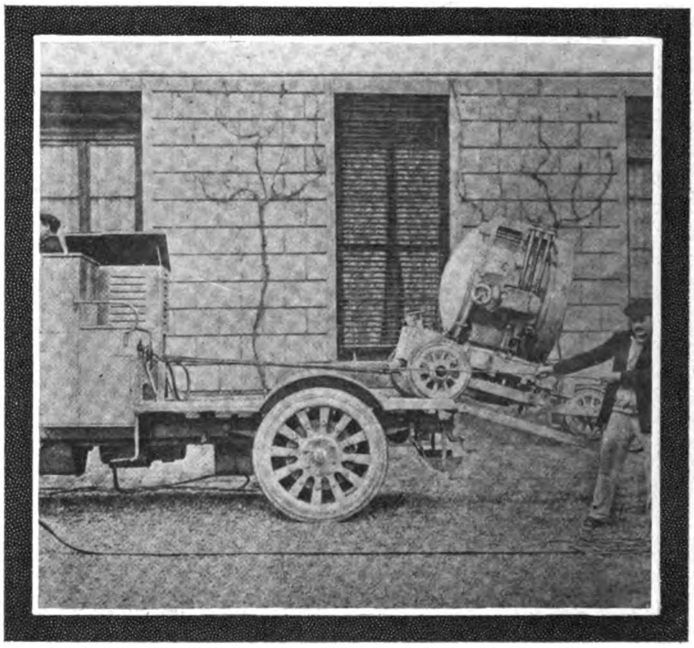
Horse-drawn vehicles being abandoned for searchlight equipment transportation; generating plant consists of dynamo and a gasoline motor to drive it; searchlight comprises another unit; chassis rolls on solid rubber tires; pneumatic control of the searchlight eliminates some troubles; projectors may be removed to ground in some models; methods for convenience and quick action shown.

ARMY organizations in Europe are keyed up to the highest pitch all the time, and the earnestness with which the automobile is taken advantage of there is a matter which may well be looked into in this country, not only on account of the advantages offered in the way of better military efficiency, but in view of the attraction which a new field has for the makers of automobiles.

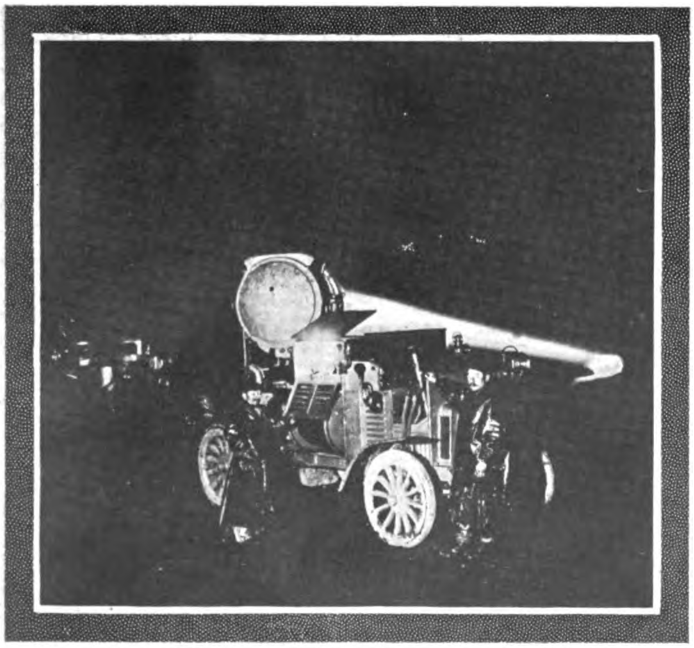
The horse has had to give way to the motor in another branch of army work. Up to the present, portable searchlights have been carried on horse-drawn vehicles, the generating plant, consisting of a gasoline motor and dynamo forming one unit, and the searchlight forming another and independent outfit. Each unit was carried on a separate vehicle. To be put into service the two units had to be connected, obviously, with a certain loss of time; and they could never send an investigating flash of light across the country when the vehicle was in movement on the highway. Even with six horses for each vehicle the outfit was not moved with all the rapidity that could be desired.

In future French troops will use a motor-driven searchlight, of a model produced by the De Dion Bouton Company and the Breguet concern, and officially adopted after searching tests by the staff officers. There is now no possibility of a failure owing to one of the vehicles getting astray, for the electricity producing plant and the projector form one unit and are self-propelled. The automobile portion of the apparatus consists of an 18-horsepower De Dion chassis suitably strengthened for the work it will have to perform, and fitted with a four-cylinder motor carried under the driver's feet. The chassis is mounted on single solid rubber tires in front and twin solids in the rear. The gear set gives three speeds forward and reverse, with a maximum of 20 miles an hour under full load on a level highroad, and an ability to climb grades of 15 per cent. Gasoline consumption works out at the rate of 10 miles to the gallon. Drive is taken through plate clutch, three-speed gear box and transverse cardans to the road wheels. Besides the rear wheels the motor also drives the dynamo mounted on the main shaft, either with the vehicle in motion or in a stationary condition. The entire electric outfit is arranged immediately to the rear of the driver's seat, the electrician sitting with his back to the driver, and in this position having in hand the entire control of the searchlight.

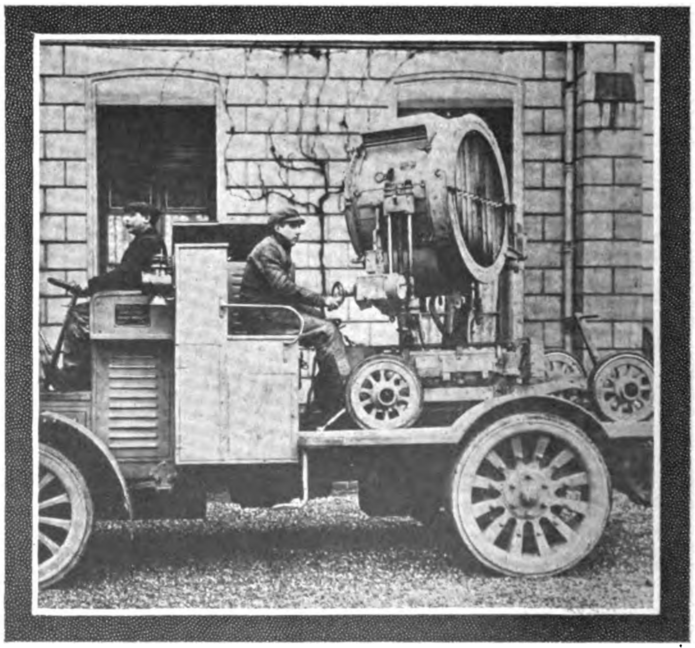
Three-quarters of the body area to the rear of the driver is left free to receive the searchlight, a Breguet instrument, the reflector of which has a diameter of 36 inches and flashes a light equal to 7,000 Carcel lamps. The projector is carried on two spring-supported forks attached to a circular track, thus allow-



Lowering the searchlight from automobile truck



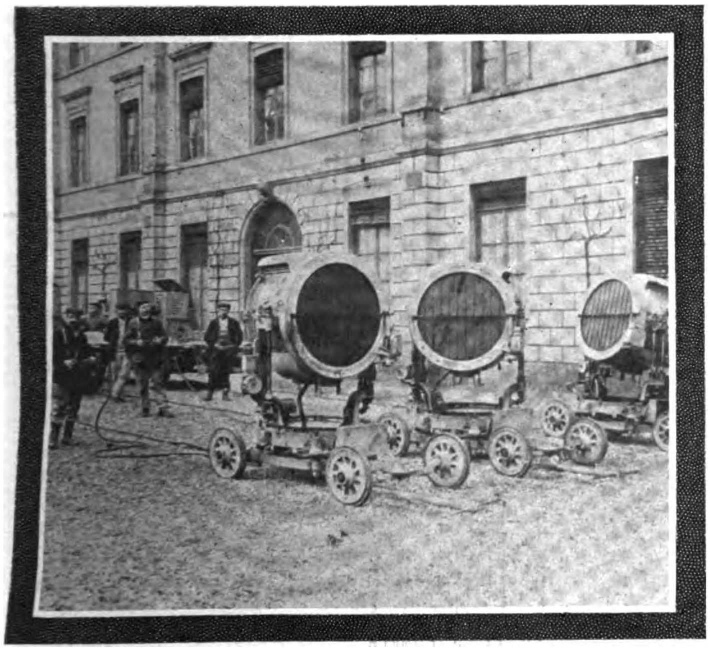
French army automobile searchlight in action



Projector raised in position for operating on the road ing for free movement in every direction. The carriage is mounted on a four-wheeled bogie, the front wheels of which are pivotable and the whole specially designed to be received on the platform of the truck. When not in use the projector is lowered until it is well within the carriage, thus keeping the center of gravity low. If the projector is to be used on the road, it can be quickly raised by hand and the glare of the lamp flashed on any object even with the vehicle in motion.

When the automobile has been brought to a stop, the 18-horsepower motor is used exclusively for driving the dynamo. The apparatus may be operated either from the platform of the truck or with the projector taken down to the ground. The operation is a simple one, requiring the services of two men only; by means of an inclined platform attached to the rear of the truck, the bogie is run down to the ground under the control of a hand-operated winch. The electric cable supporting the current is wound on a drum, and on the projector being brought to the ground is automatically unwound for a maximum length of 100 yards, thus allowing the searchlight to be maneuvered into the most favorable position for operating while the motor continues to drive the dynamo only.

As the operation of a powerful searchlight at close quarters is very trying for the eyes, the instrument has been provided with a system of pneumatic control allowing the projector to be turned in any direction or placed at any angle while the operator is 15 to 20 yards in the rear. When the operator is working the searchlight from the motor vehicle the control is direct and by hand.



Projectors in position for operation. Compressed air control

Information About Air for the Autoist

(1) To find the quantity of nitrogen by volume corresponding to one volume of oxygen, multiply by 3.77092.

(2) To find the quantity of oxygen by volume corresponding to one volume of nitrogen, multiply by 0.265182.

(3) To find the quantity of nitrogen by weight corresponding to one part by weight of oxygen, multiply by 3.313022.

(4) To find the quantity of oxygen by weight corresponding to one part by weight of nitrogen, multiply by 0.301839.

(5) To find the quantity of nitrogen by volume corresponding to one part by weight of oxygen, multiply by 2.6365411.

(6) To find the quantity of oxygen by volume corresponding to one part by weight of nitrogen, multiply by 0.2730071.

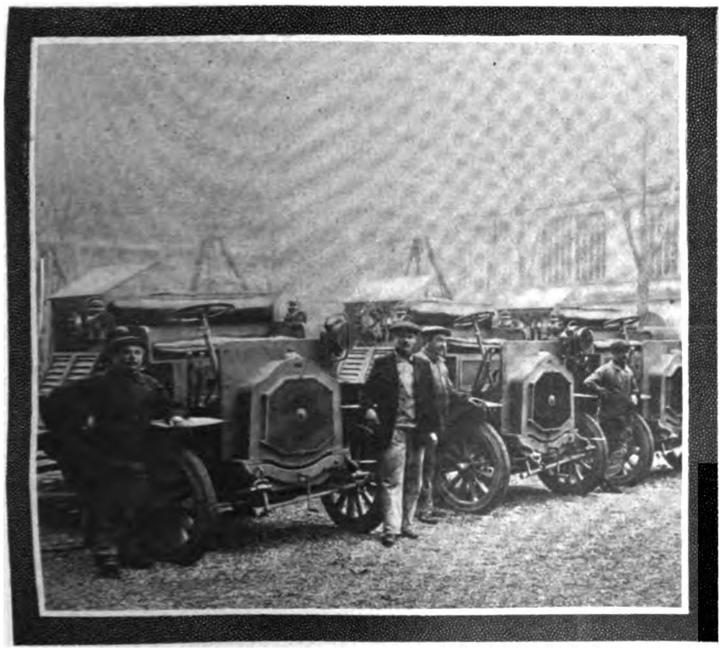
(7) To find the quantity of nitrogen by weight corresponding to one part by volume of oxygen, multiply by 3.6629154.

(8) To find the quantity of oxygen by weight corresponding to one part by volume of nitrogen, multiply by 0.3792848.

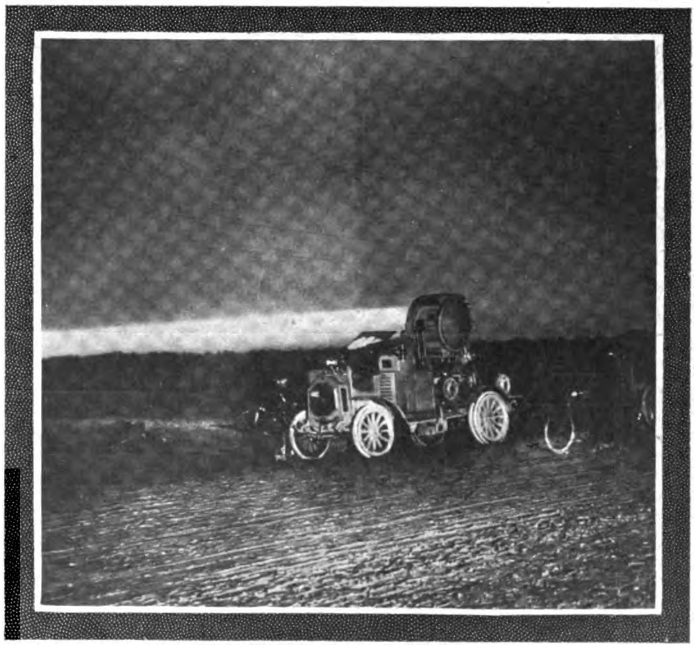
Producer-Gas Offers Certain Promise

In a certain class of freighting work involving the use of tractors and a train of cars, it is just possible that producer-gas will take the place of gasoline. The average gas of this character from anthracite coal has a thermal value of about 135 British thermal units of heat, and the various constituents by volume are:

Carbon dioxide, CO_2, 6 per cent. Carbon monoxide, CO, 24 per cent. Hydrogen, H, 15 per cent. Nitrogen, N, 55 per cent. Hydrocarbon, CH_4, trace. Oxygen, O, trace. Producers may be made in quite compact form and the fuel required per hundred miles of travel is not so much that it would more than serve as ballast for the tractor.



Army automobile searchlight trucks



Night photograph of French army automobile searchlight in action

$$\frac{210.15-27.29}{226} = 0.808,$$

Whence $n = 0.368 \times 0.808 = 0.296$. The entropies of vaporization are

$$\frac{305.04}{305 + 460} = 0.400, \text{ at 150 pounds pressure,}$$

$$\text{and } \frac{432.97}{79 + 460} = 0.808 \text{ at 1.27 pounds pressure.}$$

In an ideal vapor cycle using a vapor intially dry, the dryness at the end of expansion is computed by a familiar formula of thermodynamics,

$$n_2 - n_1 + N_2 = xN_1,$$

in which the symbols n refer to liquid entropies, N to entropies of vaporization, and the subscripts 1 and 2 to the lower and upper pressure limits respectively. We have, then, for alcohol,

$$0.296 + 0.400 = 0.808\, x$$

whence $x = 0.862$: and for steam

$$0.5142 - 0.1471 + 1.0550 = 1.8082\, x$$

whence $x = 0.79$.

The efficiency of this ideal cycle is expressed by the formula,

$$(h_2 - h_1 + L_2 - xL_1) \div (h_2 - h_1 + L_2),$$

in which the symbols h stand for heats of liquids, and L for latent heat of vaporization; the subscripts having the same significance as before. This leads to

$$\text{Ideal efficiency with steam} = \frac{330.2 - 77.94 + 863.2 - (0.79 \times 1030)}{330.2 - 77.94 + 863.2} = 0.271,$$

and with alcohol =

$$\frac{210.15 - 27.29 + 305.04 - (0.862 \times 432.97)}{210.15 - 27.29 + 305.04} = 0.235$$

The comparison is distinctly unfavorable to alcohol, and the reason is not far to seek. Ideal efficiency is increased as the temperature range is increased. In establishing the same pressure limits for both steam and alcohol, we have necessarily fixed the temperature range at 79 degrees Fahrenheit to 305 degrees Fahrenheit for the latter and 110 degrees Fahrenheit to 358 degrees Fahrenheit for the latter. The steam works through 248.5 degrees Fahrenheit and the alcohol through 226 degrees Fahrenheit.

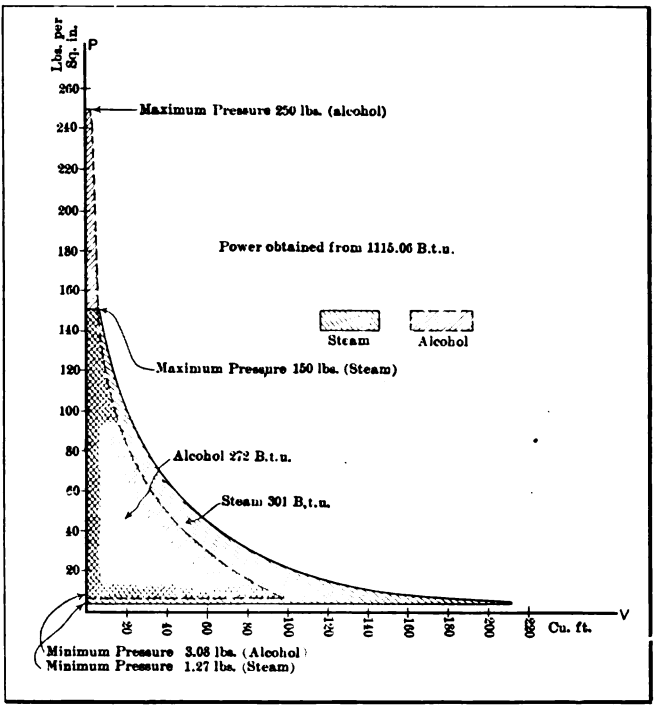


Fig. 4—Power diagram drawn to show the pressure per square inch under different conditions involving alcohol and steam

The Choice of a Fluid

While alcohol, ether, sulphur dioxide or gasoline have the advantage arising from a low boiling point in decreasing the lower temperature limit without making excessive demands upon the vacuum pump, that very fact leads to the disadvantage of a high pressure at the upper limit of temperature: which can be escaped only when the variation of pressure with temperature is much less rapid than is the case with steam. The following table shows how various substances compare in this respect:

Temp., deg. F.	Corresponding pressure at the boiling point, lbs. per sq. in.						
	Ethyl Alcohol	Gasoline	Ether	Acetone	Chloroform	Carbon Bisulphide	Steam
113	3.35	8.20	21.0	10.0	8.79	14.3	1.38
248	62.9	54.6	150.	88.5	76.5	100.3	28.8

All of these substances permit of a lower exhaust temperature than can be obtained with steam, either condensing or non-condensing; but all of them also give at even as moderate a temperature as 248 degrees Fahrenheit, a pressure considerably in excess of that necessary in the steam engine. The question of mechanical design for higher pressures has already become sufficiently troublesome to limit the development of the steam engine in that direction. A slight gain in thermal efficiency at a cost of a serious jump in pressure would not be worth considering. The only substitute for steam seems to be in the direction of the binary vapor engine, in which the binary fluid will never be worked at high pressure.

Removal of Upper Pressure Limit

While the comparison is not fair, and has little practical bearing, it is interesting to note what results follow the adoption of 358.5 degrees Fahrenheit as the upper temperature limit in the case of the alcohol engine just considered. (It is to be noted that the lower temperature limit remains unchanged.) The latent heat of vaporization at 358.5 degrees Fahrenheit is 276; the heat of the liquid is 264; the pressure approaches 250 pounds per square inch. (We have extrapolated values only for the thermal properties at this temperature.) The difference of liquid entropy between 79 degrees and 358.5 degrees is, very nearly,

$$\frac{264 - 27.29}{358.5 - 79} \log \epsilon \frac{358.5 + 460}{79 + 460} = \frac{236.71}{279.5} \log \epsilon \frac{818.5}{539}$$

$$= 0.849 \times 2.3 \log 1.52 = 0.356.$$

The entropy of vaporization at 358.5 degrees Fahrenheit is

$$\frac{276}{358.5 + 460} = 0.338.$$

The dryness at the end of adiabatic expansion comes from

$$0.356 + 0.338 = 0.808\, x \text{ as } x = 0.694 \div 0.808 = 0.86$$

The efficiency of the alcohol vapor cycle between 358.5 degrees Fahrenheit and 79 degrees Fahrenheit is then

$$\frac{264 - 27.29 + 276 - (0.86 \times 432.97)}{264 - 27.29 + 270} = \frac{512.71 - 372}{512.71} = 0.274,$$

slightly greater than that of the steam cycle with the same upper temperature limit and same lower pressure limit; but the alcohol engine must stand 250 pounds pressure and the steam engine only 150 pounds. Considering the temperature limits as fixing the ideal efficiency, the steam cycle is the better of the two, for it gives practically the same efficiency, although working with a temperature range 31 degrees or 11 per cent. less.

Identical Temperature Limits

Suppose we compare steam and alcohol, both working between 358.5 degrees Fahrenheit and 110 degrees Fahrenheit. The potential efficiency is the same in both cases,

$$\frac{358.5 - 110}{358.5 + 460} = 0.304$$

For alcohol, at 110 degrees Fahrenheit, the pressure is 3.14

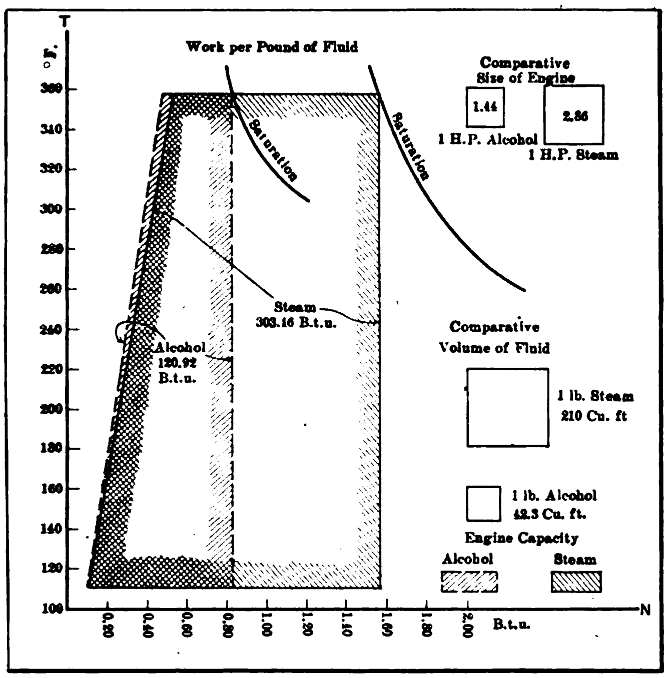


Fig. 5—A construction used in making a comparison between alcohol and steam, giving the relative sizes of engines

pounds, the heat of the liquid is 46.58, and the heat of vaporization is 426.22. The difference in liquid entropy between 110 degrees and 358.5 degrees Fahrenheit is

$$\frac{264-46.58}{358.5-110}=\frac{358.5+460}{110+460}\log_{\epsilon}=\frac{217.42}{248.5}\log_{\epsilon}\frac{818.5}{570}=$$

$$0.878 \times 2.3\ \log\ 1.437=0.32$$

The dryness at the end of adiabatic expansion is

$$(0.32+0.338)\div\frac{426.22}{110+460}=0.876,$$

and the efficiency of the alcohol cycle is

$$\frac{264-46.58+276-(0.876\times 426.22)}{264-46.58+276}=0.245,$$

against 0.271, as already found for the steam cycle.

Additional Considerations

In the comparison last made, the work obtained from one pound of fluid is given by the numerator of the efficiency expression: For alcohol, it is 120.92 B.t.u., and for steam, 303.46 B.t.u. The engine cylinder must be sufficiently large to hold one pound of fluid at the lowest pressure attained in the cycle in order that these amounts of power may be exerted by the one pound in each case. The volumes are obtained (approximately) by multiplying the volume of one pound of dry vapor at the lowest pressure by its dryness after adiabatic expansion. This gives, for steam, $265.5 \times 0.79 = 210$, and for alcohol, $48.238 \times 0.876 = 42.3$; the first figures of each product being tabular specific volumes. The ratio of

$$\frac{\text{work per pound of fluid}}{\text{volume of cylinder per pound of fluid}}$$

is then, for steam, 1.44, and for alcohol 2.86. An engine of given size, operated with alcohol, will then develop about twice the amount of power that will be developed when steam is used as a fluid. An extension of this calculation will show that the higher pressure necessary in a practical alcohol engine might be partially offset, so far as its influence on first cost is concerned, by the smaller size of cylinder necessary.

Again, the amount of heat to be abstracted by condensing water is given by the last term of the numerators of the efficiency expressions. For steam, this is $0.79 \times 1030 = 813$; for alcohol, it is $0.876 \times 426.22 = 375$. The ratios of these quantities to power developed are,

$$\text{for steam, } 813 \div 303.46 = 2.69;$$
$$\text{and for alcohol, } 375 \div 120.92 = 3.10.$$

The alcohol will require more cooling water per horsepower in the ratio of 3.10 to 2.69; say 15 per cent. more; and the necessary size of condenser will be correspondingly increased.

Conclusions

Some of the results of these computations are shown graphicacally in Figs. 4, 5 and 6. In the first, we have the ideal indicator diagrams obtained from alcohol and steam working betweeen 358.5 degrees Fahrenheit and 110 degrees Fahrenheit. The maximum pressures are shown as 250 and 150 lbs., and the minimum as 3.08 and 1.27 lbs., respectively. Our computations gave a work area of 301 B.t.u. with steam when the total heat supplied was 1115.06 B.t.u. Reducing the work obtained from alcohol to the same basis of heat supplied, we obtain 272 B.t.u. The two shaded areas of Fig. 4 then represent the relative efficiencies of the two fluids with identical temperature limits.

Fig. 5 shows the entropy diagrams for the two ideal cycles. Here the work areas obtained *per pound* of fluid are given as 120.92 and 303.46 B.t.u. The difference in specific volumes at the lower temperature limit (indicated by the two squares in the lower righthand corner of the diagram) leads, however, to a greater output from a given cylinder when supplied with alcohol than when supplied with steam; or, as represented by the squares in the upper righthand corner of the diagram, the steam engine of a given horsepower is twice as large as the alcohol engine.

Fig. 6, again, shows the heat to be removed by the cooling water per pound of fluid; b j e a for alcohol, b i h a for steam. The lesser amount of work obtained from a pound of alcohol, however, offsets this and leads to the result shown; the condenser for alcohol must be 15 per cent. larger, and the amount of cooling water supplied must be 15 per cent greater, than with steam.

Thermal efficiency is limited (a) by the mechanical difficulties accompanying high initial pressures or temperatures, and (b) by the difficulty of attaining a low temperature limit, on account of the normally available 60 degrees or 70 degrees Fahrenheit temperature of cooling water and the mechanical difficulties in maintaining a vacuum even at this temperature. Steam is as satisfactory a vapor as any, if we consider condition (a). It is almost the least satisfactory of any under condition (b), but the gain in eliminating high vacua at the lower limit is so small that the thermal properties of any specific vapor may be such as to offset it. The cooling water temperature imposes an insurmountable barrier to progress in respect to this lower limit. With a properly chosen fluid the binary vapor principle may lead to the highest thermal efficiencies, but these are not likely to be commercially profitable on any wide scale. Specimen comparisons show alcohol to be rather less efficient than steam as a working fluid: we have insufficient data to consider gasoline. The reason for using these substances arises from convenience, quick steaming, etc., and the alcohol engine may be smaller than a steam engine of same power.

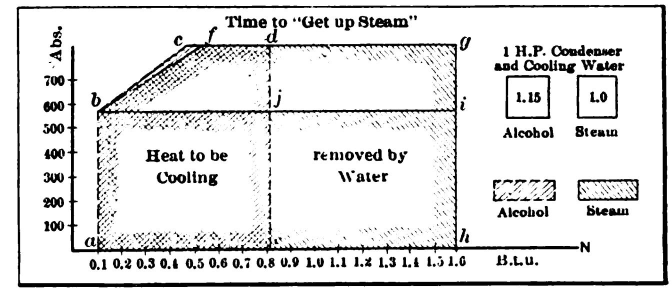


Fig. 6—Time of starting, cooling water and condenser

(The comparative times required to "get up steam" are indicated by the areas a b c d e—alcohol,—and a b f g h—steam. This is for equal weights of fluid in the boilers. These areas have the ratio 4:10. The amounts of heat to be removed by the condenser cooling water per pound of fluid are represented by the areas b j e a—alcohol,—and b i h a—steam; the ration being 4.6:10. Since more work is obtained per pound of fluid in the case of steam—see Fig. 5—the cooling water supply and size of condenser per horsepower are, however, reduced below those necessary for alcohol.)

Standardized Formulæ for Ready Reference

By THOS. J. FAY

Dealing with simplified conversion formulæ set for the slide rule, or to be used independent of same, logically arranged, and indexed by number—Empirical formulæ for determining horsepower approximations (a) for steam engines, and (b) for internal combustion motors—Practical electrical formulæ derived from the fundamental system for use in ignition work—Practical electromagnetic formulæ derived from the fundamental system for use in designing ignition systems—Abbreviated adaptations of general engineering formulæ for quick approximations

AUTOMOBILE ENGINEERS have to deal with many old problems in new garb, and the fixed formula which obtains for bridge building, electrical engineering, and battleship designing, while it holds the crux of the situation from these points of view, lacks in fineness in view of the more delicate task which confronts the designer of the automobile. Empirical formulæ in particular are dangerous to apply to the newer art, using the constants which were found to serve under the well-defined conditions which were established for the older arts. Even with a derived formula having for its basis the fundamental system, there is a certain amount of danger involved, and before it can be claimed that the automobile is standardized, it will be necessary to standardize the formula which is to serve as the method of precision for the designer.

In the shop when a part is fashioned it goes to the inspection department, where a deft inspector, imbued with high ideas, utilizes micrometers, extensometers, and fixed gauges to enable him to fix the standard the workman observes. To arrive at such close conclusions in the shop, it goes without saying that they should be based upon a mathematical design which will serve as an exact foundation for results so obtained. If the designer uses a formula which leads to wrong conclusions, what an enormous waste of talent and money it is to use $5,000 worth of instruments of precision in the process of proving how nearly the artisan comes to making the thing wrong! If the mathematical hypothesis is wrong, then the part involved, if it is made according to the formula, will be wrong, and every effort to arrive at accuracy of workmanship, under such conditions, will be for no better purpose than to show that the workman furnished a Chinese copy of a wrong design.

The method of comparison, which undoubtedly obtains to a wide extent, when reference is had to automobile designing, cannot represent the last word because no one can be held responsible for the accuracy of the parts which are used in the copying process. Even if an axle does hold up in some one make of automobile, and even if it is extensively copied, these facts do not constitute proper groundwork for a standardized product. If the original and possibly well-designed axle falls short of the perfection which would be indicated by proper investigation and the utilization of sound mathematical formulæ tempered by practical considerations, every effort based upon it will be below the standard which a board of capable engineers would be proud to embrace as their own.

The time must come in the automobile industry when the methods which are relied upon in the engineering office will be universal in character and bear the stamp of approval of a board of competent engineers empowered to act. In every other art, heterogeny of designing method was ultimately set aside in favor of crystallized endeavor due to systematic investigation, as, for illustration, the master car builders' specifications (M. C. B.) are the rule and guide in every effort involving the building of cars, the tracks on which they roll, and the locomotives that draw them. Likewise, in shipbuilding the Lloyds construction is recognized by insurance underwriters as the standard to measure by, just as in medicine the United States Pharmacopœia states the dosage which the sick must endure.

Fixed Formulæ Dealing with Geometrical Problems

$$\text{Circumference} = \frac{710 \times \text{Diameter}}{226} \quad \ldots\ldots\ldots (1)$$

$$\text{Diameter} = \frac{226 \times \text{circumference}}{710} \quad \ldots\ldots\ldots (2)$$

$$\text{Diameter} = \frac{99 \times \text{side inscribed square}}{70} \quad \ldots\ldots (3)$$

$$\text{Side inscribed square} = \frac{70 \times \text{Diameter}}{99} \ldots (4)$$

$$\text{Diameter} = \frac{70 \times \text{side of equal square}}{79} \ldots (5)$$

$$\text{Side of equal square} = \frac{79 \times \text{Diameter}}{70} \ldots (6)$$

$$\text{Circumference} = \frac{39 \text{ x side of equal square}}{11} \quad (7)$$

$$\text{Side of equal square} = \frac{11 \times \text{circumference}}{39} (8)$$

$$\text{Diagonal of square} = \frac{99 \times \text{side of square}}{70} (9)$$

$$\text{Side of square} = \frac{70 \times \text{diagonal of square}}{99} (10)$$

$$\text{Area of circle} = \frac{322 \times \text{Area of inscribed square}}{205} \quad \ldots\ldots\ldots (11)$$

Fixed Formulæ Dealing with Arithmetical Conversions

$$\text{Feet} = \frac{66 \times \text{Links}}{100} \quad \ldots\ldots\ldots (12)$$

$$\text{Links} = \frac{100 \times \text{Feet}}{66} \quad \ldots\ldots\ldots (13)$$

$$\text{Square Feet} = \frac{44 \times \text{Square Links}}{101} \quad \ldots\ldots\ldots (14)$$

$$\text{Square Links} = \frac{101 \times \text{Square Feet}}{44} \quad \ldots\ldots\ldots (15)$$

$$\text{Cubic Inches} = \frac{231 \times \text{U. S. Gallons}}{1} \quad \ldots\ldots\ldots (16)$$

$$\text{U. S. Gallons} = \frac{\text{Cubic Inches}}{231} \quad \ldots\ldots\ldots (17)$$

$$\text{Cubic Inches} = \frac{6{,}100 \times \text{Imperial Gallons}}{22} \quad \ldots\ldots\ldots (18)$$

$$\text{Imperial Gallons} = \frac{22 \times \text{Cubic Inches}}{6{,}100} \quad \ldots\ldots\ldots (19)$$

$$\text{Inches} = \frac{95 \times \text{Links}}{12} \quad \ldots\ldots\ldots (20)$$

$$\text{Links} = \frac{12 \times \text{Inches}}{95} \quad \ldots\ldots\ldots (21)$$

$$\text{Imperial Gallons} = \frac{5 \times \text{U. S. Gallons}}{6} \quad \ldots\ldots\ldots (22)$$

$$\text{U. S. Gallons} = \frac{6 \times \text{Imperial Gallons}}{5} \quad \ldots\ldots\ldots (23)$$

$$\text{Cubic Feet} = \frac{107 \times \text{U. S. Gallons}}{800} \quad \ldots\ldots\ldots (24)$$

$$\text{U. S. Gallons} = \frac{800 \times \text{Cubic Feet}}{107} \quad \ldots\ldots\ldots (25)$$

$$\text{Cubic Feet} = \frac{69 \times \text{Imperial Gallons}}{430} \quad \ldots\ldots\ldots (26)$$

$$\text{Imperial Gallons} = \frac{430 \times \text{Cubic Feet}}{69} \quad \ldots\ldots\ldots (27)$$

Conversions in Metric and English Units

$$\text{Meters} = \frac{25 \times \text{Feet}}{82} \quad \ldots\ldots\ldots (28)$$

$$\text{Feet} = \frac{82 \times \text{Meters}}{25} \quad \ldots\ldots\ldots (29)$$

$$\text{Miles} = \frac{87 \times \text{Kilometers}}{140} \quad \ldots\ldots\ldots (30)$$

$$\text{Kilometers} = \frac{140 \times \text{Miles}}{87} \quad \ldots\ldots\ldots (31)$$

$$\text{Meters} = \frac{26 \times \text{Centimeters}}{66} \quad \ldots\ldots\ldots (32)$$

$$\text{Centimeters} = \frac{66 \times \text{Meters}}{26} \quad \ldots\ldots\ldots (33)$$

$$\text{Meters} = \frac{75 \times \text{Yards}}{82} \quad \ldots\ldots\ldots (34)$$

$\text{Yards} = \frac{82 \times \text{Meters}}{75}$ ....(35)

$\text{Meters} = \frac{865 \times \text{Links}}{4,300}$ ....(36)

$\text{Links} = \frac{4,300 \times \text{Meters}}{865}$ ....(37)

$\text{Square Centimeters} = \frac{200 \times \text{Sq. Inches}}{31}$ ....(38)

$\text{Sq. Inches} = \frac{31 \times \text{Sq. Centimeters}}{200}$ ....(39)

$\text{Sq Meters} = \frac{51 \times \text{Sq. Yards}}{61}$ ....(40)

$\text{Sq. Yards} = \frac{61 \times \text{Sq. Meters}}{51}$ ....(41)

$\text{Sq. Miles} = \frac{22 \times \text{Sq. Kilometers}}{57}$ ....(42)

$\text{Sq. Kilometers} = \frac{57 \times \text{Sq. Miles}}{22}$ ....(43)

$\text{Cubic Feet} = \frac{17 \times \text{Cubic Meters}}{600}$ ....(44)

$\text{Cubic Meters} = \frac{600 \times \text{Cubic Feet}}{17}$ ....(45)

$\text{Cubic Feet} = \frac{6 \times \text{Litres}}{170}$ ....(46)

$\text{Litres} = \frac{170 \text{ Cubic Feet}}{6}$ ....(47)

$\text{Litres} = \frac{209 \times \text{Imperial Gallons}}{46}$ ....(48)

$\text{Imperial Gallons} = \frac{46 \times \text{Litres}}{209}$ ....(49)

$\text{Grams} = \frac{170 \times \text{Ounces}}{6}$ ....(50)

$\text{Ounces} = \frac{6 \times \text{Grams}}{170}$ ....(51)

$\text{Kilograms} = \frac{3,200 \times \text{Hundredweight}}{63}$ ....(52)

$\text{Hundredweight} = \frac{63 \times \text{Kilograms}}{3,200}$ ....(53)

$\text{Meters} = \frac{865 \times \text{Chains}}{43}$ ....(54)

$\text{Chains} = \frac{43 \times \text{Meters}}{865}$ ....(55)

$\text{Sq Meters} = \frac{13 \times \text{Sq. Ft.}}{140}$ ....(56)

$\text{Sq. Feet} = \frac{140 \times \text{Sq. Meters}}{13}$ ....(57)

$\text{Acres} = \frac{42 \times \text{Hectares}}{17}$ ....(58)

$\text{Hectares} = \frac{17 \times \text{Acres}}{42}$ ....(59)

$\text{Cubic Inches} = \frac{5 \times \text{Cubic Centimeters}}{82}$ ....(60)

$\text{Cubic Centimeters} = \frac{82 \times \text{Cubic Inches}}{5}$ ....(61)

$\text{Cubic Yards} = \frac{85 \times \text{Cubic Meters}}{65}$ ....62)

$\text{Cubic Meters} = \frac{65 \times \text{Cubic Yards}}{85}$ ....(63)

$\text{U. S. Gallons} = \frac{14 \times \text{Litres}}{53}$ ....(64)

$\text{Litres} = \frac{53 \times \text{U. S. Gallons}}{14}$ ....(65)

$\text{Grains} = \frac{108 \times \text{Grams}}{7}$ ....(66)

$\text{Grams} = \frac{7 \times \text{Grains}}{108}$ ....(67)

$\text{Pounds} = \frac{75 \times \text{Kilograms}}{34}$ ....(68)

$\text{Kilograms} = \frac{34 \times \text{Pounds}}{75}$ ....(69)

$\text{English Ton} = \frac{63 \times \text{Metric Ton}}{64}$ ....(70)

$\text{Metric Ton} = \frac{64 \times \text{English Ton}}{63}$ ....(71)

Conversion Formulæ Involving Pressures

$\text{Pounds per Sq. Inch} = \frac{640 \times \text{Kilograms per Sq. Centimeter}}{45}$ ....(72)

$\text{Kilograms per Sq. Centimeter} = \frac{45 \times \text{Pounds per Sq. Inch}}{640}$ ....(73)

$\text{Pounds per Sq. Yard} = \frac{59 \times \text{Kilograms per Sq. Meter}}{32}$ ....(74)

$\text{Kilograms per Sq. Meter} = \frac{32 \times \text{Pounds per Sq. Yard}}{59}$ ....(75)

$\text{Inches of Mercury} = \frac{82 \times \text{Pounds per Sq. Foot}}{5,800}$ ....(76)

$\text{Pounds per Sq. Foot} = \frac{5,800 \times \text{Inches of Mercury}}{82}$ ....(77)

$\text{Inches of Water} = \frac{74 \times \text{Pounds per Sq. Foot}}{385}$ ....(78)

$\text{Pounds per Sq. Foot} = \frac{385 \times \text{Inches of Water}}{74}$ ....(79)

$\text{Feet of Water} = \frac{5 \times \text{Pounds per Sq. Foot}}{312}$ ....(80)

$\text{Pounds per Sq. Foot} = \frac{312 \times \text{Feet of Water}}{5}$ ....(81)

$\text{Atmospheres} = \frac{99 \times \text{Inches of Mercury}}{2,960}$ ....(82)

$\text{Inches of Mercury} = \frac{2,960 \times \text{Atmospheres}}{99}$ ....(83)

$\text{Atmospheres} = \frac{34 \times \text{Pounds per Sq. Foot}}{7,200}$ ....(84)

$\text{Pounds per Sq. Foot} = \frac{7,200 \times \text{Atmospheres}}{34}$ ....(85)

$\text{Atmospheres} = \frac{23 \times \text{Feet of Water}}{780}$ ....(86)

$\text{Feet of Water} = \frac{780 \times \text{Atmospheres}}{23}$ ....(87)

$\text{Pounds per Sq. Inch} = \frac{29 \times \text{Feet of Water}}{67}$ ....(88)

$\text{Feet of Water} = \frac{67 \times \text{Pounds per Sq. Inch}}{29}$ ....(89)

$\text{Pounds per Sq. Foot} = \frac{51 \times \text{Kilograms per Sq. Meter}}{249}$ ....(90)

$\text{Kilograms per Sq. Meter} = \frac{249 \times \text{Pounds per Sq. Foot}}{51}$ ....(91)

$\text{Inches of Mercury} = \frac{57 \times \text{Pounds per Sq. Inch}}{28}$ ....(92)

$\text{Pounds per Sq. Inch} = \frac{28 \times \text{Inches of Mercury}}{57}$ ....(93)

$\text{Inches of Water} = \frac{720 \times \text{Pounds per Sq. Inch}}{26}$ ....(94)

$\text{Pounds per Sq. Inch} = \frac{26 \times \text{Inches of Water}}{720}$ ....(95)

$\text{Feet of Water} = \frac{60 \times \text{Pounds per Sq. Inch}}{26}$ ....(96)

$\text{Pounds per Sq. Inch} = \frac{26 \times \text{Feet of Water}}{60}$ ....(97)

$\text{Inches of Mercury} = \frac{15 \times \text{Feet of Water}}{17}$ ....(98)

$\text{Feet of water} = \frac{17 \times \text{Inches of Mercury}}{15}$ ....(99)

$\text{Atmospheres} = \frac{34 \times \text{Pounds per Sq. Inch}}{500}$ ....(100)

$\text{Pounds per Sq. Inch} = \frac{500 \times \text{Atmospheres}}{34}$ ....(101)

$\text{Atmospheres} = \frac{30 \times \text{Kilograms per Sq. Centimeter}}{31}$ ....(102)

$\text{Kilograms per Sq. Centimeter} = \frac{31 \times \text{Atmospheres}}{30}$ ....(103)

$\text{Atmospheres} = \frac{3 \times \text{Meters of Water}}{31}$ ....(104)

$\text{Meters of Water} = \frac{31 \times \text{Atmospheres}}{3}$ ....(105)

43 × Kilograms per Meter

Combinations Using Metric and English Units

$\text{Pounds per Foot} = \frac{43 \times \text{Kilograms per Meter}}{64}$ ....(106)

$\text{Kilograms per Meter} = \frac{64 \times \text{Pounds per Foot}}{43}$ ....(107)

$\text{Pounds per Sq. Yard} = \frac{46 \times \text{Kilograms per Sq. Meter}}{25}$ ....(108)

$\text{Kilograms per Sq. Meter} = \frac{25 \times \text{Pounds per Sq. Yard}}{46}$ ....(109)

$\text{Pounds per Cubic Yard} = \frac{27 \times \text{Kilograms per Cubic Meter}}{16}$ ....(110)

$$\text{Kilograms per Cubic Meter} = \frac{16 \times \text{Pounds per Cubic Yards}}{27} \tag{111}$$

$$\text{Imperial Gallons per Minute} = \frac{700 \times \text{Litres per Second}}{53} \tag{112}$$

$$\text{Litres per Second} = \frac{53 \times \text{Imperial Gallons per Minute}}{700} \tag{113}$$

$$\text{Pounds per Yard} = \frac{127 \times \text{Kilograms per Meter}}{63} \tag{114}$$

$$\text{Kilograms per Meter} = \frac{63 \times \text{Pounds per Yard}}{127} \tag{115}$$

$$\text{Pounds per Cubic Foot} = \frac{49 \times \text{Kilograms per Cubic Meter}}{785} \tag{116}$$

$$\text{Kilograms per Cubic Meter} = \frac{785 \times \text{Pounds per Cubic Foot}}{49} \tag{117}$$

$$\text{Cubic Feet per Minute} = \frac{89 \times \text{Litres per Second}}{42} \tag{118}$$

$$\text{Litres per Second} = \frac{42 \times \text{Cubic Feet per Minute}}{89} \tag{119}$$

$$\text{U. S. Gallons per Minute} = \frac{840 \text{ Litres per Second}}{53} \tag{120}$$

$$\text{Litres per Second} = \frac{53 \times \text{U. S. Gallons per Minute}}{840} \tag{121}$$

Practical Electrical Formulæ Fundamentally Derived

$$R = \frac{E}{I} = \text{Resistance in Ohms} \tag{122}$$

$$R = \frac{W}{I^2} = \text{Resistance in Ohms} \tag{123}$$

$$R = \frac{E^2}{W} = \text{Resistance in Ohms} \tag{124}$$

$$I = \frac{E}{R} = \text{Current in Amperes} \tag{125}$$

$$I = \frac{W}{E} = \text{Current in Amperes} \tag{126}$$

$$I = \sqrt{\frac{W}{R}} = \text{Current in Amperes} \tag{127}$$

$$E = IR = \text{Electromotive Force in Volts} \tag{128}$$

$$E = \frac{W}{I} = \text{Electromotive Force in Volts} \tag{129}$$

$$E = \sqrt{WR} = \text{Electromotive Force in Volts} \tag{130}$$

$$W = EI = \text{Energy in Watts} \tag{131}$$

$$W = I^2R = \text{Energy in Watts} \tag{132}$$

$$W = \frac{E^2}{R} = \text{Energy in Watts} \tag{133}$$

$$J = \frac{E^2}{R}t = \text{Heat in Joules} \tag{134}$$

$$J = I^2Rt = \text{Heat in Joules} \tag{135}$$

$$J = EIt = \text{Heat in Joules} \tag{136}$$

$$Q = \frac{E}{R}t = \text{Quantity in Columbs} \tag{137}$$

$$Q = It = \text{Quantity in Coulombs} \tag{138}$$

$$C = \frac{Q}{E} = \text{Capacity in Farads} \tag{139}$$

$$C = \frac{(It)}{E} = \text{Capacity in Farads} \tag{140}$$

$$C = \frac{\left\{\frac{E}{R}t\right\}}{E} = \text{Capacity in Farads} \tag{141}$$

Note:—In the construction of condensers for use in magnetos and spark coils in connection with ignition systems for automobile motors, a more practical determination of condenser capacity is expressed as follows:

Let,
C = Capacity in farads;
Cl = Capacity in micro-farads;
k = A constant representing the specific inductive capacity of the dielectric;
A = Area of conductor plates in square centimeters;
d = Distance between plates (thickness of dielectric) in millimeters;

When,

$$C = \frac{kA}{4\pi d} = \text{Capacity in Farads} \tag{142}$$

$$Cl = \frac{k\,A}{1.1313 \times d \times 10^7} = \text{Capacity in Micro-Farads} \tag{143}$$

$$A = \frac{1.1313 \times k \times d \times 10^7}{k} = \text{Area in Sq. Centimeters} \tag{144}$$

Note:—The specific inductive capacity of air equals unity; the specific inductive capacity of other media is variable, but authorities give some of the values as follows:

Paraffine = 2.16
Oiled paper = 2.00
Mica = 4.75
Ebonite = 2.67
Petroleum = 2.05
Ozokerite = 2.10

Relation of Horsepower to Electromagnetic Units

Since 1 watt equals 1-746 of a horsepower, the relations as follows hold:

$$\text{H.P.} = \frac{W}{746} = \text{Horsepower} \tag{145}$$

$$\text{H.P.} = \frac{EI}{746} = \text{Horsepower} \tag{146}$$

$$\text{H.P.} = \frac{I^2R}{746} = \text{Horsepower} \tag{147}$$

$$\text{H.P.} = \frac{\left\{\frac{E^2}{R}\right\}}{746} = \text{Horsepower} \tag{148}$$

$$\text{H.P.} = \frac{\text{KW} \times 1{,}000}{746} = \text{Horsepower} \tag{149}$$

$$\text{K.W.} = \frac{\text{H.P.} \times 746}{1{,}000} = \text{Kilowatts} \tag{150}$$

Heat Equivalent of Electrical Energy

$$H = I^2Rt \times 0.24 = \text{Calories} \tag{151}$$

$$t = \frac{H}{I^2R} \times 0.24 = \text{Time in Seconds} \tag{152}$$

Conventional Formulæ of the Steam Engine

$$\text{I.H.P.} = \frac{Ps \times A \times Mp}{33{,}000} = \text{Indicated horsepower} \tag{153}$$

$$Mp = \frac{\text{I.H.P.} \times 33{,}000}{A \times Ps} = \text{Mean effective pressure} \tag{154}$$

$$A = \frac{\text{I.H.P.} \times 33{,}000}{Mp \times Ps} = \text{Area in Square Inches} \tag*{155}$$

$$Ps = \frac{\text{I.H.P.} \times 33{,}000}{A \times Mp} = \text{Piston Travel in Feet Per Minute.} \tag{156}$$

The mean effective pressure to be expected from a properly constructed and suitably adjusted steam engine may be approximated as follows:

$$Mp \text{ (1-4 cut-off)} = \frac{Ip \times 34}{57} = \text{Mean effective pressure} \tag{157}$$

$$Mp \text{ (3-8 cut-off)} = \frac{Ip \times 23}{31} = \text{Mean effective pressure} \tag{158}$$

$$Mp \text{ (1-2 cut-off)} = \frac{Ip \times 11}{13} = \text{Mean effective pressure} \tag{159}$$

$$Mp \text{ (5-8 cut-off)} = \frac{Ip \times 34}{37} = \text{Mean effective pressure} \tag{160}$$

$$Mp \text{ (3-4 cut-off)} = \frac{Ip \times 53}{55} = \text{Mean effective pressure} \tag{161}$$

$$Mp \text{ (7-8 cut-off)} = \frac{Ip \times 124}{125} = \text{Mean effective pressure} \tag{162}$$

For a single-acting steam engine working 1-4 cut-off, if it is in good working order and the valves are tight, the horsepower to be realized should be as follows:

$$\text{I.H.P.} = \frac{\left(d^2 \frac{\pi}{4}\right) \times \left(\frac{Ip \times 34}{57}\right) \times \left(\frac{S \times 2}{12} \times R\right)}{33{,}000} = \text{indicated hp.} \tag{163}$$

When,
Ip = Initial steam pressure:
S = Stroke in inches:
R = Crankshaft speed in revolutions per minute:
d^2 = Square of diameter of piston in inches.

Simple Rating Formulæ for Automobile Motors

The Association of Licensed Automobile Manufacturers, in an attempt to "rate" motors, reached the conclusion that there is no formulæ that will give absolutely accurate results, and, in the absence of a formulæ that can be relied upon to do more, preferred to lay down one that all may use on a nominal basis, taking for a foundation the conventional motors of the day, and a piston travel of 1,000 feet per minute as permissible. This formulæ is stated as follows:

$$\text{H.P.} = \frac{d^2n}{2.5} = \text{horsepower} \tag{164}$$

When,
d^2 = square of diameter of cylinder in inches;
n = number of cylinders on a 4-cycle basis.

It is believed that the time has arrived in the automobile motor when users would prefer to introduce a little complication if only they may be able to see for themselves the effect of a stroke. This may be accomplished in the manner as follows:

$$\text{H.P.} = \left\{\frac{m^2 \times m^1 \times n \times s}{10^9}\right\}k = \text{horsepower} \tag{165}$$

When,
m^2 = square of bore in millimeters;
m^1 = stroke in millimeters;
n = number of 4-cycle cylinders;
s = speed of crankshaft in revolutions per minute;
k = a constant for a given type and design of motor;
k = 4 for the conventional type of automobile motor;
10^9 = 1,000,000,000.

Note.—In dividing by 10^9 it is only necessary to point off to 9 decimal places. This formula, like that of the A.L.A.M., is purely empirical. hence is limited in its application to present types of 4-cycle motors. It closely approximates the power as realized from reasonably well-designed motors.

Relations of Torque, Speed and Power

It is frequently desirable to determine the relations of torque, speed and power; they may be ascertained as follows:

$$H.P. = \frac{2\pi RSP}{33{,}000} = \text{horsepower} \quad \ldots\ldots (166)$$

$$R = \frac{H.P. \times 33{,}000}{2\pi SP} = \text{radius of the lever-arm} \quad \ldots\ldots (167)$$

$$S = \frac{H.P. \times 33{,}000}{2\pi RP} = \text{speed in revolutions per minute} \quad \ldots\ldots (168)$$

$$P = \frac{H.P. \times 33{,}000}{2\pi RS} = \text{pull in pounds at end of lever-arm} \quad \ldots ((169)$$

With a Prony brake, using the above equation, if the length of the lever-arm is 5.4 feet, the horsepower becomes:

$$H.P. = \frac{6.28 \times SP}{1{,}000} = \text{horsepower} \quad \ldots\ldots (170)$$

Loads on Ball Bearings in Gear Transmissions*

ASIDE from the advantages of small friction, as compared with cylindrical bearings, and relative independence of lubrication, ball bearings offer undisputed points of superiority for automobiles in their ability to absorb end thrusts. A certain percentage of the radial load may be transformed into end thrust without harm. If a shaft has been designed too weak and bends under overload or shock, so that the inner race goes askew, the lateral stresses are without much trouble taken up by the balls, while with parallel bearings heating and scoring of shaft or bearing, with their evil consequences, are always to be feared.

But the stability of the shaft needs to be well looked after if two ball bearings close to one another are depended upon for the support of the load, as otherwise a bending of the shaft causes one of the bearings to be overloaded. The admissible loads for single ball bearings are given in the tables covering this subject and should not be exceeded. The loads on the gear pinion shafts in a transmission mechanism change greatly, however, according to the gear speed, and reach their maximum at low speed and reverse. At the other speeds the load on the ball bearing is considerably reduced. If, therefore, the dimensions of the ball bearing are decided according to the stresses obtaining at low speed or on the reverse, there will be a large unutilized surplus strength for the other gear ratios. Investigation of the transmissions used in a number of well-known automobiles shows, on the other hand, that the ball bearings in many cases are considerably overloaded. But temporary overloading of the materials is nothing new in automobile construction, and is also well endured within reasonable limits, owing to the excellence of the special automobile steels. Considering that the low speed and the reverse are switched into use only off and on and then only for a brief period, a small overload for the bearings at these speeds should be admissible with a view to a better utilization of ball bearings in normal operation, but in many instances in practice the overload is too great.

Roller bearings have been placed on the market which agree in dimensions with the established ball bearings and may be substituted for them, while capable of supporting loads 100 to 150 per cent. higher.

In the following there is offered an examination of ball bearing loads at the different gear speeds in a number of automobiles, with disregard of friction losses. The tables will show the actual loads and also the loads which are given as admissible by the manufacturers of ball bearings for the corresponding number of revolutions in each instance. The formula employed for the calculation of the turning moment is:

$$N = 0.4 \times 1 \times d^2 \times s \times 1200$$

but at the present advanced stage of motor design the coefficient 0.4 should be raised to 0.5 or 0.6, which will give 25 to 50 per cent. higher loads for given dimensions than are indicated in the tables, and an examination of the latter will disclose that, when this additional load due to the increased power of motors (as compared with their power at the time when the formula was calculated) is also considered, several transmissions show an overload even for the second speed. At the close of each table the percentage of overload, if any, is given. The data are compiled from published specifications.

An example of the calculations, with application of the above-mentioned formula, is given in full in the case of the Lorraine-Dietrich 20-horsepower transmission, used with a motor of 90 mm cylinder bore and 120 mm stroke.

The number of teeth on the various pinions is as follows:

Pinion A—26 teeth } giving a constant transmission ratio of 1 to 1.42
Pinion B—37 teeth }
Pinion C—15 teeth
Pinion D—41 teeth
Pinion E—23 teeth
Pinion F—33 teeth
Pinion G—29 teeth
Pinion H—27 teeth

Pinion J—17 teeth } reverse
Pinion K—12 teeth }

Multiplying with the constant gear speed ratio of 1 to 1.42, the total ratios for each gear speed are found to be 1 to 3.86 for low speed, 1 to 2.04 for second speed, 1 to 1.32 for third speed, 1 to 1 for fourth speed and 1 to 5.5 for the reverse.

The turning moment for shaft I is now seen to be 11 kilogrammeters and for shaft II 15.6 kilogrammeters. For shaft III the low speed gives a turning moment of 42.5 kilogrammeters; the second speed 22.4 kilogrammeters; the third 14.5 kilogrammeters; the fourth 11 kilogrammeters, and the reverse 60 kilogrammeters.

The stress on the teeth of the pinions A and B becomes 11,000 divided by 52, which equals 212 kilograms; for C and D, 15,600 divided by 33.75, which is 462 kilograms; for E and F, 15,600 divided by 51.75, or 302 kilograms; for G and H, 15,600 divided by 65.25, or 240 kilograms, and for the pinion-pair, K and J, the pressure rises to 7624 divided by 12, or 652 kilograms.

Looking at the diagram of the transmission, it will be noticed that the distances from the points where the shafts sustain their loads to the ball bearings are given in millimeters. Figuring with these distances in each case, the stresses upon the bearings are found to be as follows:

a_1 = stress on bearing a at low speed =

$$\frac{212 \times 35}{68} - \frac{126 \times 12}{68} = 109 - 22 = 87 \text{ kg.}$$

a_2 = stress on bearing a at second speed =

$$\frac{212 \times 35}{68} - \frac{178 \times 12}{68} = 109 - 31 = 78 \text{ kg.}$$

a_3 = stress on bearing a at third speed =

$$\frac{212 \times 35}{68} - \frac{167 \times 12}{68} = 109 - 29 = 80 \text{ kg.}$$

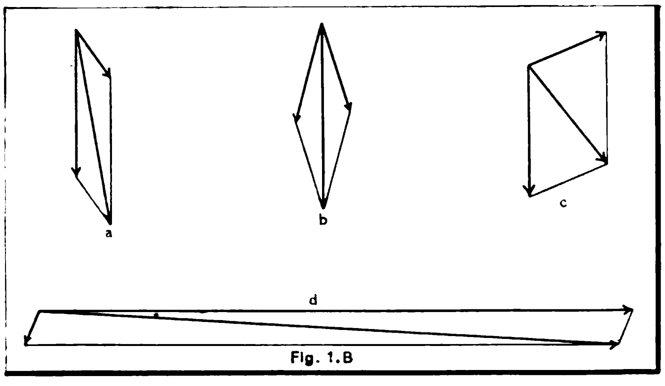


Fig. 1B—Showing parallelograms of forces which come into play when reverse is applied at various speeds

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* Translation of article in *Der Motorwagen* by J. Dornacher.

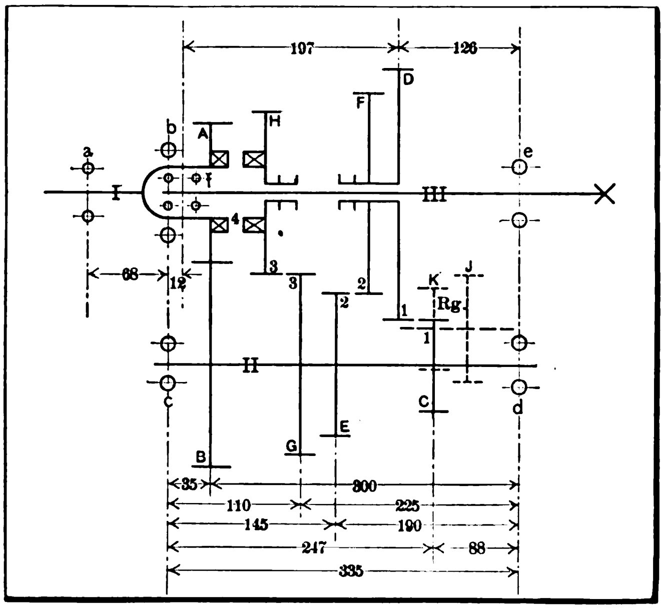

Fig. 1A—Diagram of transmission of the Lorraine-Dietrich

b_1 = stress on bearing b at low speed =

$$\frac{212 \times 103}{68} - \frac{126 \times 80}{68} = 321 - 148 = 173 \text{ kg.}$$

b_2 = stress on bearing b at second speed =

$$\frac{212 \times 103}{68} - \frac{178 \times 80}{68} = 321 - 209 = 112 \text{ kg.}$$

LORRAINE-DIETRICH
90 mm Bore; 120 mm Stroke
Fig. 1A

	Ball Bearing		a	b	c	d	e	f
Load in kg. at:		Reverse	150	595	183	332	398	254
		Low speed	87	173	68	318	336	126
		2d speed	78	112	19	109	124	178
		3d speed	80	125	29	57	73	167
Ball-bearing number			210	213	307	407	310	205 double
Admissible load in kilograms according to r.p.m. in each case, as authorized by:	Deutsche Waffen- und Munitions-fabrik	Reverse	315	540	410	720	1100	220
		Low speed	315	540	410	720	1035	270
		2d speed	315	540	410	720	840	300
		3d speed	315	540	410	720	750	350
	Maschinen-fabrik "Rheinland"	Reverse	335	520	400	620	940	190
		Low speed	335	520	400	620	870	250
		2d speed	335	520	400	620	725	290
		3d speed	335	520	400	620	605	330
	Fichtel u. Sachs .1 W. H. cage	Reverse	320	600	435	870	1390	190
		Low speed	320	600	435	870	1330	330
		2d speed	320	600	435	870	1135	400
		3d speed	320	600	435	870	915	480
	Fichtel u. Sachs .2 Solid cage	Reverse	250	450	385	680	1090	140
		Low speed	250	450	385	680	1030	240
		2d speed	250	450	385	680	835	300
		3d speed	250	450	385	680	650	380
	Kugelfabrik Fischer A.-G.	Reverse	165	310	305	575	1160	130
		Low speed	165	310	305	575	1040	180
		2d speed	165	310	305	575	775	270
		3d speed	165	310	305	575	525	390
Overload in Percentage:	Deutsche Waffen- und Munitions-fabrik	Reverse	......	10	......	......	......	51
		Low speed	......	......	......	......	......	......
		2d-speed	......	......	......	......	......	......
		3d speed	......	......	......	......	......	......
	Maschinen-fabrik "Rheinland"	Reverse	......	14	......	......	......	33
		Low speed	......	......	......	......	......	......
		2d speed	......	......	......	......	......	......
		3d speed	......	......	......	......	......	......
	Fichtel u. Sachs .1	Reverse	......	......	......	......	......	33
		Low speed	......	......	......	......	......	......
		2d speed	......	......	......	......	......	......
		3d speed	......	......	......	......	......	......
	Fichtel u. Sachs .2	Reverse	......	32	......	......	......	81
		Low speed	......	......	......	......	......	......
		2d speed	......	......	......	......	......	......
		3d speed	......	......	......	......	......	......
	Kugelfabrik Fischer A.-G.	Reverse	......	92	......	......	......	95
		Low speed	......	......	......	......	......	......
		2d speed	......	......	......	......	......	......
		3d speed	......	......	......	......	......	......

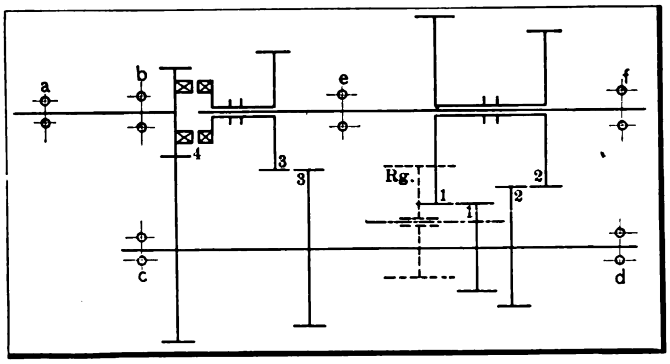

Fig. 2—Diagram of the tıansmission of the Protos "18-35"

b_3 = stress on bearing b at third speed =

$$\frac{212 \times 103}{68} - \frac{167 \times 80}{68} = 321 - 196 = 125 \text{ kg.}$$

c_1 = stress on bearing c at low speed =

$$\frac{212 \times 300}{335} - \frac{462 \times 88}{335} = 190 - 122 = 68 \text{ kg.}$$

c_2 = stress on bearing c at second speed =

$$\frac{212 \times 300}{335} - \frac{302 \times 190}{335} = 190 - 171 = 19 \text{ kg.}$$

c_3 = stress on bearing c at third speed =

$$\frac{212 \times 300}{335} - \frac{240 \times 225}{335} = 190 - 161 = 29 \text{ kg.}$$

d_1 = stress on bearing d at low speed =

$$\frac{462 \times 247}{335} - \frac{212 \times 35}{335} = 340 - 22 = 318 \text{ kg.}$$

d_2 = stress on bearing d at second speed =

$$\frac{302 \times 145}{335} - \frac{212 \times 35}{335} = 131 - 22 = 109 \text{ kg.}$$

PROTOS, 18-35 H.P.
110 mm Bore; 120 mm Stroke
Fig. 2

	Ball-Bearing		a	b	c	d	e	f
Load in kg. at:		Reverse	170	645	130	675	720	300
		Low speed	170	645	130	675	546	474
		2d speed	170	645	265	540	308	442
		3d speed	170	645	65	160	646	76
Ball-bearing number			307	408	306	406	408	309
Admissible load in kilograms according to r.p.m. in each case, as authorized by:	Deutsche Waffen- und Munitions-fabrik	Reverse	360	740	355	680	1140	870
		Low speed	360	740	355	680	1140	870
		2d speed	360	740	355	680	1025	780
		3d speed	360	740	355	680	840	670
	Maschinen-fabrik "Rheinland"	Reverse	325	615	330	560	1040	840
		Low speed	325	615	330	560	1040	840
		2d speed	325	615	330	560	930	750
		3d speed	325	615	330	560	760	625
	Fichtel u. Sachs .1 W. H. cage	Reverse	350	750	480	870	1460	1160
		Low speed	350	750	480	870	1460	1160
		2d speed	350	750	480	870	1350	1050
		3d speed	350	750	480	870	1060	840
	Fichtel u. Sachs .2 Solid cage	Reverse	300	650	340	680	1260	900
		Low speed	300	650	340	680	1260	900
		2d speed	300	650	340	680	1150	760
		3d speed	300	650	340	680	940	620
	Kugelfabrik Fischer A.-G.	Reverse	220	......	330	550	1150	920
		Low speed	220	......	330	550	1150	920
		2d speed	220	......	330	550	950	765
		3d speed	220	......	330	550	......	550
Overload in Percentage:	Deutsche Waffen- und Munitions-fabrik	Reverse	......	......	......	......	......	......
		Low speed	......	......	......	......	......	......
		2d speed	......	......	......	......	......	......
		3d speed	......	......	......	......	......	......
	Maschinen-W fabrik "Rheinland"	Reverse	......	5	......	20	......	......
		Low speed	......	5	......	20	......	......
		2d speed	......	5	......	......	......	......
		3d speed	......	5	......	......	......	......
	Fichtel u. Sachs .1	Reverse	......	......	......	......	......	......
		Low speed	......	......	......	......	......	......
		2d speed	......	......	......	......	......	......
		3d speed	......	......	......	......	......	......
	Fichtel u. Sachs .2	Reverse	......	......	......	......	......	......
		Low speed	......	......	......	......	......	......
		2d speed	......	......	......	......	......	......
		3d speed	......	......	......	......	......	......
	Kugelfabrik Fischer A.-G.	Reverse	......	......	......	22	......	......
		Low speed	......	......	......	22	......	......
		2d speed	......	......	......	......	......	......
		3d speed	......	......	......	......	......	......

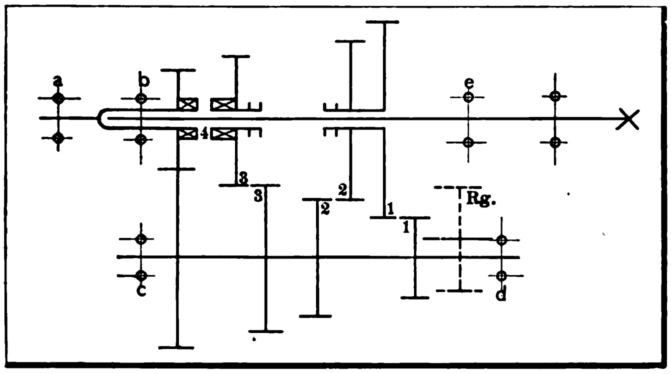

Fig. 3—Diagram of the transmission of the N. A. G. "35"

$$d_3 = \text{stress on bearing d at third speed} = \frac{240 \times 110}{335} - \frac{212 \times 35}{335} = 79 - 22 = 57\ \text{kg.}$$

$$e_1 = \text{stress on bearing e at low speed} = \frac{462 \times 235}{323} = 336\ \text{kg.}$$

$$e_2 = \text{stress on bearing e at second speed} = \frac{302 \times 133}{323} = 124\ \text{kg.}$$

$$e_3 = \text{stress on bearing e at third speed} = \frac{240 \times 98}{323} = 73\ \text{kg.}$$

$$f_1 = \text{stress on bearing f at low speed} = \frac{462 \times 88}{323} = 126\ \text{kg.}$$

$$f_2 = \text{stress on bearing f at second speed} = \frac{302 \times 109}{323} = 178\ \text{kg.}$$

$$f_3 = \text{stress on bearing f at third speed} = \frac{240 \times 225}{323} = 167\ \text{kg.}$$

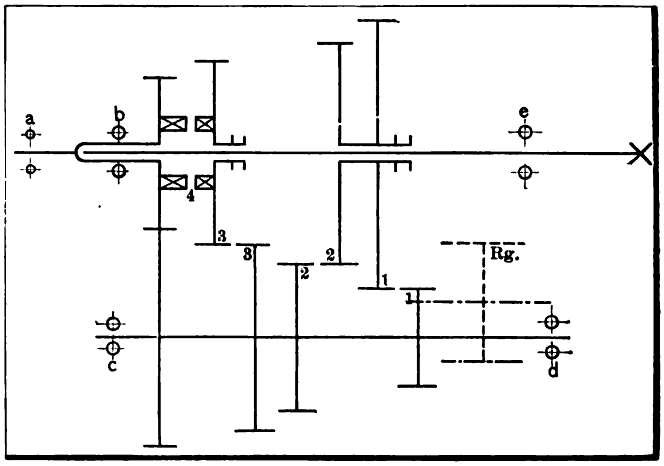

Fig. 4—Diagram of the transmission of the Peugeot "70"

The parallelograms of the forces which come into play when the reverse is applied at the various speeds are indicated in the diagram Fig. 1B, in which the figures are marked a, b, c and d, the letters corresponding to those denoting the bearing under stress in each case.

Working these resultants out graphically, the compounded stresses on bearings a, b, c and d are found to be as follows when the reverse is applied:

$$a_r = \text{stress on bearing a at reverse, composed of } \frac{212 \times 35}{68} = 109\ \text{kg.}$$

$$\text{and } \frac{254 \times 12}{68} = 45\ \text{kg.; resultant} = 150.\text{kg.}$$

N. A. G., 35 H. P.
115 mm Bore; 125 mm Stroke
Fig. 3

Ball Bearing			a	b	c	d	e
Load in kg. at		Reverse	230	950	460	800	780
		Low speed	230	618	168	760	892
		2d speed	230	378	62	295	384
		3d speed	230	354	58	150	216
Ball bearing number			308	308	307	307	309
Admissible load in kilograms according to r.p.m in each case, as authorized by:	Deutsche Waffen- und Munitions-fabrik	Reverse	460	460	450	450	825
		Low speed	460	460	450	450	825
		2d speed	460	460	450	450	740
		3d speed	460	460	450	450	660
	Maschinen-fabrik "Rheinland"	Reverse	400	400	445	445	835
		Low speed	400	400	445	445	835
		2d speed	400	400	445	445	715
		3d speed	400	400	445	445	620
	Fichtel u. Sachs .1 W. H. cage	Reverse	450	450	495	495	1155
		Low speed	450	450	495	495	1155
		2d speed	450	450	495	495	1000
		3d speed	450	450	495	495	820
	Fichtel u. Sachs .2 Solid cage	Reverse	350	350	425	425	895
		Low speed	350	350	425	425	895
		2d speed	350	350	425	425	700
		3d speed	350	350	425	425	610
	Kugelfabrik Fischer A.-G.	Reverse	280	280	375	375	895
		Low speed	280	280	375	375	895
		2d speed	280	280	375	375	700
		3d speed	280	280	375	375	550
Overload in Percentage:	Deutsche Waffen- und Munitions-fabrik	Reverse	....	106	2	78	....
		Low speed	....	34	....	69	8
		2d speed	....	....	....	....	....
		3d speed	....	....	....	....	....
	Maschinen-fabrik "Rheinland"	Reverse	....	138	3	80	....
		Low speed	....	54	....	71	6
		2d speed	....	....	....	....	....
		3d speed	....	....	....	....	....
	Fichtel u. Sachs .1 W. H. cage	Reverse	....	111	....	61	....
		Low speed	....	37	....	53	....
		2d speed	....	....	....	....	....
		3d speed	....	....	....	....	....
	Solid cage Fichtel u. Sachs .2	Reverse	....	172	8	88	....
		Low speed	....	76	....	78	....
		2d speed	....	8	....	....	....
		3d speed	....	....	....	....	....
	Kugelfabrik Fischer A.-G.	Reverse	....	240	22	113	....
		Low speed	....	120	....	102	....
		2d speed	....	35	....	....	....
		3d speed	....	26	....	....	....

PEUGEOT, 70 H.P. (6 CYL.)
130 mm Bore; 140 mm Stroke
Fig. 4

Ball Bearing			a	b	c	d	e
Load in kg. at:		Reverse	308	1540	725	1104	1018
		Low speed	308	600	154	1038	1178
		2d speed	308	428	28	372	466
		3d speed	308	464	74	200	284
Ball-bearing number			208	209	206	405	212
Admissible load in kilograms according to r.p.m. in each case, as authorized by:	Deutsche Waffen- und Munitions-fabrik	Reverse	270	295	195	430	740
		Low speed	270	295	195	430	740
		2d speed	270	295	195	430	675
		3d speed	270	295	195	430	590
	Maschinen-fabrik "Rheinland"	Reverse	275	320	200	410	670
		Low speed	275	320	200	410	670
		2d speed	275	320	200	410	575
		3d speed	275	320	200	410	495
	Fichtel u. Sachs .1 W. H. cage	Reverse	250	280	225	530	935
		Low speed	250	280	225	530	935
		2d speed	250	280	225	530	785
		3d speed	250	280	225	530	675
	Fichtel u. Sachs .2 Solid cage	Reverse	200	230	175	440	665
		Low speed	200	230	175	440	665
		2d speed	200	230	175	440	585
		3d speed	200	230	175	440	485
	Kugelfabrik Fischer A.-G.	Reverse	145	155	150	....	630
		Low speed	145	155	150	....	630
		2d speed	145	155	150	....	480
		3d speed	145	155	150	....	340
Overload in Percentage:	Deutsche Waffen- und Munitions-fabrik	Reverse	14	422	270	156	37
		Low speed	14	103	....	142	59
		2d speed	14	45	....	....	....
		3d speed	14	57	....	....	....
	Maschinen-fabrik "Rheinland"	Reverse	12	380	262	169	52
		Low speed	12	87	....	153	75
		2d speed	12	33	....	....	....
		3d speed	12	45	....	....	....
	Fichtel u. Sachs .1	Reverse	23	450	222	108	9
		Low speed	23	114	....	96	26
		2d speed	23	53	....	....	....
		3d speed	23	65	....	....	....
	Fichtel u. Sachs .2	Reverse	54	570	314	150	53
		Low speed	54	160	....	136	77
		2d speed	54	86	....	....	....
		3d speed	54	100	....	....	....
	Kugelfabrik Fischer A.-G.	Reverse	112	895	383	....	62
		Low speed	112	286	....	....	87
		2d speed	112	176	....	....	....
		3d speed	112	200	....	....	....

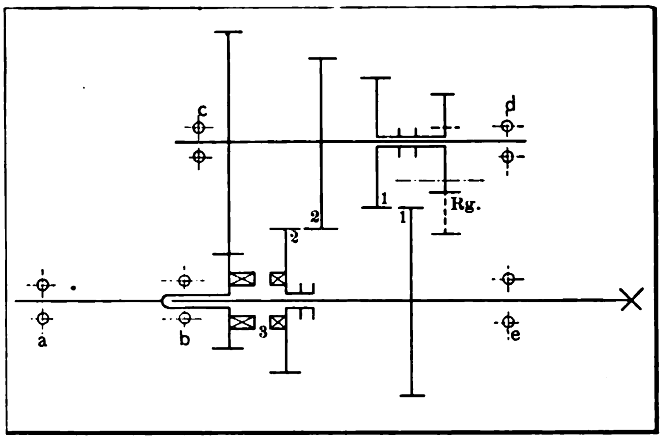

Fig. 5—Diagram of the transmission of the Adler "8-15"

b_r = stress on bearing b at reverse, composed of $\frac{212 \times 103}{68} = 321$ kg.

and $\frac{254 \times 80}{68} = 299$ kg.; resultant = 595 kg.

c_r = stress on bearing c at reverse, composed of $\frac{212 \times 300}{335} = 190$ kg.

and $\frac{462 \times 88}{335} = 122$ kg.; resultant = 183 kg.

d_r = stress on bearing d at reverse, composed of $\frac{212 \times 35}{335} = 22$ kg.

and $\frac{462 \times 247}{335} = 340$ kg.; resultant = 332 kg.

while the stresses on bearings e and f, being simple, are:

$$e_r = \frac{652 \times 197}{323} = 398 \text{ kg.}$$

$$f_r = \frac{652 \times 126}{323} = 254 \text{ kg.}$$

The tables give the results of identical calculations applied to different designs of the transmission mechanism.

ADLER, 8-15 H.P.
80 mm Bore; 100 mm Stroke
Fig. 5

		Ball Bearing	a	b	c	d	e
Load in Kg. at:		Reverse	91	497	235	365	365
		Low speed	40	136	75	254	267
		2d speed	32	78	28	94	110
Ball-bearing number			211	212	205	306	309
Admissible load in kilograms according to r.p.m. in each case, as authorized by:	Deutsche Waffen- und Munitions-fabrik	Reverse	400	520	160	365	830
		Low speed	400	520	160	365	790
		2d speed	400	520	160	365	700
	Maschinen-fabrik "Rheinland"	Reverse	365	410	150	340	845
		Low speed	365	410	150	340	790
		2d speed	365	410	150	340	670
	Fichtel u. Sachs .1 W. H. cage	Reverse	380	500	210	500	1165
		Low speed	380	500	210	500	1100
		2d speed	380	500	210	500	920
	Fichtel u. Sachs .2 Solid cage	Reverse	280	400	160	350	910
		Low speed	280	400	160	350	825
		2d speed	280	400	160	350	660
	Kugelfabrik Fischer A.-G.	Reverse	225	250	150	350	910
		Low speed	225	250	150	350	830
		2d speed	225	250	150	350	580
Overload in Percentage:	Deutsche Waffen- und Munitions-fabrik	Reverse	......	......	47	......	......
		Low speed	......	......	......	......	......
		2d speed	......	......	......	......	......
	Maschinen-fabrik "Rheinland'	Reverse	......	21	56	7	......
		Low speed	......	......	......	......	......
		2d speed	......	......	......	......	......
	Fichtel u. Sachs .1	Reverse	......	......	12	......	......
		Low speed	......	......	......	......	......
		2d speed	......	......	......	......	......
	Fichtel u. Sachs .2	Reverse	......	24	47	4	......
		Low speed	......	......	......	......	......
		2d speed	......	......	......	......	......
	Kugelfabrik Fischer A.-G.	Reverse	......	100	56	4	......
		Low speed	......	......	......	......	......
		2d speed	......	......	......	......	......

New Farcot Two-Cylinder Two-Cycle Revolving Motor

PARIS, July 14—There is a considerable amount of originality in the design and construction of the Farcot two-cylinder two-cycle revolving motor now undergoing tests at the laboratory of the Automobile Club of France. As in the case of a very successful French seven-cylinder motor, the designer causes cylinders and crankcase to revolve round a fixed crankshaft. By adopting the two-cycle principle, however, he has got away from the complication of valves and valve mechanism, has reduced weight, and simplified the motor by the abolition of all gear wheels except the magneto driving and driven pinions.

The two cylinders are machined out of a solid bar of nickel steel, together with their radiating fins. Bore is 4.7 inches and stroke 3.9 inches. There is no separate crankcase, the base of each of the two cylinders forming this chamber. The two halves are dovetailed together and secured by an encircling collar, which gives extreme lightness, together with a perfectly gas-tight chamber. The cylinders are offset in relation one to the other in order to allow the use of a two-throw crankshaft of the ordinary type. There is nothing unusual, either, in the design of the connecting rods. Aluminum as the material for pistons is an innovation which, after a series of experiments, has been found satisfactory by the inventor. The pistons are a die casting, ribbed in the head for

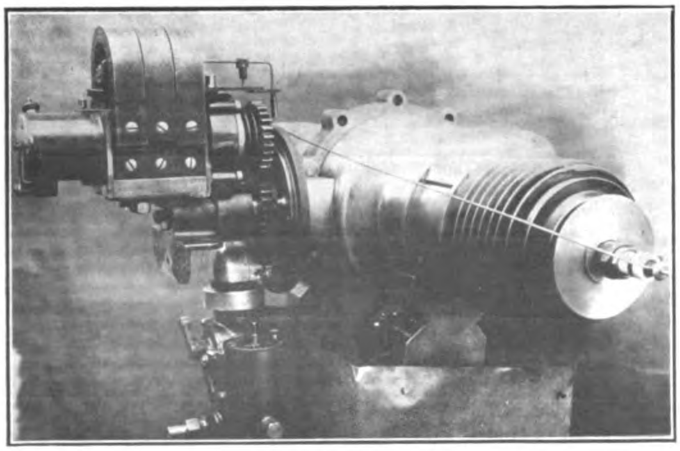

Fig. 1—Farcot 2-cylinder motor of the revolving type, showing the magneto and details of the timing equipment

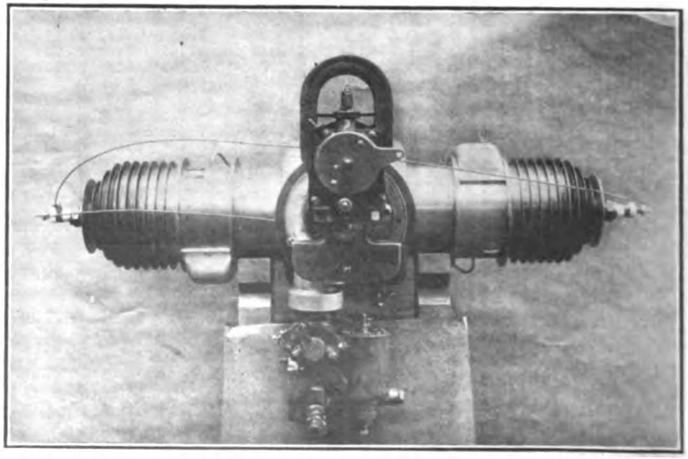

Fig. 2—Farcot 2-cylinder 2-cycle motor, side view, showing location of the carbureter and other details

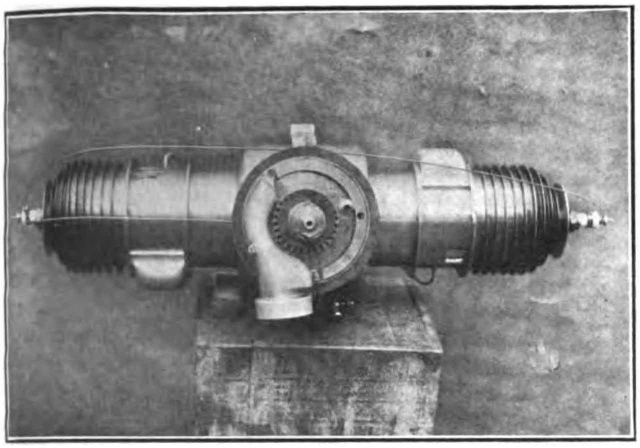

Fig. 3—Opposite side view of Farcot motor showing the exhausting device and methods of construction

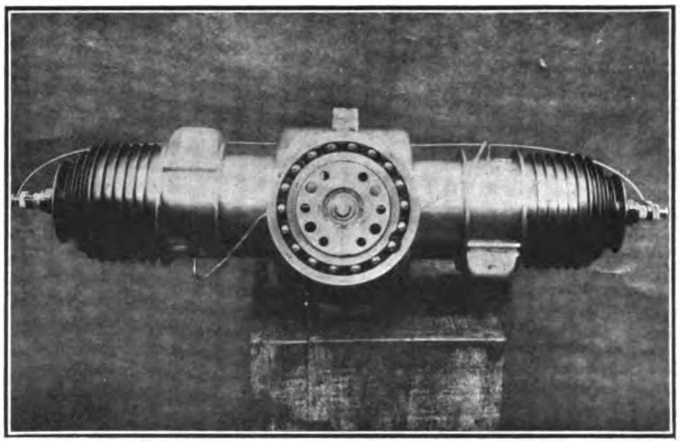

Fig. 4—View of the motor with the magneto removed showing the ball-bearing crankshaft and simplicity in designing

strength, provided with two rings side by side, and carrying the usual type of baffle plate in order to deflect the gases away from the exhaust port.

A standard type of carbureter is employed, with connection to the motor by a single straight length of intake piping. On the end of the crankshaft is a fixed disc with an oval port corresponding with the end of the intake pipe, and in friction with it a revolving disc, also provided with an oval port, revolving with the crankcase. On the upstroke of the pistons the revolving disc uncovers the port on the fixed disc, allowing a mixture to be aspired into the crank chamber. After compression the charge is passed through a series of ports in the walls of the piston, corresponding with similar ports in the walls of the cylinder, into an aluminum chamber applied to the outside of the cylinder and communicating, according to the position of the piston, with both the crank chamber and the combustion chamber. The baffle plate on the piston head deflects the gas towards the upper portion of the cylinder, away from the exhaust port.

Ignition is provided for by a high-tension magneto mounted on a bracket above one extremity of the fixed crankshaft, and driven by a gear wheel on the crankcase. The magneto driving and driven pinions are the only gear wheels in the motor. The spark plugs are in the head of the cylinders. Lubrication is under pressure from a belt-driven lubricator through the hollow crankshaft to the main bearings and the connecting rod ends, with a separate lead, by external pipe, to the cylinder walls.

In complete running order the motor weighs 70 pounds and develops 30 horsepower at 1200 revolutions. A motor on the same principles, but with four instead of two cylinders, has also been constructed with a total weight of 110 pounds for 45 to 50 horsepower at 1100 revolutions. The illustrations give an excellent idea of the appearance of the motor.

Some Light-Weight Motors from Europe

STRAINING many points which experience in the automobile field has well-nigh established as essential for reliability of the internal-combustion motor, designers of engines intended for aviation purposes have gone at the task of creating new relations between power and weight with an ardor which no other purpose than that of gaining prominence and laurels in the new spectacular form of locomotion could have produced. The long-stroke motor, suddenly looked upon with so much favor, may be the upshot of other considerations, such as the keen desire for fuel economy, which is much more pronounced in Europe than here, owing to the higher prices for gasoline, but it is safe to say that air cooling, the two-cycle system and the revolving-cylinder systems would never have gained their new and enthusiastic votaries but for the prevalence of greatly exaggerated notions of the desirability of minimum weight in the power plant of aeroplanes. Though the rage for lightness has already given birth to highly interesting and promising developments, same reaction against this tendency has already made itself felt. It is becoming understood that not one tittle or iota of reliability should be sacrificed in order to enable the aspiring but perhaps indiscreet aviator to leave the ground easily with a machine of indifferent merit, and that the good aviation motor should be one which might be turned to account for automobile or other earthly purpose without compromising in the least with any other requirements than perhaps that of low cost of production. Even as compared with the motors which in the past have been produced especially for racing automobiles at a cost which at first forbade a wide commercial application, and in which lightness was also a desideratum, the aviation motor is the more exacting, with regard to reliability, since it is necessary that it shall be wholly automatic in its lubricating and cooling systems. On the other hand, the demands born of long-distance racing for a motor capable of being worked at its very highest power development for a very long time without giving trouble, are not at present emphasized to the same degree for aviation motors, it being particularly desirable that the motor which drives the aeroplane shall possess a considerable reserve over and above the power normally employed for flight. All told, the aviation motor, rationally conceived, seems to promise a more direct application to automobile purposes than the quondam racing

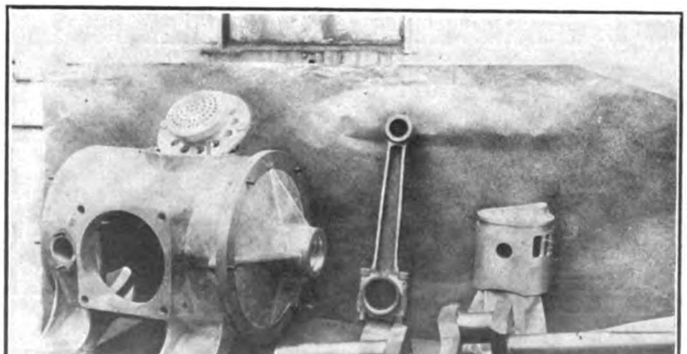

Fig. 5—Component parts of Farcot motor showing the crankshaft, connecting rod and other parts

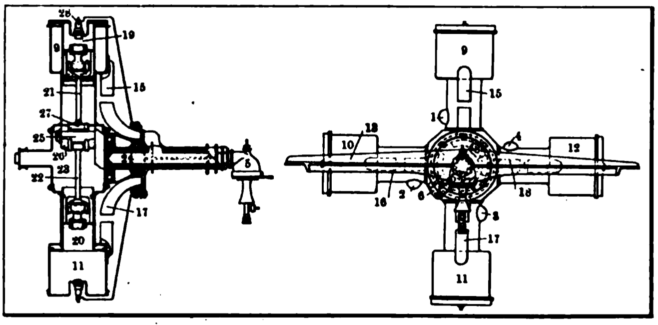

Fig. 2—Sectional views of the Palous & Beuse revolving cylinder two-cycle motor

motor did, and, as it was almost invariably found that all the important advantages in any new racing motor, whatever was its initial price of production, could be duplicated at nothing more than ordinary cost after those advantages had been ratified by experience and factory methods had been applied, it may be assumed that the efforts devoted to the development of the long-stroke, two-cycle, air-cooled, light-weight and high-powered power plant for the road of air will eventually exert a stronger influence in the whole motor field than the automobile racing motors ever did.

There seem to be only two avenues of escape from this conclusion, one in assuming that none of the aviation motors will reach perfection except by returning to the present automobile type; the other, which is even less reasonable, in advancing the assertion that there is something intrinsically inconsistent with low cost of production in the development of those designs which have latterly seen the light of day and of which extreme lightness is at present the most attractive and least disputed feature.

At the present moment the aviation movement has at least broken that trend of conservatism which threatened to throw into oblivion all scientific pursuit of motor perfection in favor of a widespread imitation of certain successful types, and a large number of able designers have been put to work in the world's experimental department, where progress is manufactured from the raw material of fresh ideas, as well as from old ideas once prematurely discarded, but which are showing new values under new conditions, especially the highly improved shop facilities for giving adequate material expression to the designer's conceptions. It would for example have been next to impossible ten years ago to have found any combination of foundry, machine shop, workmen and designer by which the fourteen-cylinder revolving Gnome could have been turned out at commercial cost and in fit condition to run.

Some obvious short cuts to aviation results—which are identical with the capturing of fat prizes at the many meets—still mar the renewed efforts, here and there. The entire genus of motors with revolving cylinders is looked upon by many in that light, on account of the remote chance of having it applied to other uses, but it is especially the separate exhaust from each cylinder through the cylinder heads, a truly pyrotechnical display, which proclaims a serious difficulty in their design, since it is evident that even for aviation the time is not very distant when the exhaust will require to be taken care of in a civilized manner. Fuel waste and lack of flexibility in the power output constitute another marring defect, forgiven at present only because lightness is the concomitant feature which is overvalued.

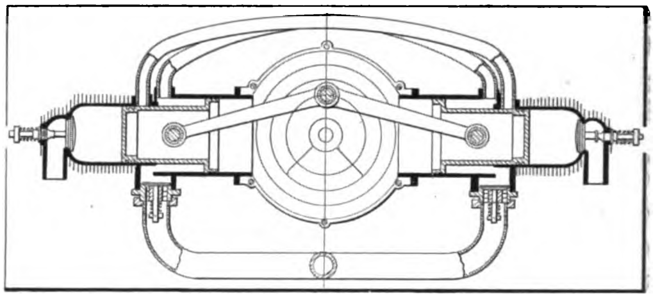

Fig. 6—Sectional view of the Anzani two-cycle motor.

The conservative British Green motor exemplifies prettily what may be done in light construction without departing far from automobile practice. It weighs little more than 4 to 5 pounds per brake horsepower, and its constructive peculiarities may be observed directly on the accompanying drawing, copied from *Der Motorwagen*. Most notable are the following: Dead spaces around the valves are wholly avoided, giving high compression with satisfactory precautions against premature ignition and overheating. Valve parts are interchangeable and easily dismounted. Valves are actuated from the camshaft extending over the tops of the cylinders and enclosed in an aluminum housing, whereby reciprocating masses are reduced as well as dimensions and vibrations. The aluminum housing may be readily unhinged. The water jacket embraces the whole upper portion of the cylinders, including the walls adjacent to the valves. It is tightened at the bottom joint by means of a rubber ring, so as to permit expansion without leak. The combination of parallel and ball bearings for the crankshaft and flywheel should secure uniformity of wear which in turn should afford a good guarantee against the early development of knocking and other irregularities which sooner or later develop into something worse.

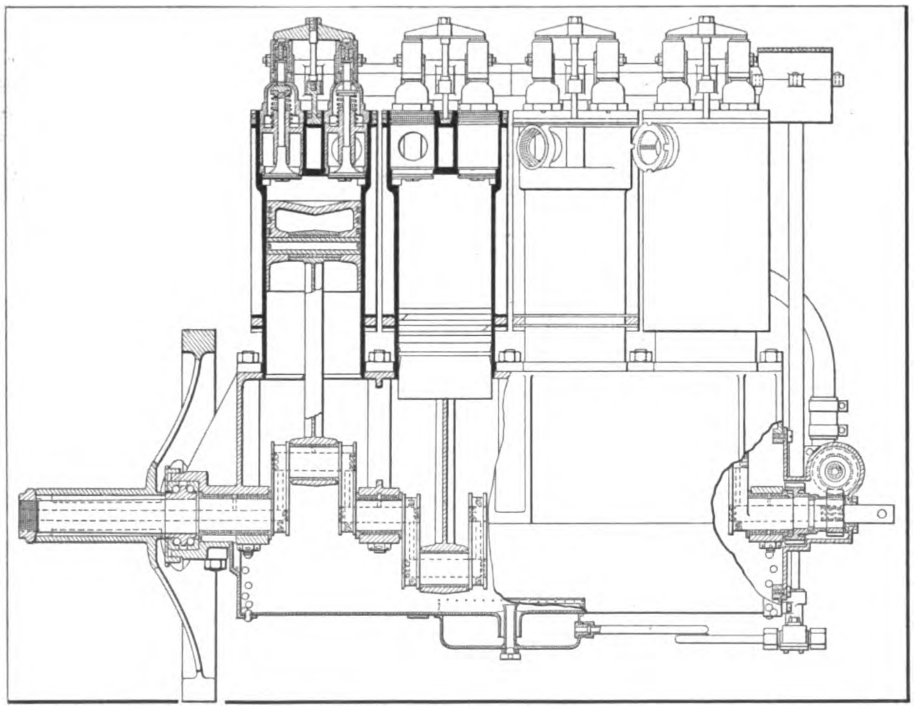

Fig. 1—Construction drawing of the Green motor

Much crankshaft weight is saved by the multiple V-type, of which the Miller motor, built in Italy, is an example. The cylinders are 50° apart, and are fired in the order 1, 3, 2, 4, making the angular distances between explosions 100°, 310°, 100° and 210°, which makes the regularity a little better than for the ordinary four-cylinder V-type motor with two pairs of cylinders 90° apart. One of the connecting rods is knuckled so as to embrace the crankpin in the usual manner, and is provided with a rock shaft upon which the three other connecting rods work, this being a simple method for overcoming a mooted difficulty in the multiple V-type and one which apparently works out to satisfaction. With regard to the intake valve there is a return in this motor to the automatic type, which has the advantage of lightness and is, perhaps, as good as one mechanically operated when no extremely low throttling is required. The details of this automatic intake valve are shown in illustration. *A* is an aluminum tube which connects directly with the carburetion chamber of the carbureter *C,* of ordinary but highly simplified design. The crankcase forms a partitioned oil reservoir with splash action, but a force system is used in addition. At 1100 r.p.m. the Miller motor, with four cylinders of 100 mm. bore and 130 mm. stroke, gives close to 40 horsepower, and at 800 r.p.m., which should correspond to about 30 horsepower, the fuel consumption was found to be 11.650 litres for one hour of 265 grammes per horsepower, which is as low as for good motors of much heavier construction. The weight of the Miller is 70 kg., but the lightness is the result of the choice of type rather than of any skimping in the dimensions of parts. *La Vie Automobile* mentions the fact that this is one of the few motors for aviation whose makers furnish a propeller designed especially to agree with its power and speed, thus recognizing the great loss of efficiency which follows when the matching of these two elements is left to chance or must be effected by gearing.

The combination of the revolving with the two-cycle type offers an opportunity to dispose centrally of the exhaust. This is done in the German Palous & Beuse motor by means of a pocket in the edge of the pistons, which is arranged to register with an outlet port at the end of the downstroke, on the plan of the auxiliary exhaust of several air-cooled automobile and two-cycle marine motors. The P. & B. aviation motor has four revolving cylinders of 150 mm. bore and 140 mm. stroke, completely valveless, and weighing, everything included, 1 kg. per horsepower. The construction is shown in two sectional views. The manner of operation is as follows: The gas mixture is ignited when the piston 19 reaches the top of the stroke, but meanwhile this piston has drawn in a fresh charge through the pipe 15, during the upstroke, and has filled the chamber 9 completely with the mixture. By the downstroke this charge in chamber 9 is compressed, and, after the piston has reached the entrance to induction pipe 15, the gases enter through this opening in the cylinder, and while this takes place the exhaust port is also becoming free, as above referred to. The ignition, as well as the regulation of the gas mixture, takes place through the curved aperture 8, which is opened and closed by a fibre ring 7, on which the ignition roller rotates. The carbureter is of the spray type, without float. While the cooling is effected mostly by the rapid revolving of the cylinders without recourse to flanges, the distribution and compression of the fresh charge all around the cylinder contributes to the desired effect.

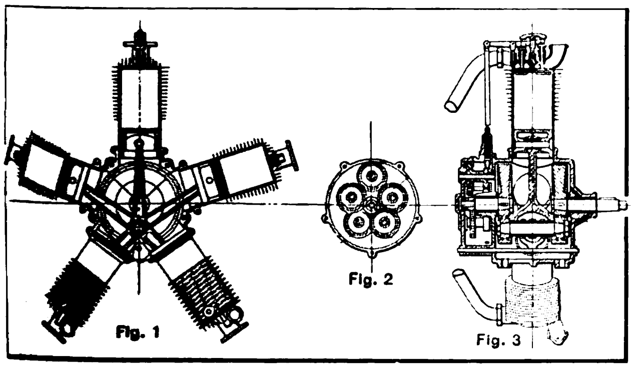

Fig. 3—Sectional view of the Anzani five-cylinder, four-cycle motor

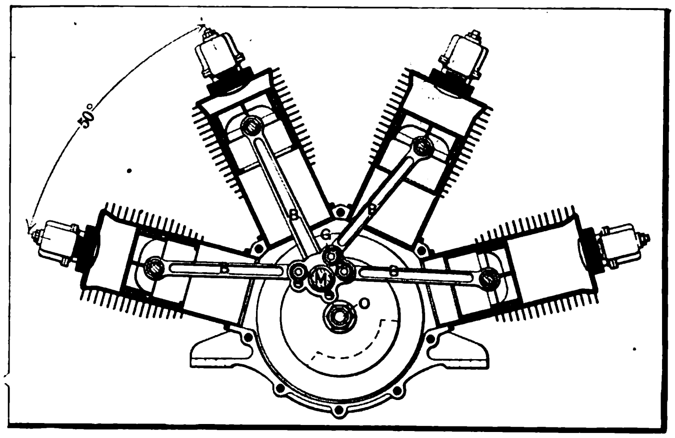

Fig. 4—General construction of the Miller motor

Anzani's two-cylinder, two-cycle motor, giving 30 horsepower, with a bore of 95 mm. and a stroke of 200 mm. (3 7/10 inches by 7 4/5 inches), and weighing 130 pounds, all included, is an air-cooled engine, but not of the revolving type. The cylinders are bolted to a vertically divided crankcase of aluminum in the usual way. The two pistons move together in the same direction with the two connecting rods attached to one crank pin. The internal flywheel is drilled to pare down weight. All gear wheels are avoided, the two-cycle system admitting of operating the exhaust valves in the heads of cylinders from a single cam on the crankshaft, and the magneto is also operated from the crankshaft. The accompanying sectional view shows the double bore of cylinders and the enlarged diameter of the lower end of the piston. At the head of the wide-diameter portion of the cylinders is a port into which is mounted an intake pipe with an automatic poppet suction valve, and the carbureter is on the middle of this length of piping. Each cylinder aspires the gas mixture for the opposed cylinder, compresses it, and drives it across through one of the two transfer pipes shown overhead, ready for use in the other cylinder as soon as its own power stroke is completed. By means of a very large exhaust valve, only one inch less in diameter than the bore, and by a one-fifth lead in the exhaust valve opening, mixing of the incoming charge with the exhaust is minimized. While this motor has been used largely on Blériot aeroplanes, there is a significant absence of reports with regard to its ability to remain cool, and Anzani has created another type which is a four-cycle, five-cylinder, star-shaped engine, weighing 176 pounds, and developing 50 horsepower. The cylinders are 105 by 120 mm. (4 by 4 7/10 inches) and are screwed into the crankcase. All the pistons work on a single throw crankshaft, each connecting rods clasping the crankpin in the usual way, so that all pistons have the same travel, unlike the Miller engine and other star-shaped or revolving cylinder motors in which only one connecting rod has the full length. The explosions in the Anzani five-cylinder motor take place in the order 1, 3, 5, 2, 4, at regular intervals of 144°, permitting ignition by high-tension magneto turning at 5/4 the speed of the crankshaft. Instead of a camshaft, there is a small pinion on the end of the crankshaft driving four independent pinions and cams, and a fifth pinion receiving its movement from one of the others, an arrangement which is probably dictated by lack of transverse space, but also serves the purpose of affording independent adjustment of the individual valves. The lubrication is by means of a pump driven from the crankshaft, with a collector to return excess oil find-

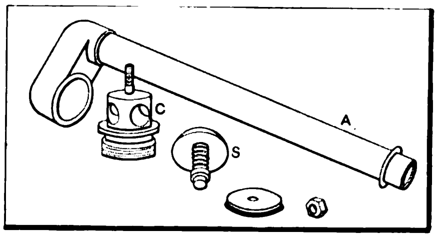

Fig. 5—Valve parts of the Miller motor

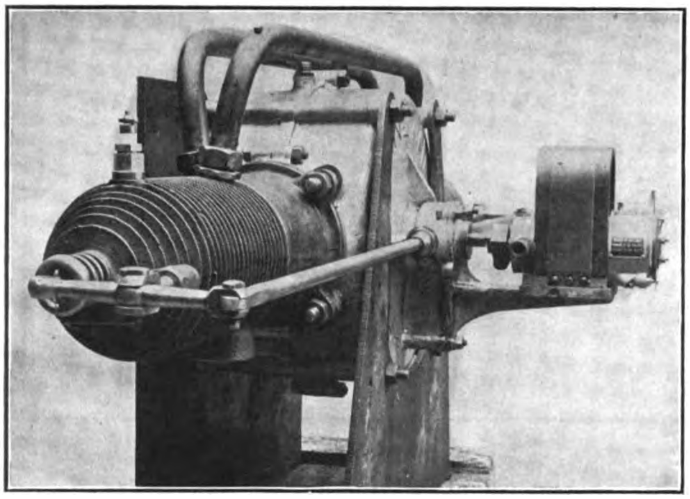

Fig. 7—Anzani's two-cycle, two-cylinder, air-cooled, 80 H.P. motor

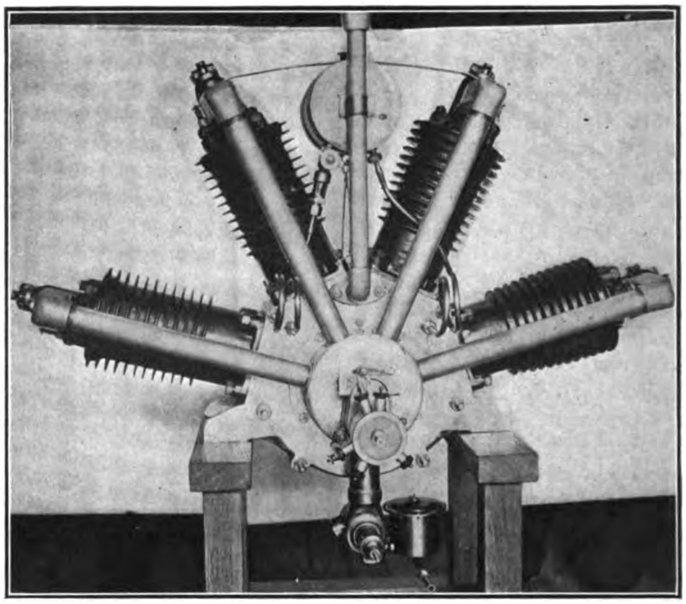

Fig. 3—The Miller aviation motor, built in Italy

ing its way to those cylinders whose heads are down. Both intake and exhaust valves are in the cylinder heads, and are operated by a double rocker arm similar to that used in the Panhard aviation motor referred to in this article. The carbureter consists of a cast aluminum choke tube mounted on an aluminum saucer, from the center of which rises a vertical nozzle. The base of the tube is provided with air openings and the gasoline flow is regulated with the conical-head screw shown in the illustration. In an aeroplane machine this screw is turned off or on by means of a Bowden wire. The weight of this carbureter is only a little more than one-half pound. In practice it sends a steady semi-liquid flow into the hot induction tubes. Its fuel economy is probably slightly better than that of the surface evaporators used in 1897, and its small weight is therefore more than counterbalanced by the greater amount of gasoline to be carried by the aviator for any but very short exhibition flights.

One of the most conservative aviation motors is the four-cylinder Panhard with which the Tellier monoplane is equipped, and with which flight records have been made quite equal to most of those made with motors of much lighter weight. As it is practically an automobile motor with copper water jackets, steel cylinders with separate heads and concentric valves, an illustration of the valve mechanism will serve the purposes of this article. The cylinder head is a Y-shaped casting, one arm of which is bored out to receive the intake manifold, while the other arm forms a bracket for the special rocker arm operating the two valves, and its stem is bored to house the valves. In the upper portion of this housing, with reduced diameter, is inserted a helical spring, which maintains the intake valve in position on top of the cylindrical exhaust valve bell, and into the top of the housing is screwed a cap, against which the external exhaust valve spring abuts, and which also carries a rocker arm, by means of which the intake valve is operated. While the short end of the rocker arm depresses the exhaust valve on the downward thrust of the main rocker, the long end raises the extremity of the short rocker arm, on the upward lift, and depresses the intake valve. Each pair of valves is operated by a single cam and a single tappet rod. The water-cooling connection between the cylinders is by means of a narrow rubber-bound collar, as plainly seen in two of the illustrations. This motor develops 40 horsepower, and it is worthy of belief in its stability on account of the service already rendered by the type, resulting in efficiency of performance and high thermal results. It is stated that the fuel consumption is only 3 gallons per hour at full power.

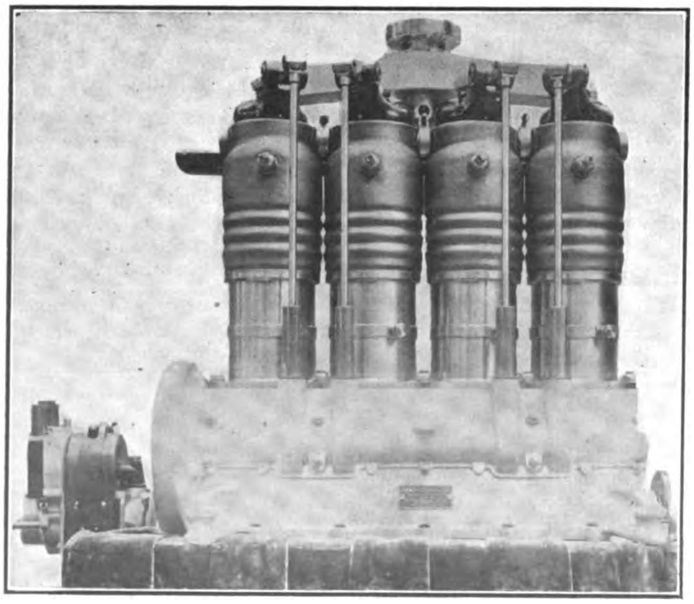

Fig. 9—The Panhard-et-Levassor aviation motor

For a considerable time the seven-cylinder Gnome motor held the position as the most pronounced deviation from current practice, both with regard to lightness and design, and it has been frequently described. The cylinder walls are only ½ mm. thick, or about one-fortieth of one inch, though bore and stroke are approximately 4½ inches and the centrifugal strain arising from the very rapid revolving of the whole engine must be very considerable. The cooling flanges contribute greatly to strength, however. When running full power this motor makes a thundering noise, and sends smoke and greasy spray in all directions, radially, as the exhaust is in the seven cylinder heads and passes out unchecked, while the lubricant is either a mixture of mineral and castor oil, or pure castor oil, which has to be supplied in profusion. The power development reaches 50 horsepower, however, with a 'total weight of 150 pounds. The inlet valves are in the pistons and are auto-

Fig. 12—The floatless carbureter of the Anzani motors

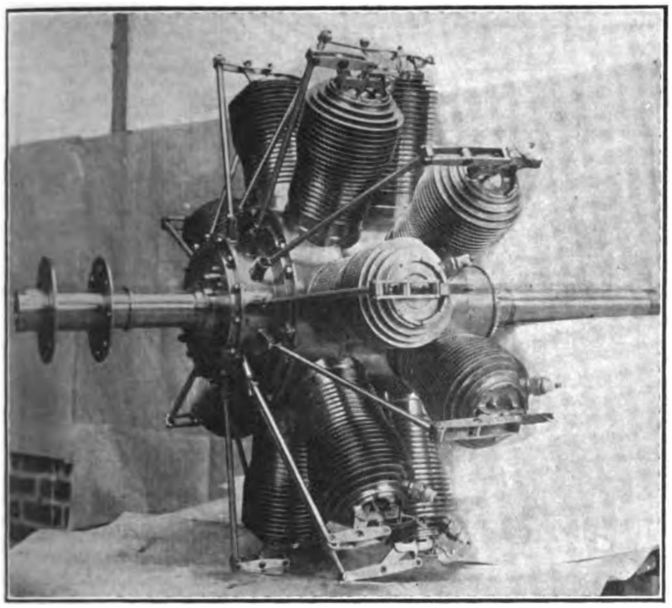

Fig. 13—Gnome 14-cylinder revolving, four-cycle, 100-hp. motor

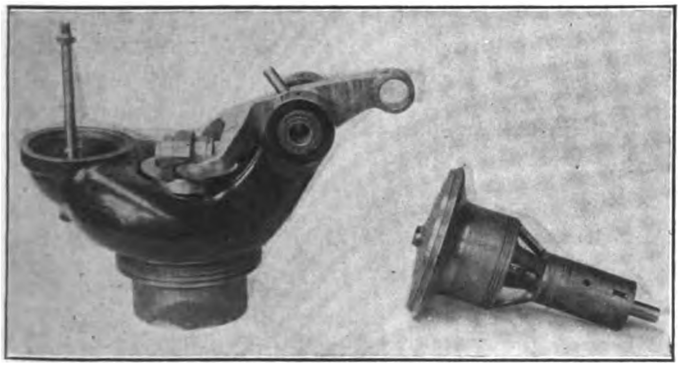

Fig. 11—Cylinder head and concentric valves of Panhard motor

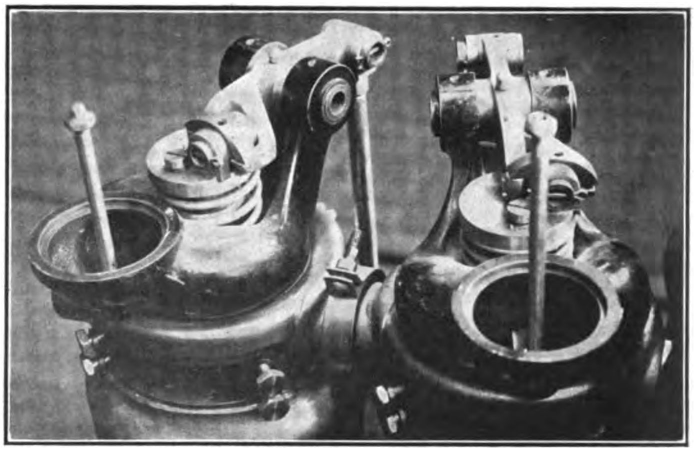

Fig. 10—Valve-operating mechanism of Panhard aviation motor

matic. The pistons, by the way, are provided with only one cast-iron piston ring each, close to the top of the piston, but this single ring is surrounded with a ring of L-section spun from a strip of brass and kept expanded by the pressure of the cast ring. The inlet valve is of the ordinary mushroom type, but its stem is engaged by a pair of levers which terminate in counterweights arranged to counteract the tendency to opening of the valve which naturally results from centrifugality. The faster the motor revolves, the harder the counterweights press upon a flat spring which serves as valve-closing spring. The effects are balanced so nicely that the centrifugal action is neutralized and the suction of the piston, in drawing in the gases has no more nor less work to do in overcoming the valve spring than if the motor were not of the revolving type. With keen logic the designer has perceived that the inaccessibility of these valves would not matter, as the aviator, anyway, has no time to fix a valve giving trouble.

This motor has now been distanced by a 14-cylinder Gnome of the same general construction, but in which the effects of a gasoline turbine are even more strongly marked. The horsepower is increased to a round 100. It is practically a double seven-cylinder Gnome, one placed staggered in relation to the other on the common crank case, for each has its own magneto and its own lubricating pump. The operation of all the valves from the same side, despite the far-over reach for one set of the valve rods, unites the two motors into a single engine to the eye, and the whole weighs 260 pounds, being a weight saving of 40 pounds, as compared with doubling the weight of the seven-cylinder species. The circular crankcase is machined from a steel casting, and each cylinder is secured in position by means of an internal-locking ring. The crank pin, which is single in the seven-cylinder motor, is here double-opposed, with seven connecting rods acting on each crank. The whole mass of cylinders and valve-operating parts revolves around this shaft mounted upon two ball bearings. The carbureter is a brass elbow, with a series of air holes, surrounding a spray jet and provided with a mechanically operated sleeve giving additional air for starting cold, and a butterfly throttle valve. The motor can be throttled down to run at 300 revolutions. The gas mixture is drawn through the hollow crankshaft into the crank case, where it is acted upon by the automatic intake valves. Lubrication is also effected through the fixed crankshaft by means of two copper tubes passed through the same and fed from two force feed pumps. The pure castor oil, which is the material preferably used, passes to each of the two sets of cylinders through fine perforations in the shaft.

Abstracts from the 50 Best Foreign Papers

Digest Along Technical Lines for Engineers

Methods for joining aluminum parts, other than by flanging and riveting, are reviewed with the special object of determining the maximum strength of true soldering joints. With regard to autogenous welding, Spring has shown that two pieces of aluminum heated to 400° C. and pressed together are slowly united. W. C. Heraeus, of Hanau, heats pieces of aluminum by means of a hydrogen blower and hammers them together. In this manner tubes are formed almost equal to drawn. Rapid oxidation is the greatest hindrance to soldering and welding. When metallically clean, aluminum at once takes on a film of oxide which effectually prevents the uniting with another piece of metal coated likewise. There is needed a flux to prevent or dissolve this formation. The "Autogen" Company has a process for dissolving the oxide and forming a slag which isolates the weld-place airtight. For true soldering a great number of solder preparations are used corresponding to the great number of aluminum alloys in the market. A. Minet states in *L'Electrochimie* that Otto Nicolai uses a zinc-tin alloy and gets firm joints by covering the solder-place with powdered chloride of cadmium or iodide of cadmium. This is believed to be the process referred to later in the tests of "Grubelin" flux. Dr. Edw. D. Self says the skin is a film of clay, but gets results, by using vaseline or paraffine as flux, with any one of four solder alloys: (1) One part silver and two parts aluminum; (2) 85 to 95 parts tin and 15 to 5 parts bismuth; (3) 99 parts tin and 1 part bismuth, but this is improved by adding 1 part aluminum; (4) 90 parts of tin, 5 parts bismuth and 5 parts aluminum. He states that good cleaning and cautious heating (not exceeding requirements for fusion) are necessary and that the solder should be put on with a soldering iron. W. S. Bates stated before the American Chemical Society at Chicago that 70 parts of aluminum and 30 parts of tin gives a very firm joint, but that in course of time the molecules change their positions and the joint gives way; also that 81 parts of aluminum with 19 parts of copper, while not so fusible as the other composition, makes a lasting joint. But the best results, Bates says, are obtained with 70 parts of aluminum, 20 of tin and 10 of copper or silver, and a joint made with this solder proved perfectly durable and was not affected by immersion in water for two months. For the soft solders, Bates used as a flux chloride of zinc, stearin, soap, sugar, chloride of mercury and some iodides; for the hard solders and higher temperatures he used borax, fluoride of alkali, chloride of lithium.

Some time ago a ready-to-use aluminum solder, together with a flux designated in trade as "Grubelin," was brought into the market. The fusion point of the solder is 230° C. or no higher than that of tin. With this, it seems, sheets, tubes, wires and even cast pieces may be joined strongly and lastingly. By reason of the low melting point, even sheets and wires not more than one-tenth of one millimeter in thickness may be soldered. In using this process, the work is cleaned with a scraper, not with sand or emery, and heated by means of a Bunsen burner or a blowpipe, small pieces of the solder being placed on the work after the latter has been sprinkled with the flux. But the work may also be done as soft soldering, the solder being rubbed on with the heated soldering-iron till the surface is covered. By the rubbing, the oxide skin just formed by the heat is removed.

This was tried in the Royal (Prussian) Laboratory for Testing of Materials, with aluminum sheets bought in the open market. Strips of 30 mm. width were cut from the sheets and soldered with varying overlapping. A scraper was used to brighten the surfaces, and the areas were at once covered with solder, a copper wire being used to distribute it. The two areas were placed against each other, held with two tongs and heated over the Bunsen burner. As soon as the solder began to melt, the copper wire was used to apply a little more of the solder along the edges of the seam, and then the work was allowed to cool under the pressure of the tongs. The soft soldering part of the test was carried on in the customary manner, but without sal-ammoniac or water. To obtain a basis for judging the strength of the joints, the strength of aluminum strips 30 mm. wide was first determined in their original condition and subsequently after they had been heated in the Bunsen flame. The result of this was as follows:

Sample No	Condition	Measurements			Breaking Load	
		Width cm.	Thickness cm.	Area of Section sq. cm.	Observed kg.	Tension kg per. sq. cm
1	As bought	3.0	0.05	0.15	330	2000
2	As bought				317	2100
3	Heated over Bunsen Burner				132*	880
4					164	1090

From this it is seen that the aluminum sheet loses about one-half its strength in being heated for soldering, and consequently the soldered joint must for this reason alone be weaker than the sheet in its original condition. Probably the rolling process gives the sheet the higher strength which it loses by heating. The data of the solder joints are given in the following table:

Sample No.	Dimensions of Seam		Method	Done by	Breaking Load		Location of Fracture
	Length cm.	Width cm.			Observed kg.	Tension kg. per sq. cm.	
1	1.8	3.0	heated over Bunsen burner	by inventor of process	156	1040—1	—1 = outside the soldered area. —2 = in the soldered area. —3 = in the seam —4 = in seam when adjusted for test.
2	1.2				158	1050—1	
3	1.6				150	1000—2	
4	1.0				136	910—2	
5					156	1040—1	
6	1.0				148	990—2	
7	1.0				138	920—3	
8	1.0				134	890—3	
9	1.0		with soldering iron	by locksmith employed at test station	...	—4	
10	1.0				50	330—3	
11	1.0				...	—4	
12	1.0				156	1040—2	
13	1.0				66	440—3	
14	1.8		cautiously over Bunsen flame		258	1720—1	
15	1.2				214	1430—2	
16	0.6				200	1330—1	

Samples 4 to 8 and 9 to 13 were produced by soldering two sheets of 16½ cm. width to one another, so that a seam was made of 16½ cm. in length, and these sheets, so joined, were then cut in strips of 3 cm. in width, with the seam in the middle. The tests show that the firm joints may be made of sheets 0.05 cm. thick and that the strength of the joints, in the case of rolled sheets, depends on the heat. Sample No. 14 gave the best results through very cautious soldering, the strength being reduced only 330 kg. per square cm., or 16 per cent. below the average strength of the sheets before heating, which was 2,050 kg. In other words, the soldered joint reached 84 per cent. of that of the material itself, while the latter by mere heating to red would have lost 50 per cent.

A very recent soldering method consists in nickel-plating the parts to be joined and then proceeding to solder with usual tin solder and soldering-iron. This method is, so far as experience has shown to date, dependable, besides being easy to carry out.—*Metall-Technik*, Nos. 20 and 21, 1910.

An immediate patina for copper and bronze, taking the place of the offensively bright metallic surface, may be produced at a pinch by very simple means. The method is not one that gives absolutely lasting results, as when an etching solution is used, but it is quicker and cheaper and lends itself to many variations in the shades. It consists simply in sandblasting the object until the metallic brightness has given way to a matt effect, then brushing into this matt surface powdered dry coloring matter, as fine as possible and of the main shade which it is desired to obtain in the finished article. Usually Paris green or chrome green with an addition of brown or black will serve the purpose; even a powdered brown alone will do. The metal takes a satiny appearance and a light after-brushing will remove an excess of color. There will always remain an adhering coat of coloring matter in the minute furrows and indentations caused by the sandblast. The object is then dipped in a bath of transparent varnish or shellac and left to dry in a dust-free drying room. The shellac does not only protect the coloring matter, so it will not readily wear off, but also imparts a lustre to it.—*La Vie Automobile*, July 9.

Complete independence of cooling methods is promised by Martin-Saxton, an engineer, who proposes to lengthen the cylinder to make the lubricated and tight-fitting lower portion of the piston work in the lower continuation of the cylinder, this continuation being isolated from the upper portion by a non-conductive ring, and on top of the lower portion of the piston to have a loose-fitting cylinder which is independent of lubrication.

Manual training at universities.—The university of Göttingen has made arrangements by which science and medical students may learn the practical parts of laboratory and experimental work at the manual training school maintained by the city of Göttingen. The courses for the students remain under the direction of the university authorities and are paid for through the latter.—*Werkstatts-Technik*, July.

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*Was broken by adjustment in the machine.

Aviation News of the Week

FOLLOWING the line of experimentation laid down by Glenn H. Curtiss when he dropped fifteen out of twenty-two bombs within the outlines of a battleship while flying at full speed and at varying elevations in his aeroplane at Keuka Lake, the United States Government has just completed a lot of research work to develop the possibilities of the aeroplane as a military and naval factor.

The conclusions of the officers were that there is no firearm in existence that can cope with the perfected type of aerial torpedo craft and that such perfected aerial torpedo craft will become stable adjuncts of the navies of the world within five years.

In the way of protection, the tests were intended to prove that steel nettings or similar devices would shield ships, men or forts from bombs or torpedoes projected from aeroplanes. According to reports rendered to the War Department, the momentum caused the experimental shells used by the authorities to crash through a steel wire net so closely woven as to equal the resistance offered by a sheet of half-inch steel.

The main points urged by the advocates of the aeroplane are as follows: Small possible casualties; low cost; small target; invulnerability of machine and crew through simple protective armor; efficiency against ships, troops, or forts; mobility and facilities for gaining information of the disposition of an enemy's forces.

Inspection of aeroplanes is being seriously considered by the United States Government, according to recent announcement. The French Government is also about to install some sort of an inspection system.

An even dozen entries for the *World-Post Dispatch* prize of $30,000 for a flight between St. Louis and New York have been made or are about to be made. Among the entrants are the following: Harry S. Harkness with an Antoinette monoplane; Louis Strang, a Bleriot; Philip Wilcox, Joseph Seymore, George Russell, Tod Shriver, Walter L. Fairchild, and Israel Ludlow.

Clifford B. Harmon, who may make a try for the prize, is trying to influence Louis Paulhan to enter the contest, but on account of the legal tangle that followed the last attempt of Paulhan to aviate in this country, there is small chance of his doing so.

Rheims Aviation Meet Brings New Results

The complete official results of the second annual Rheims aviation meeting are as follows:

Grand Prix de Champagne offered to the builder whose three machines fly the greatest total distance

	Miles
Antoinette monoplanes, Antoinette 8-cylinder motor......	1616
Bleriot monoplanes, Gnome 7-cylinder motor............	1430
Henry Farman biplanes. Gnome 7-cylinder motors......	1181
Sommer biplanes, Gnome 7-cylinder motors..............	850

Greatest Distance in a Single Flight

	Miles
R. Labouchére, Antoinette monoplane, Antoinette motor	211
Olieslagers, Bleriot monoplane, Gnome motor............	139
Tetard, Henry Farman biplane, Gnome motor............	115
Cattaneo, Bleriot monoplane, Gnome motor..............	111

Note.—Last year's record, Henry Farman, 111 miles.

Gordon Bennett Elimination Race, 62 1-10 Miles

	Time
Alfred Leblanc, Bleriot monoplane, Gnome motor........	1:19:13 3-5
Hubert Latham, Antoinette monoplane, Antoinette motor	1:24:58 3-5
R. Labouchère, Antoinette monoplane, Antoinette motor	1:25:24

Altitude Prize Brings Out Large Field

	Feet
Hubert Latham, Antoinette monoplane, Antoinette motor	4540
George Chavez, Bleriot monoplane, Gnome motor........	3772
Morane, Bleriot monoplane, Gnome motor..............	2460
De Baeder, Henry Farman biplane, E. N. V. motor......	1640
Cattaneo, Bleriot monoplane, Gnome motor..............	1345
Tetard, Henry Farman biplane, Gnome motor..........	1321
Lindpaintner, Sommer biplane, Gnome motor............	1131
Louis Wagner, Hanriot monoplane, Darracq motor......	961
Nieuport, Nieuport monoplane, Nieuport motor..........	298

Note.—Last year's record, Hubert Latham, Antoinette monoplane, 508 feet.

Military Officers' Competition, 31 Miles

	Time
Lieut Cammermann, Farman biplane, Gnome motor....	:46:50
Lieut. Fequant, Farman biplane, Gnome motor..........	:47:40

Ladies' Prize, Not Heavily Competed For

	Miles
Mme. Delaroche, Voisin biplane.........................	3

Passenger-Carrying Prizes—With One Passenger

Aubrun, Bleriot monoplane, Gnome motor, 85 miles in..	2:09:07 4-5

Passenger-Carrying Prizes—With Two Passengers

	Miles
Mamet, Bleriot monoplane, Gnome motor,................	58

Note.—Last year's record, Henry Farman, 6 miles in :10:39 with two passengers.

Speed Tests, Distance 12 2-5 Miles

	Time
Morane, Bleriot monoplane, Gnome 100-h.p. motor...... Average, 66 1-10 miles an hour.	:12:45 3-5
Alfred Leblanc, Bleriot monoplane, Gnome 50-h.p. motor	:12:55 4-5
Olieslagers, Bleriot monoplane, Gnome 50-h.p. motor....	:13:15

Note.—Last year's record, Glenn H. Curtiss, :15:15 3-5.

Speed Tests, Distance 6 1-5 Miles.

Morane, Bleriot monoplane, Gnome 100-h.p. motor......	:05:42 2-5
R. Labouchère, Antoinette monoplane, Antoinette 50-h p. motor	:06:31
Alfred Leblanc, Bleriot monoplane, Gnome motor......	:06:33

Note.—Last year's record, Louis Bleriot, :07:47 4-5.

Speed Tests, Distance 3 1-10 Miles

Morane, Bleriot monoplane, Gnome 100-h.p. motor......	:02:48 2-5

Note.—No record for this distance last year.

Michel Ephrussi Cross-Country Race, About 18 Miles

	Time
Alfred Leblanc, Bleriot monoplane, Gnome motor........	19:14 1-5
Louis Wagner, Hanriot monoplane, Darracq motor......	:20:57 4-5
Nieuport, Nieuport monoplane, Nieuport motor..........	:23:22 3-5
Pischoff, Werner monoplane..............................	:24:46 1-5
Lindpaintner, Sommer biplane, Gnome motor............	:25:51 1-5
Marcel Hanriot, Hanriot monoplane, Clerget motor......	:26:35
Aubrun, Bleriot monoplane, Gnome motor................	:29:34 2-5

Michelin Prize

Olieslagers, Bleriot monoplane, Gnome 50-h.p. motor, 244 miles	5:03:05 1-5

Note.—Previous record, Henry Farman, 145 miles in 4:17:53.

Totalization of Heights (minimum of each 330 Feet)

	Feet
Hubert Latham, Antoinette monoplane, Antoinette motor.	26,552
De Baeder, Farman biplane, E. N. V. motor............	21.194
Morane, Bleriot monoplane, Gnome motor..............	14.225
George Chavez, Bleriot monoplane, Gnome motor........	7.273
Cattaneo, Bleriot monoplane, Gnome motor..............	3 811
Tetard, Farman biplane, Gnome motor..................	3,248
Lindpaintner, Sommer biplane, Gnome motor............	2.135
Louis Wagner, Hanriot monoplane, Darracq motor......	1,856
Nieuport, Nieuport monoplane, Nieuport motor..........	747

Greatest Totalized Distances

	Miles
Olieslagers, Bleriot monoplane, Gnome motor............	1,051
Weymann Farman biplane, Gnome motor..............	778
Fischer, Farman biplane, Gnome motor..................	720
R. Labouchère, Antoinette monoplane, Antoinette motor	716
Hubert Latham, Antoinette monoplane, Antoinette motor	574

Coming Events in the Automobiling World

Dec. 1...........	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Jan. 7-14, 1911...	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 16-21, 1911..	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4. '11.	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11, '11.	Chicago Coliseum, Tenth National National Automobile Show Under the Auspices of the National Association of Automobile Monufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill-Climbs, Etc.

July 30...........	Wildwood, N. J., North Wildwood Automobile Club, Speedway Races and Club Meet.
July 30...........	Long Island Motor Parkway, Track Meet.

THE AUTOMOBILE

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WE believe that associations of bankers have the same right to combine against the automobile as the American Federation of Labor had to boycott the Buck Stove & Range Company. Gompers, Mitchell and colleagues are now facing serious action on the part of the Court for persisting along lines which are looked upon as in restraint of trade. Under the heading "Bankers Find Many Automobile Crazy" the New York *Herald* of July 22 printed a press despatch as follows: "Mount Vernon, N. Y., Thursday.—The Westchester Bankers' Association believe the people of the country are automobile crazy. On information received by its members at a session at the Briarcliff Hotel to-day, it was decided to look carefully into the applications of those who wish to borrow money on notes. If it is found that the applicant is to purchase an automobile, the bank will use extreme caution in discounting his paper. It was said that hundreds of persons have either mortgaged their homes or hypothecated valuable securities to purchase automobiles in the last six months." According to this Bankers' Association, a man who purchases an automobile is either lacking in sense or dishonest. It is of course gratifying to know that these bankers disapprove of dishonesty; it saves a bank examiner considerable worry to know that he does not have to watch a "string" of banks, but when a grave body of respected citizens makes the broad claim that purchasers of automobiles hypothecate valuable securities, the public at large will be justified in believing that they at least know the meaning of the word.

STANDARDIZATION, from the users' point of view, is a subject that has received but scant attention, due to the difficulty involved in combining the many opinions as they are voiced in the light of the experience of autoists, and to the further fact that makers of automobiles find it a sufficiently large task to bring about a condition of the standardization of the materials used in automobiles. Some of the illustrations presented in this issue of THE AUTOMOBILE are believed to be sufficiently terse to furnish a basis for thought, but it is not enough to merely ponder over a matter of such wide importance; the subject is ripe for action.

* * *

AT the pending meeting of the Society of Automobile Engineers one of the important subjects for discussion relates to the standardization of materials for automobiles. Naturally enough, engineers are sufficiently keen to understand perfectly the impossibility of bringing about a condition of standardization of cars on a broad basis before the materials used are reduced to a definite level. It is fitting that the question of the uniformity of materials be disposed of, and while this subject is far from new, the fact remains that much of the progress made by the Mechanical Branch of the A. L. A. M. was lost sight of during the last year or two, owing to inactivity on the part of the Mechanical Branch, and to a famine of material during the last year.

* * *

TO some extent, the scarcity of materials for automobiles was brought about through the lack of standards. The promiscuous ordering of materials, to the high disregard of stock sizes, introduced a high percentage of special work, and according to producers, made it unsafe to manufacture certain sizes for stock. If the Society of Automobile Engineers succeeds in establishing a set of standards for materials, producers will then be in a position to safely stock up, and the probability of a protracted famine will be materially reduced. Beyond this, a reduction in cost will be a reasonable expectation, and as a further benefit, the average of quality will mount to a higher plane.

* * *

IN reviewing the life and work of the Society of Automobile Engineers attention is called to the diversity of the subjects that received consideration, and a closer study for purposes of estimating will lead to the conclusion that the working of the Society has had a marked influence on the reform of steel mill practice. It has always been claimed that American steel fabricators stood for quantity production, and that they preferred to disregard questions of quality in the absence of quantity. This was another way of saying that the quality of American product was not up to the highest standard. Persistent work on the part of the members of the Society, coupled with the understanding that the good steel would be purchased from abroad if it could not be had from fabricators in this country, furnished the necessary inducement, and as it stands to-day the American mill is endeavoring to suppress its longing for tonnage sufficiently to make a foothold for quality. Great progress has been made and it now looks as if the time will soon be here when standard grades of steel will be regular from American mills.

RATIONAL conclusion in body designing is one of the subjects in this number, and it suggests a line of thought that must be uppermost with the men who participated in the late Glidden Tour, and with autoists in general who have had experience beyond the confines of paved streets and improved highways. It is a well appreciated fact that cooling, for illustration, is not a difficult process when an automobile is traveling at a high rate of speed, so that the only time when the radiator is likely to be overworked is when the car is traveling at a low rate of speed on an upgrade, or when the car is standing at the curb and the motor is slowed down with the spark retarded. Hooding over the front of the car, then, is advantageous in that splashes of mud are not permitted to destroy the radiating value of the cooler surfaces, nor is the low temperature of winter time likely to induce a considerable repair bill due to freezing water, whereas the relatively small opening, as shown in the hooded front, is sufficiently large when a fan propels the air as it does at low speeds. In the Glidden Tour improvised methods obtained for this purpose, but in the Prince Henry Tour the cars were so designed that the radiators were protected.

* * *

STRANGE to relate, the average autoist takes kindly to an aggregation of accessories plastered all over the exterior surfaces of his car; he overlooks the fact that at some time or other in his past one of the scenes that made an indelible mark on the tablet of his memory was the old-fashioned peddler and his store on wheels, with pots and pans dangling from hooks, placed with such a fine display of ingenuity that not a space remained uncovered. It is not believed that the peddler's wagon was regarded as a work of art; it was simply curious.

* * *

IS the peddler's plan a good one to be adopted for the automobile? But, if it is, are there not almost insurmountable disadvantages? The peddler kept an eye on his wares, despite the fact that a purloiner would scarcely be able to carry away more than a dollar's worth if he loaded himself down. In the case of the automobile, if nimble-fingered gentry succeed in appropriating a tire, to replace same will make quite a gap in the sparse pocketbook of the man who economizes for the purpose of buying and using an automobile. There are other angles to this problem. Tires depreciate quite as rapidly when they are hung on the side of the car and the sun beats down upon them as they do when they are serving their useful purpose on the wheels. One of the points brought out in this study of a body, as presented, is the fact that the spare tire can be placed in a dark and safe storage compartment, where it will keep without deteriorating, and the nimble-fingered purloiner of other people's property will give one disdainful glance at the body so arranged and take himself away empty-handed, he being afraid of work.

* * *

WHEN the chauffeur holds the wheel the owner sits in the tonneau and enjoys himself, he having the friendly protection which the tonneau affords; but when the owner drives he finds himself in a more strenuous atmosphere, and despite the protection offered by gloves, the hands get cold, and steering at the higher speeds becomes a dangerous occupation. Disregarding the fact that the chauffeur becomes hardened to his life, and exposure is less of a detriment, it remains to be seen that automobile bodies can be so designed that to occupy the front seat is quite as pleasurable as to lie back in the tonneau. The coming of the torpedo type of body was the last straw that broke the camel's back separating the automobile from its predecessor, the horse-drawn vehicle.

* * *

IN the engineering section a method of predicting the efficiency of internal combustion motors is presented with as much freedom from complication as can be expected in view of the importance of the subject and the complex thermo-dynamic problems involved. Certainly the time has arrived in the career of the automobile engineer when to build a motor first and find out afterwards whether or not it is good should be labeled as a high crime. The fact that a motor is made in the exact image of some other design, even though the model taken seems to be a work of art, is not sufficient ground for assuming that a condition of finality obtains.

* * *

IT is impossible to copy the design of a motor and obtain precisely the same results as those which are available to the original designer, because there is no way of taking advantage of the reasoning process which must be entered into by an original designer; hence danger besets the plan of the copyist, and success, instead of being assured, is represented by a tantalizing mirage, because while it is possible to copy the form, there is missing from the effort not only the precise materials used, but the condition in which they reside as well.

* * *

SMALL automobiles, once so prevalent in America, find favor abroad. When the foreign maker builds a big "road locomotive" he has a cast in his eye which reflects an American millionaire as a prospective customer, but when he builds an automobile for the native clientèle he puts a pair of blinds over the cast and designs on a basis of fuel economy, which is the paramount issue abroad. But it is not in the fuel economy alone that the small automobile sells. The depreciation of a car is in proportion to the power of its motor, or to the square of its speed on the road for a given weight, and in proportion to the weight, all other things being equal.

* * *

THERE is one other point that the foreign designer keeps in his mind's eye when he builds for home consumption. He remembers that the depreciation of an automobile is largely affected by its weight and speed, and that the life of the car is measured by the length of time it will serve silently, rather than by the distance it will make before it breaks down. In order to accomplish the intended purpose the parts are fashioned in such a way as not to court lost motion; they are protected from the accumulations of the roadside, and the method of lubrication is given the minutest scrutiny. It will be worth while for the American patrons of foreign products to notice the fact that they are the subjects for special consideration, but the time may arrive when the cost of maintenance will go up, due to the price of repair parts.

Possibilities of Automobile Construction

By HOWARD E. COFFIN, President Society of Automobile Engineers

THERE are many novel vital problems involved in automobile engineering and manufacture. The vast amount of experiments and testing necessary to bring the art to its present stage must be greatly added to.

Nearly all European and American pioneer automobile inventors, designers and builders started in the same general way. For sound engineering reasons certain paths of merit have been followed. As a result of many years' work by the best engineers, a popular design for large cars has resulted, after long trial of different features of construction separately appearing in early vehicles, such as the joint production of Peugeot and Levassor in the early nineties, and the production of Renault, Maybach, Bouton and some American engineers. The past several years have seen a substantially standard arrangement in small cars, so far as the principal component elements are concerned; here other features more largely the production of American engineers are dominant.

Prior to 1906, when the American automobile really began to reach its present high development, automobile engineers hesitated to co-operate openly, though they had followed the work of the contemporaries with interested closeness. Knowledge from the experience of others had greatly benefited the industry. Such blind co-operation exists in every industry.

Since 1906 open, frank discussion between automobile engineers has resulted in their mutual benefit and the benefit of the public. Realization that many heads are better than one brought through open discussion of the competent, newer and better methods of automobile construction.

There is no possibility of the Society of Automobile Engineers becoming a trade adjunct, but through its committee work and recommendations for standardization in specifications and materials, much practical benefit will result to the trade and the public; the technical value of the society to its members as a result of the presentation and discussion of theoretical papers, research work, etc., at the same time being continually increased.

No one of intelligence will to-day controvert the statement that all things in automobile engineering which can be, should be standardized—those things, the uniformity of which in no way stifles meritorious originality of design, but facilitates economic production and benefits the public. Many specifications for materials, and the method of treating and testing them, are standard; and there will be many more such specifications. Much good work in the way of simplifying seamless steel tubing specifications has been done; more of which will follow soon. The "deliveries problem" in the sheet metal field will be much less imposing within a relatively short time. There is a demand for standardization in the case of wood wheel dimensions and fastenings for solid tires; lock washers, brake and clutch levers; the various articles for the supply of which automobile manufacturers depend on automatic screw machine companies; round cornered square holes, spring shackle bolts; clutch leather.

There is an almost limitless field for good and an immediate necissity for action by way of standardization or such co-operation on the part of automobile engineers as amounts to the same thing. The automobile industry has sprung up like a mushroom, outstripping the detail engineering development which normally accompanies gradual growth. Lack of concerted work on the part of engineers, of standard reference tables, disregard of uniformity in material specification, can only result in greatly increasing the already existing great amount of needless expense, delay and vexation of automobile production.

A. A. A. Contest Board Disqualifies Buicks

At the last meeting of the Contest Board of the A. A. A., with Chairman S. M. Butler presiding, action in the matter of Buick models 16A and 16B was taken, disqualifying such models in all stock contests in which they participated during the race meeting at Indianapolis Speedway July 1, 2 and 4.

As cars of these models finished first in several of the races, the ruling will change the ownership of a number of purses and prizes and the effect on the general automobile contest situation may be radical.

The matter of the competence of Buick models 16A and 16B to enter stock car events was first brought into question at the Spring meeting at Indianapolis, when the cars were disqualified prior to the start. W. C. Durant, of the General Motors Company, made a sharp protest at that time, but was overruled by Chairman Butler.

When these cars were allowed to start in the recent races at Indianapolis it was supposed that the status of the models had been established, all of which adds to the suddenness of the blow. Mr. Durant left New York for Flint, Mich., early this week and nothing concerning the attitude of the General Motors Company could be learned, in his absence from the New York offices of that concern.

Mr. Butler, while making the announcement officially, would not comment upon its possible effect.

The general impression along Automobile Row was that the ruling is the first gun in what may prove a general engagement, the outcome of which may be a new alignment of the forces of motordom.

The possibilities involved are of such deep moment that few responsible leaders of the trade would hazard an opinion upon the matter.

Maryland Refused Motor Reciprocity

Baltimore, Md., July 25—Through Highway Commissioner Joseph W. Hunter, Pennsylvania has refused Maryland's overtures for reciprocal relations. In his letter to Motor Vehicle Commissioner John E. George, Mr. Hunter states that no matter what concessions Maryland may make, he has no authority to waive any of the provisions of the Pennsylvania motor car laws. This means that Marylanders who desire to pass through Pennsylvania or go to points north will have to pay the annual $10 license fee.

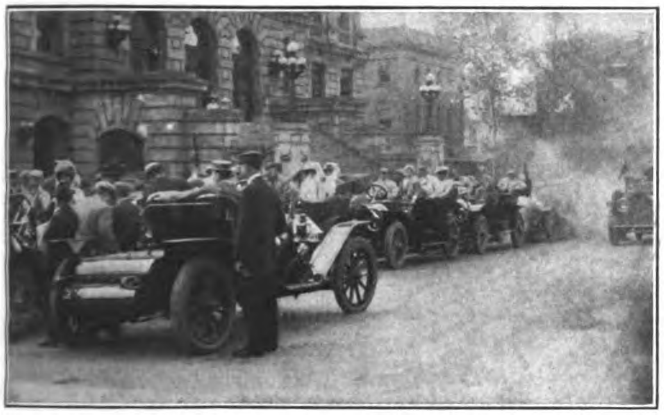
Marylanders will be at the same disadvantage that the laws of this State place upon Washingtonians. Persons in the District of Columbia are refused under the Maryland law a limited license at a reduced price for those who wish to go through Maryland. Thus Maryland seems to be getting a dose of its own medicine in consequence of the decision of the Pennsylvania authorities.

The District of Columbia authorities, because of Maryland's decision, have decided that Maryland motorists will have to pay $2 every time they want to go to Washington or pass through the District. And the motorists of all the States and sections are the ones who have to stand the hardship.

New speed rate notices have been designed by Special Officer Noah Walker, of West Arlington, to be placed along Park Heights avenue, the most popular thoroughfare out of the city. These signs explain the rate per hour permitted under the new law. The signs are of galvanized iron, circular in shape, a foot and a half in diameter. They will be placed on iron posts protruding less than two feet above the ground along the side of the highway. One side is painted bright red, while the opposite side is worded in large black letters with a bright yellow background.

Syracuse "Instructive" Run Proves Enjoyable Affair

SYRACUSE, N. Y., July 25.—The Automobile Club of Syracuse held last Wednesday its first contest for the B. E. Watson trophy, donated by a member of the club. It was an instructive run, so called, based upon the provisions of the new automobile law which takes effect in the Empire State August 1. A secret time was established by a committee of which President Hurlburt W. Smith was chairman.



Start of Watson-Cup Run from Syracuse Court House

The time, based upon all requirements of the new law, was fixed at 6:07 3-4 for a run from the Court House here to the Spring House at Rexford Falls, where dinner was taken, and return. The cup was won by T. E. Lawless, one of the new members of the club, in 6:06 3-4, just a minute faster than the set time.

Mr. Lawless's car was a Maxwell. Miss Nettie Grody won, with a Pullman, a handsome silver cup donated perpetually by the club to the woman driver coming closest to the secret time. Miss Grody's time was 6:03. Mrs. Henry E. Mills, in a Franklin, was next among the women with 5:50. There were three other women drivers. The men finishing nearest to Mr. Lawless's time were W. J. Latimer, 6:02, and F. L. Wightman, 6:10.

Thirty-seven automobiles started, carrying 173 people, and all finished. The total value of the cars making the trip was estimated at $111,000. No confetti was used in the trip to mark the way.

Ideal weather conditions prevailed, the roads were in fine condition, and the route was pronounced one of the most picturesque in the State.

A feature pleasantly noticeable was the interest displayed by residents of the villages through which the automobiles passed.

The mechanical experts on the trip considered it a good, hard test for the cars, some of which were four or five years old, and that the run was made with a total of four punctures, forming the entire list of mishaps, was considered a splendid commentary upon general automobile construction of the present day.

The official summary follows:

No. Name	Car.	Time
1—H. W. Smith (non-contestant)	Packard	....
2—B. E. Watson (non-contestant)	Oldsmobile	....
3—M. C. Smith	Amplex	5.06
4—George E. Messer	Franklin	5.14 1-2
5—H. W. Chapin	Thomas-Detroit	5.02 1-2
6—P. B. Ward	Winton	6.21 1-2
7—Charles Ludwig	Cadillac	5.35
8—P. E. Peacock	Buick	6.17
9—A. T. Brown	Packard	5.10 3-4
10—H. D. Weed	Speedwell	5.25
11—Strait & Shaw	Welch	5.36
12—D. Millen	Buick	5.35 3-4
13—R. P. Byrne	Speedwell	6.14 1-2
14—J. J. Barber	Pierce-Arrow	5.39
15—Mrs. L. P. Kellogg	Buick	5.39
16—Miss Nettie Grody	Pullman	6.03
17—Mrs. H. E. Mills	Franklin	5.50
18—G. L. Mardin	Selden	5.57 1-2
19—Charles A. Smith	Oldsmobile	5.58
20—A. M. Chase	Chase	5.45
21—E. L. Wright	Maxwell	5.51 1-2
22—A. J. Conine	Buick	5.46 1-4
23—F. L. Wightman	Winton	6.10
24—E. C. West	Stoddard-Dayton	5.59 1-2
25—George J. Arnold	Cartercar	5.47
26—Mrs. J. E. Heffernan	Knox	5.43 1-2
27—George J. Hessler	Franklin	6.16
28—W. J. Latimer	Buick	6.02
29—W. L. Brown (non-contestant)	Interstate	....
30—T. E. Lawless (winner)	Maxwell	6.06 3-4
31—Mrs. Susan Millan	Packard	5.43 1-2
32—H. H. Baker	Pullman	5.21
33—Dr. Albert Fisher	Selden	5.54
47—C. A. Benjamin (non-contestant)	Packard	5.21
48—H. F. Smith	Franklin	6.33 1-2
49—N. C. Hyde (non-contestant)	Chalmers-Detroit	5.40 1-2
50—F. Wilkinson (non-contestant)	Franklin	5.45 1-2

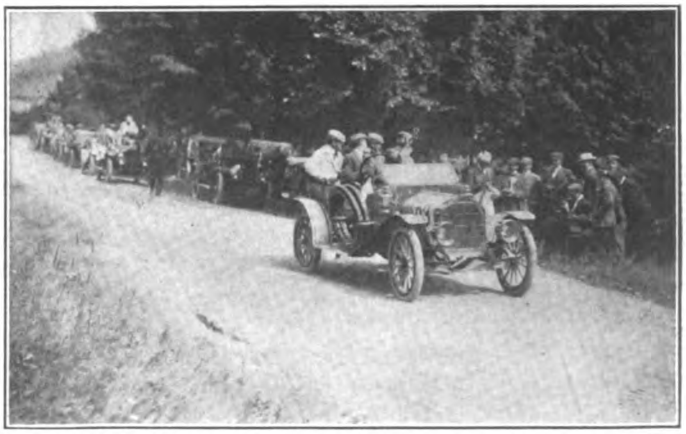
Bay State Notes of Automobile Interest

BOSTON, July 25—The Massachusetts Highway Commission is having completed this year about 50 miles additional of State highways that will fill in gaps here and there on through routes, and when the work is ended it will be possible to go from Boston to many large cities without leaving the State roads.

The South shore roads are getting much attention and very soon it will be possible to motor from Boston clear to the end of Cape Cod, returning by way of Buzzard's Bay, all on State roads, except where small villages are passed. The roads running through the center of the State are now nearly finished, while the northerly ones touching New Hampshire have been completed for some time. New Hampshire has made much progress with her State highways that come down to meet the Massachusetts roads. And Maine has taken up the work and appropriated a large sum to construct a decent road from the New Hampshire line through to Portland. That particular road has always been dreaded by motorists who knew its conditions, and many of them went to New Hampshire rather than go over it to Maine. These improvements will make motoring more of a pleasure to New Englanders and attract many visitors as well.

The Easton Machine Company has taken the salesrooms made vacant on Hereford street, Boston, by the retirement of the Hol-Tan company, as headquarters for the Morse car, made at Easton, Mass.

The Boston branch of the Winton company will be moved in December from the present quarters on Berkley street to a new building being erected on Commonwealth avenue in the vicinity of of the Packard, Buick, Peerless and Studebaker buildings. The new building will hold three motor companies, and C. F. Whitney with the Stoddard-Dayton and Alco cars will be another occupant. The Winton will occupy the center of the building.



First car in Watson-Cup contest returning to Syracuse

Brighton Beach Matinee Brings

BETWEEN 12,000 and 15,000 automobile enthusiasts paid admission Saturday to witness the program of nine races staged at Brighton Beach by the Motor Racing Association. The card was attractive and well filled, and there was enough incident and excitement during the afternoon to hold the interest of the spectators.

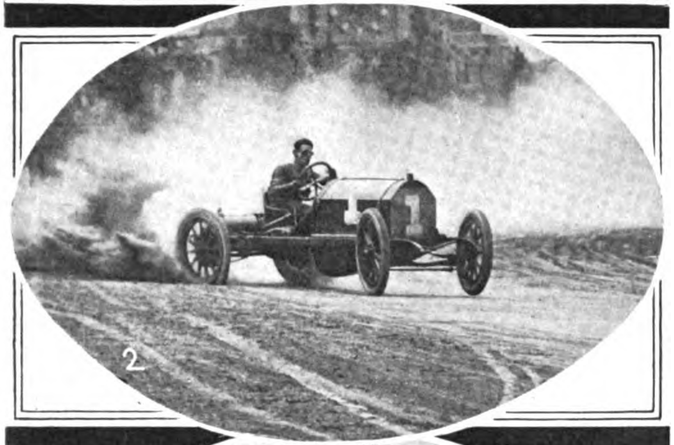
Caleb S. Bragg, in the amateur handicap event, proved the star of the matinee. Starting from scratch he pushed his big special Fiat along at a hair-raising speed and was picking up his field with ease when in making the turn into the stretch during the third circuit his car skidded and before he could regain control the radiator was butted through the infield fence. The driver kept his head and making a quick turn shot through the fence at a different point, took up the chase once more and managed to get to the wire ahead of his field by about 50 yards.

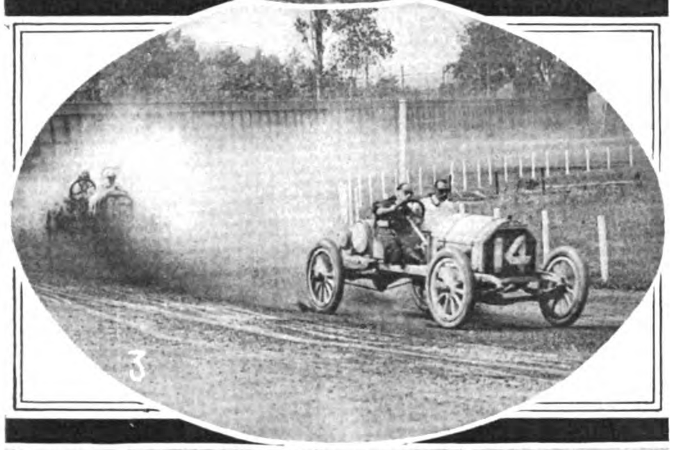
The duel between the Simplex "90" and the Fiat "60," run in two heats, the first of five miles and the second in two miles, resulted in a victory for the former. In the first heat the Fiat led for three miles, when the Simplex, moving fast in the stretches and hanging close on the turns, caught and passed its rival, winning very easily in 4:41 3-5. As an indication of the margin the Simplex had in the final mile, it may be cited that the time of the fifth mile was 10 seconds slower than that made in either the third or fourth circuits. In the second heat the Fiat broke first and led for a mile and a quarter, when the Simplex collared its rival and came on to win by three lengths in 1:49 4-5, last mile in 51 4-5, a new mark for the track.

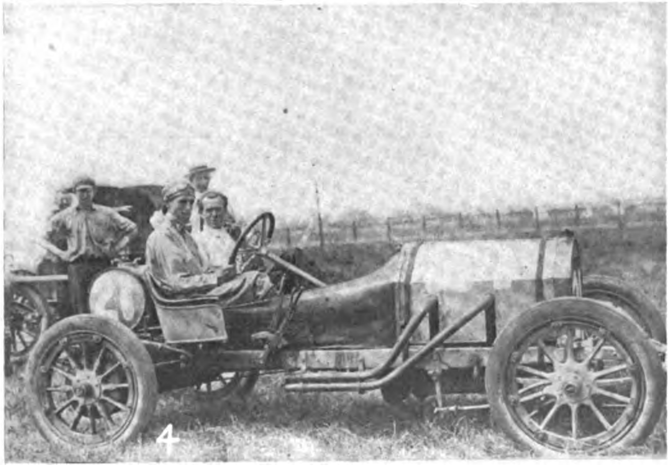
Tire trouble was plentiful in the match race and in several of the other events on account of a sharp edge at the head of the stretch, where the turn had been cemented and the cars were obliged to plunge off the cement at an angle that proved trying to the tires. There was an agreement in the match race that in case of tire trouble in any heat the heat might be run over. Both contestants were obliged to take advantage of the rule and the Simplex finished the first heat on flat tires.

The hour race was well filled and its running was sharply contested. The carded field consisted of eight machines, and while S. P. O. No. 17, which broke its steering knuckle in its class race, and the Buick No. 16, winner of its class race, were withdrawn their places were taken by the Croxton-Keeton and the Palmer-Singer. The Simplex "50" got away with the gun, trailed by the Palmer-Singer and No. 20, S. P. O. The rest of the field was close up, the tailender being the Croxton-Keeton, which took a position on the rail and plugged steadily along during the whole hour, going faster at the end than at the beginning. The Marion and the Cole "30" also trailed the early pace.

When the cars had settled down to hard work the Simplex was in front with the No. 20 S. P. O. second and the Palmer-Singer third. This order was maintained to the twentieth mile, when the S. P. O. was driven up to the pacemaker and in a fierce struggle managed to lead the Simplex down the length of the back stretch. There the S. P. O. had enough and after trailing for a few circuits limped around to the stable turn, where adjustments were made. During this process the car was lapped a couple of times and the Palmer-Singer succeeded to second place. The Marion came along steadily between this point in the race and the thirty-third mile and was lying in fourth position when the Simplex threw a tire, leaving the Palmer-Singer out in front with the Marion in second position. By the time the Simplex returned the Palmer-Singer was a mile and a half in front and it held the lead until the fortieth mile post, when it was taken to the pits for new tires. In the meantime the Simplex, coming with a whoop, assumed the lead again and held it to the end, winning by a fraction of a lap from the Marion, which appeared to be gaining slightly upon the winner. The Palmer-Singer despite its hard luck was third, while the Cole was fourth







1—Start of Event 7, in which the Fiat beat the Simplex

2—De Palma's Fiat throwing a tire at head of the stretch

3—Lorimer's Chalmers leading the Beardsley Buick in Event 5

4—Louis Disbrow and the Marion, mile trophy winners

Great Enjoyment and Success

and the Croxton-Keeton fifth. S. P. O. No. 20 was sixth and made the last mile two seconds faster than the winner. The Houpt-Rockwell was on three cylinders for 10 miles of the 43 it covered and the S. P. O. 23 retired with a score of only 18 miles.

The first event was between two Hupmobiles and was won by No. 7. The farther the cars went the greater was the lead of the winner. The final margin was over half a mile. The second was between a Cole "30" and a Patterson. The latter led most of the way to the tenth mile, where the Cole galloped away, winning by the length of the stretch.

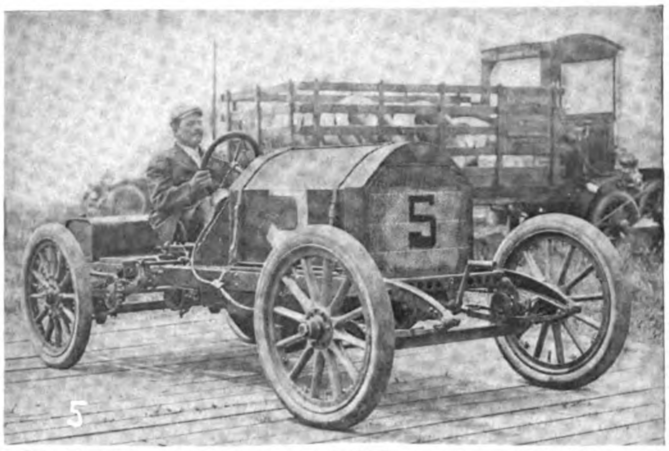
The fourth found a field of five, including three S. P. O. cars entered by different owners, a Marion and a Correja. The Marion won a beautiful race from S. P. O. No. 23 and S. P. O. No. 20. It was in this race that S. P. O. No. 17 broke its steering knuckle. Correja was on three cylinders most of the way.

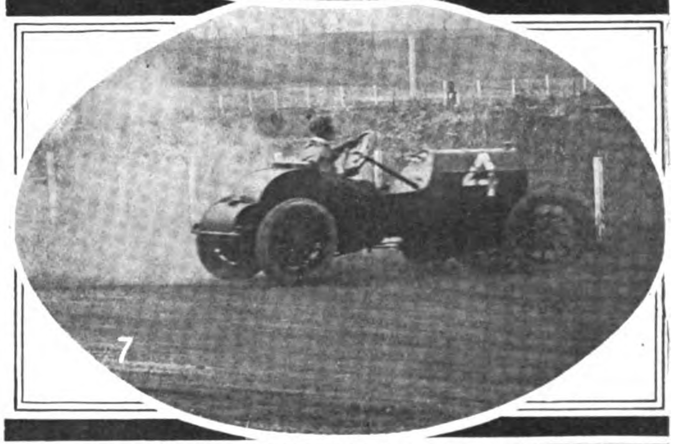
No. 16 Buick won the fifth event in a sharp drive all the way from the Chalmers entry. The Midland narrowly escaped accident, striking the fence at the head of the stretch, but continued to the finish. The seventh was captured by the Fiat "60," which took a winning lead after the fourth mile. The Simplex "50" was second and the Knox third with a quarter of a mile interval separating them. The Knox suffered severely from tire troubles and finished on two flat tires.

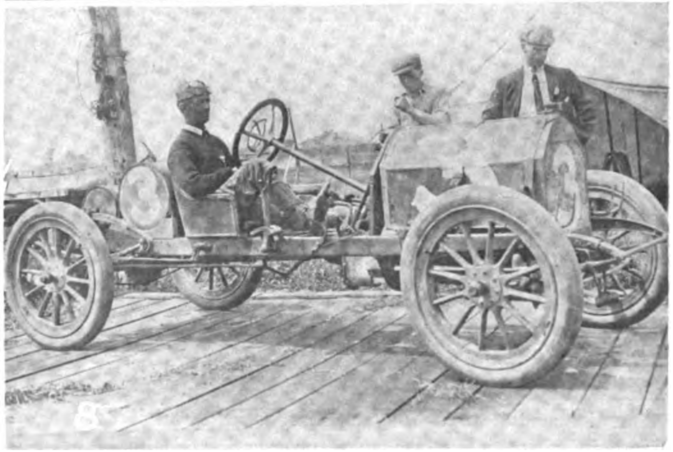
The Fiat No. 4 won the free-for-all with ease. The Knox was second and the Midland took the small end of the purse. Buick No. 16 appeared a certain contender for second honors until the eighth mile, when it retired. The Hupmobile completed eight circuits and The Only Car made two less.

A. B. Cordner was chairman of the racing committee and H. M. Swetland presided as referee. The summary:

Event 1, Class C, Division 1C—Awards: $100 to winner, $50 to second; ten miles—				
No.	**Car**	**Entrant**	**Driver**	**Time**
7	Hupmobile	C. B. Derby	C. B. Derby	13:35 3-5
8	Hupmobile	H. J. Koehler	A. C. Dam	14:26 3-5
Event 2, Class C, Division 2C—$100 first, $50 second; ten miles—				
3	Cole "30"	Colt-Stratton Co.	"Bill" Endicott	12:32 3-5
6	Patterson	W. P. Mallon	H. A. Neeley	12:44 3-5
Event 3, Special Match Race—Purse $500; first heat five miles; second, two miles—				
5	Simplex "90"	Simplex Auto Co.	Robertson	4:41 3-5
1	Fiat "60"	Fiat Auto Co.	De Palma	
Second heat—				
5	Simplex "90"	Simplex Auto Co.	Robertson	1:49 4-5
1	Fiat "60"	Fiat Auto Co.	De Palma	1:50 3-5
Event 4—Class C, Division 3C—$100 and Milo trophy, first; $50 second; ten miles—				
21	Marion	C. E. Reiss	L. A. Disbrow	10:55 2-5
23	S. P. O.	S. E. Wishart	S. E. Wishart	11:11
20	S. P. O.	H. S. Lake	J. Juhasz	11:52
Event 5, Class C, Division 4C—Ten miles; first $100, second $50—				
16	Buick	R. E. Beardsley	R. E. Beardsley	10:05 2-5
14	Chalmers	C. H. Page Co.	L. Lorimore	10:09 3-5
19	Midland	J. M. Boyle	Leo Anderson	10:40
Event 6—Five miles, amateurs; trophies for first and second; handicap—				
4	Fiat (scratch)	C. S. Bragg	C. S. Bragg	4:46 1-5
24	Simplex (15)	James Doig	Doig	5:09 2-5
16	Buick (20)	R. E. Beardsley	Beardsley	
23	S. P. O. (30)	S. E. Wishart	Wishart	
25	White St. (55)	E. A. Bofinger	Bofinger	
Event 7, Class C, Division 5C—First $100, second $50; ten miles—				
1	Fiat	Fiat Auto Co.	De Palma	10:00 2-5
9	Simplex "50"	Simplex Auto Co.	Robertson	10:10
2	Knox Giantess	Mrs. J. N. Cuneo	L. A. Disbrow	
18	Palmer-Singer	P.-S. Mfg. Co.	Harry Cobe	
8	Houpt-Rockwell	H. S. Houpt Mfg. Co.	S. Martin	
Event 8—Free-for-all—$200 first, $100 second, $50 third; ten miles—				
4	Fiat	C. S. Bragg	C. S. Bragg	10:09 1-5
2	Knox	Mrs. J. N. Cuneo	Disbrow	10:30
19	Midland	J. M. Boyle	L. Anderson	10:38 2-5
16	Buick	R. E. Beardsley	Beardsley	No fin.
8	Hupmobile	H. J. Koehler	A. C. Dam	No fin.
26	The Only Car	W. D. Gloat	Gloat	No fin.
Event 9—Hour race; $300 first, $150 second, $75 third, $25 fourth; and $200 gold watch to winner—				miles
9	Simplex	Simplex Auto Co.	Robertson	53 1-2
21	Marion	C. A. Reiss	Disbrow	53 1-4
18	Palmer-Singer	P.-S. Mfg Co.	Cobe	52
3	Cole "30"	Colt-Stratton Co.	Endicott	51
12	Croxton-Keeton	C.-K. Company	W. C. Spenney	49
20	S. P. O.	H. S. Lake	J. Juhasz	48
8	Houpt-Rockwell	H. S Houpt Mfg. Co.	S. Martin	43







5—G. E. Franquist, designer of Simplex 90 that won Event 3

6—Robertson, the Simplex driver, winning the hour race

7—Bragg going through the fence in the 10-mile free-for-all

8—"Bill" Endicott, who handled the Cole very cleverly

Detroit Hears of Electric Truck Plant's Coming

DETROIT, July 25—One of the most important expansions with which the local automobile industry has been identified in some time is foreshadowed by the announcement of President Walter E. Flanders, of the E-M-F Company, that the electric commercial vehicle plant of the Studebaker Manufacturing Company will be moved to this city from South Bend.

Immediately after the reorganization of the Studebaker-E-M-F companies, Mr. Flanders set about securing the consent of his associates to a centralization of manufacturing interests. The first step in this direction will be the establishment here of an electric commercial vehicle plant on an immense scale.

When the E-M-F Company took over the old DeLuxe plant and rebuilt it throughout as a home for the Flanders "20" most of the vacant property to the north was purchased, ostensibly for further expansion of the Flanders and constituent plants. Now plans have been prepared for factory buildings to house the newest addition to the local industry.

All that remains to be cleared up is the question of constructing a tunnel under the railroad lines dividing the property, through which to transmit power. When this is out of the way actual construction will be undertaken without delay, and it is stated that when completed the new plant will give employment to 2,000 skilled mechanics. This will make the fourth immense plant for the Studebaker-E-M-F interests in Detroit, the others being the E-M-F "30" plant on Piquette avenue, where new buildings are in process of construction; the Flanders "20" plant on Clark avenue, and a big factory on Franklin street. In addition there is a body factory at Pontiac and a large plant at Port Huron where rear axles for the "30" are manufactured.

This move puts an effectual quietus on unfounded rumors which have been circulated that Mr. Flanders contemplated resigning his present position and identifying himself with a new company. Mr. Flanders has strenuously denied this report, declaring himself satisfied where he is.

According to the State highway commissioner, Wayne County, in which Detroit is situated, has the finest roads of any county in the State. To those who have toured Michigan in unfavorable weather this may not seem like an achievement of which to boast; but the fact remains that within a short time all the principal thoroughfares leading out of Detroit will be in first-class condition, thanks to the activity of the county road commissioners. The paving of Woodward avenue has been completed to the county line, and Michigan, Gratiot and Grand River avenues, familiar to motorists the country over, are being improved as rapidly as possible. The Detroit Board of Commerce has taken the initiative in a move to secure a bond issue of $2,000,000 for good roads, and as an object lesson to unbelievers and to satisfy themselves about 100 members of that body indulged in a tour of inspection Thursday. What they discovered was plenty, and their findings will be incorporated in a report to be presented to the supervisors at an early date.

The resignation of Ernest Moross as general manager of the Indianapolis speedway has served to revive talk about a speedway for Detroit, on which Moross has long been figuring. Two or three sites have been under consideration for some time, and all that is necessary to make the undertaking assume tangible form is the financial backing. Whether that will be forthcoming remains to be seen, as in spite of the lead they hold in the matter of production Detroit makers have never been particularly partial to the racing game.

The Chalmers Motor Company has decided to withdraw from racing, in which it has been so successful, and the Hudson is counted among the new entrants.

Anent auto racing, the coming auto exhibit at the Michigan State Fair grounds will be further enlivened by races on Saturday of fair week, September 24. It is expected that the track, which is very fast, will be the scene of some good sport.

To accommodate employees in the new plant it will erect for the manufacture of Hewitt trucks in the northern part of the city, the Metzger Motor Car Company is preparing to build on a private right-of-way a half mile of street railway, running from Hamilton boulevard west to Twelfth street. The line will also connect with an extension of the Woodward avenue car tracks. Ground will soon be broken for the first of the buildings, which, it is expected, will eventually cover the entire 40 acres holdings of the Metzger company at this point.

Local automobile men are feeling the effects of the Grand Trunk Railroad strike in no uncertain manner, owing to the curtailment of accustomed shipping facilities in this quarter. Several of the larger plants are located on the Grand Trunk line, and the suspension of freight operations is alike hindering the receipt of cars for outbound shipments and the arrival of materials from outside points. Railroad officials give the assurance that the trouble will be brief and the fact that freight is beginning slowly to move bears out this statement.

The Charles H. Fuller Company has opened advertising offices in Detroit, with Martin V. Kelley and F. M. Randall in charge. Mr. Kelley recently disposed of his half interest in the McManus-Kelley Company, which removed to Detroit a short time ago, and F. M. Randall was associated with the Lord & Thomas Company up to the time of making this change.

What promises to be Detroit's biggest automobile show is scheduled for State fair week, September 19-24, when the motor interests will be found housed in a handsome new building, 125 by 275 feet, of two floors and affording ideal lighting conditions for show purposes.

There was a space drawing recently, and the entire ground floor went like hot cakes, being subscribed for in 30 minutes. Nearly every car handled in Detroit will be represented and the accessory firms are also showing interest in the display.

According to announcement, no expense will be spared to give the motor companies a suitable place to display their products. The new building will cost $40,000.

Progress is being made toward the completion of the various new motor car factories that have been in course of erection for the past two months or more, and early fall will see practically all of them in operation and working full capacity. Out in the Fairview district the new buildings of the Anderson Forge & Machine Company and the Hudson Motor Car Company, diagonally across from the Chalmers industrial group, are rapidly taking shape and have put an entirely different complexion on a district which, up to a few months ago, was nothing more than pasture land.

The Van Dyke Motor Company's new factory, 60 by 512 feet, at Campbell avenue and Leavitt street, has started operations and the first few of the 1,400 machines contracted for up to July 1 have been turned out. The plant has a capacity of 5,000 cars per year and for the present will give employment to 300 men. The new plant of the Grabowsky Power Wagon Company at Mount Elliott avenue and the Michigan Central Railroad, is almost ready for occupancy. Transportation facilities are such that 20 cars may be loaded at one time.

The Detroit United Railway moved into its new Woodward avenue barns in Highland Park last week and the Cadillac Motor Car Company immediately took possession of the old barns at Woodward avenue and Amsterdam street.

Announcement is made that the Small Motor Car Company is to be incorporated shortly with a capital of $200,000 for the manufacture of an underslung runabout car with a 25-horsepower engine of unit power plant construction. The bearing and cooling systems will be specially featured. The car will have a 100-inch wheelbase, 34-inch wheels and will weigh 1,400 pounds fully equipped. It is planned to manufacture the car in Detroit and Winnipeg.

Putting the Automobile House in Order

By COKER F. CLARKSON, General Manager Society of Automobile Engineers

A BIG task in automobile engineering lies right at hand. President Coffin, of the S. A. E., long ago suggested the adoption of definite terms for the multitudinous parts of the automobile, the component elements of which are denominated by various titles. This reform never came to fruition with the Licensed Association, having been sidetracked for other matters temporarily more important. The Society of Automobile Engineers is now entering upon this work.

Standardization is simply a matter of common sense, an absolute essential in bringing any important industry to its proper basis of efficiency in both production and replacement. Its accomplishment in its proper function can be brought about only by the utmost care on the part of those competent to pass on the particular matter in hand. The attention of the competent men must be had; and these men are abnormally busy in their routine duties. Much correspondence, detail work, discussion in committee and full meetings are necessary. Frequently a large amount of experimental data must be considered; often special tests must be made. But if the work be not done, confusion will become chaos. This is the history of every industry in which mechanical, as well as other, engineering is involved. The positive benefits of standards have been most clearly proved, as well as the many forms of vexation resulting from their nonexistence.

There are thousands of parts in any automobile. All makers of automobiles buy raw material which they form and machine into finished product. Their engineering departments must first specify more or less minutely the chemical composition or the physical characteristics required in each case before turning over orders to the purchasing departments. This specifying of the chemical properties or physical qualities is very largely a matter of standardization. For a proper working basis, it is necessary that the use of standard terms be established, bringing celerity and exactitude in specification. The engineering departments must specify dimensions of materials ordered. For this, standard reference tables, prepared in view of all the reasonable demands of design and of the inexorable facts surrounding sufficiently fast production of raw materials or parts, must be at hand. The point is that if the number of sizes of a given article be standardized down to a list representing the reasonable demands of the case, the article can be made better, more cheaply and more quickly, and therefore be delivered sooner. Anyone familiar with the workings of an automobile factory knows of the delays and complications attendant upon production. All of the material and parts producers say the same thing: "If you automobile makers jointly require us to fill orders in which a lot, sometimes many hundreds, even thousands, of sizes are specified, you must pay more for the goods and wait longer for them. Difference in size means new setting of machinery and change of tools. Variety of production strongly tends to reduce excellence of product. If you specify unreasonable or unnecessary sizes, you are only standing in your own light." This applies to all the materials of which an automobile is made, and to the tools with which it is made.

Sentinel Trophy Won by Buick Car

MILWAUKEE, WIS., July 25—Going through a hard six-day run, the brake, clutch and motor tests and a rigid final technical examination without a demerit, a Model 19 Buick, entered by the Hokanson Automobile Company of Madison, Wis., and driven by Emil Hokanson, won the $1,000 *Milwaukee Sentinel* trophy, the first prize in the Wisconsin State Automobile Association's first annual reliability tour. The Pope-Hartford T model, entered and driven by Emil Estberg, of Milwaukee, was awarded second place, with a total penalty of three points. The Model G Franklin, nominated by the Franklin Auto & Supply Company, of Milwaukee, and driven by L. M. Springer, was third, with six demerits. The summary:

No.	Car	Model	Entrant	Driver	Total Penalty
8	Buick	19	Hokanson Auto Co.	Emil Hokanson	0
17	Pope-Hartf'd	T	Emil Estberg	Emil Estberg	3
21	Franklin	G	Franklin Auto and Supply Co.	L. M. Springer	6
20	Ford	T	Hickman - Lauson-Diener Co.	W. H. Diener	9
9	Buick	17	Buick Motor Co. (Wis. Branch)	Wm. Fisher	14
2	Rambler	53	Rambler Garage Co. of Milwaukee	Art Gardiner	16
22	Overland	42	Bates - Odenbrett Auto Co.	John Heber	16
18	Reo	S	Curtis Auto Co.	A. C. Thomas	19
7	Jackson	59	W. L. McEldowney	W. L. McEldowney	26
11	KisselKar	D-10	KisselKar Co.	W. C. Rice	34
10	KisselKar	D-10	KisselKar Co.	W. R. Rice	35
24	Petrel	F	Petrel M. Car Co.	G. D. Waite	38
12	KisselKar	LD-10	Johnson Service Co.	J. Marsden	42
15	Johnson	10-Spl	KisselKar Co.	Arthur Ove	52
14	Pierce-Rac'e	K	Morrison M. Car Co.	Lewis Strang	53
5	Mitchell	T	Mitchell Auto Co.	F. P. Wilkins	57
19	Corbin	18	Curtis Auto Co.	Gordon Bird	111
4	Badger	B10	Badger M. Car Co.	C. Kobersteen	142
26	Marion	Bob-Cat	Geo. Browne	Geo. Browne	204
6	Cadillac	30	Jonas Auto Co.	Aug. A. Jonas	422
16	Ohio	40A	Case Plow Works	Ross Henwood	488
3	Badger	B10	Badger M. Car Co.	Dan Arbogast	648
23	Staver-Chi.	M	Stephenson M.C. Co.	H. Monckmeier	1000
	Withdrawn end of second day.				
1	Rambler '11	64	Rambler Garage Co.	Ted Collier	2813
	Withdrawn at end of run. No final examination.				

Thirty-two Start in Cleveland "News" Reliability

CLEVELAND, O., July 26—At six o'clock on the dot, Monday morning Starter George Collister sent away the first of the 32 contesting cars in the Cleveland *News* Reliability run, the biggest automobile event that Cleveland has ever seen.

Nearly every car of prominence that is handled in Cleveland was entered in the run. Prominent among the starters were the famous Thomas Flyer, the hero of the round-the-world New York to Paris contest, and the historic Oldsmobile Mudlark, which carried representatives of the Cleveland newspapers.

Of the 1911 cars entering the first run of their existence are the Owen, 50 horsepower model, made by Ralph Owen, of Cleveland and driven by F. Monroe, and the Palmer-Singer, driven by Hugh Miller, the Cleveland agent, a 6-cylinder, 40 horsepower machine. Following is a list of the starters:

Car	Entrant	Driver
Oldsmobile	Olds-Oakland Co.	C. H. Winters
Studebaker "40"	Studebaker Automobile Co.	W. D. Cousins
Palmer-Singer	Hugh Miller	Hugh Miller
Buick	Cleveland br. Buick Co.	....
E-M-F	L. J. Frisch	Frank Grace
Henry "35"	Jack Sperry	Jack Sperry
Regal	Regal Motor Sales Co.	J. C. Hipp
Hinescar	O. Alexander	O. Alexander
Gabriel	Gabriel Carriage Co.	A. S. Soper
Firestone-Columbus	Euclid Auto Co.	Harry McIntosh
Atlas	Euclid Auto Co.	Harry Kortz
Pierce-Racine	H. S. White & Co.	C. W. White
Hupmobile	J. M. Rauch	J. M. Rauch
Cutting "40"	Sterling Motor Sales Co.	J. C. Koepke
Maxwell	Maxwell-Briscoe Cl. Co.	Frank Santry
Brush	Maxwell-Briscoe Co.	D. E. McCoy
Columbia	Maxwell-Briscoe Co.	C. G. Bleasdale
Gaeth	Gaeth Auto Co.	Otto Linder
Krit	Gabriel Auto Co.	Harry Gabriel
Owen	H. R. Hoffman	Ralph Owen
National	D. E. Foote	D. E. Foote
Garford Truck	Garford Motor Truck Co.	Ralph Kinney
De Tamble	Kraus Motor Sales Co.	H. W. Orndorfer
Hudson	Hudson Motor Car Co.	Wm. McCalla
Packard	Thomas Swan	Thomas Swan
Hinescar	Woodland Motor Car Co.	F. J. Moore
Norwalk "35"	Norwalk Motor Car Co.	H. B. Olds
Oakland	Olds-Oakland Co.	Fred Krune
Stoddard-Dayton	Harry S. Moore	H. S. Moore
Overland	H. C. Knudsen	H. C. Knudsen
Chalmers-Detroit	John Stambaugh	John Stambaugh

Contest Board Declares Premier Gliddenites Are Not Stock

LIKE a bolt from the blue came the news last week that the Contest Board of the A. A. A. had reversed the ruling of the referee in the Glidden tour of 1910 and had disqualified the two Premier cars that finished in the Glidden Trophy class. One of these cars had apparently won the prize. The ruling was based upon the protest of the Chalmers Motor Company that the auxiliary oil tanks and pump equipments used by the protested cars were not stock equipment according to catalogue.

The significance of the ruling is that the Chalmers entry for the Glidden Trophy is placed first and is awarded the prize. The meeting was presided over by S. M. Butler and the text of the ruling was as follows:

> "The appeal of the Chalmers Motor Company is sustained. There was no evidence adduced before the Contest Board on this appeal or before the referee or at the time the Premier entries were made or at the start of the 1910 Glidden tour to prove that the auxiliary oil tank and pump equipment was stock equipment. The Contest Board finds that this auxiliary oil tank and pump equipment was not stock equipment under the rules.
>
> "The Premier Motor Manufacturing Company fails to comply with Rule 6 of the 1910 contest rules in not furnishing, to the technical committee of the American Automobile Association, after repeated demands, from June 29 to July 21, 1910, during which period three of its members visited the Premier factory, evidence sufficient to establish the stock status of Premier cars numbers 1 and 2 entered in the 1910 national reliability tour of the American Automobile Association in respect to equipment of auxiliary oil tank and pump for injecting oil direct to the crank case.
>
> "The decision of the referee is reversed and Premier cars numbers 1 and 2 are disqualified, and the Glidden Trophy awarded to the Chalmers Motor Company's entry No. 5."

Harold O. Smith, president of the Premier Motor Manufacturing Company, secured a preliminary order of injunction from Supreme Justice Kelly of New York against the Contest Board of the A. A. A., forbidding that body to make delivery of the Glidden Trophy to the Chalmers Motor Company.

The complaint filed on behalf of President Smith alleges that the action of the Contest Board in disqualifying the Premier entries is without jurisdiction, wrongful, illegal and a violation of the rules governing the contest.

H. O. Smith was represented in the Court proceedings by Sidney S. Gorham, of Chicago, and George C. Lay, of New York.

In commenting upon the situation, Mr. Smith said: "I have decided to test in the courts the validity of the action of the Contest Board of the American Automobile Association in reversing the decision of Referee Whiting in awarding the Glidden Trophy to me as the entrant of the Premier car No. 1, after having passed upon the protests filed with him."

At a meeting of the Contest Board of the American Automobile Association on Wednesday H. O. Smith and the Premier Motor Manufacturing Company were disqualified and rendered ineligible for competition in all contests here under the sanction of the Contest Board of the A. A. A. until further notice.

Automobile Notes from Quaker City

PHILADELPHIA, July 25—Entry blanks for the third Fairmount Park 200-mile stock chassis road race, which is now recognized as the chief motoring feature of Philadelphia, and which is rapidly attaining the distinction of being one of the chief events in the country, have been issued and as there is assurance of many notable drivers and machines, there is no doubt about its success.

The Quaker City Automobile Club will co-operate with the Philadelphia municipal authorities in conducting it. The contest this year will take place on Saturday, October 8, at 12 o'clock noon. R. E. Ross, who acted in a similar capacity last year, will be the referee, with G. Hilton Gantert and Joseph L. Kier starters. The following conditions and details of classification are announced in the entry blanks:

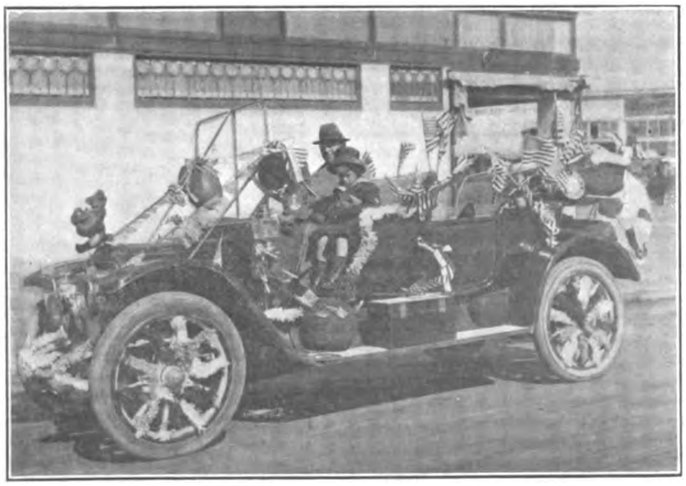
The race is open to any chassis of gasoline car which is in accordance with definition of "stock chassis" and to be governed by the following table of piston displacement and minimum chassis weights:

Division	Piston displacement in cubic inches	Minimum weight in pounds
4-B	301 to 450	2000
5-B	451 to 600	2300
6-B	601 to 750	2500

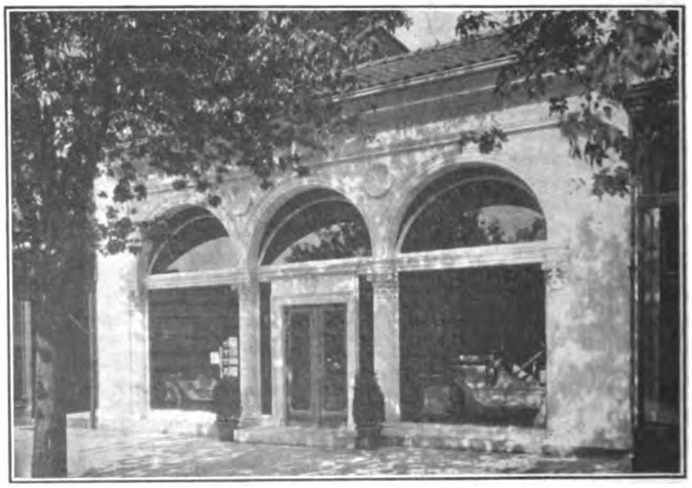
No car to compete in any class above that to which its weight entitles it. No dead weight of any character or description to be added or attached in any manner to a car as ballast. Entrance fee, $500.

Four prizes are offered for the best time for the 200 miles—first, $2,500; second, $1,250; third, $750, and fourth, $500; while at the same time there will be additional prizes for cars in each of the respective divisions.

The Philadelphia *North American* commercial vehicle reliability run from Philadelphia to Atlantic City and return August 12 and 13 is unique in that it will be the first of its kind ever held. The 26 entries in the various classes are divided as follows: Manufacturers' Division—Class A—1 1-2 tons capacity and less. Class B—Between 3001 and 5999 pounds. Class C—Three tons and over. Private Owners' Division—Class A—1 1-2 tons capacity and under. Class C—3 tons and over.



How a White gasoline party traveled to the Reno fight



New store of Maxwell-Briscoe Washington (D. C.) Company

Buicks Outclass Fields at Fort Erie Meeting

BUFFALO, July 25—Racing for two days at the Fort Erie track under the auspices of the Automobile Trade Association ended Saturday. Over 5,000 attended the final meeting.

The track was the regulation flat oval, and the competitors in the various events were hidden for part of the distance under a pall of dust. The smallness of the fields alone made it possible to try for any speed. The events generally had only two or three entrants, which robbed them of the spectacular features of large and hotly contested races. The Buick entries outclassed their rivals so as to render the majority of the events one-sided.

The Buick team had practically their own way in the majority of the contests. The summary:

FRIDAY'S EVENTS

Five miles, stock chassis, 160 cubic inches or under—

Car	Driver	Time
Herreshoff	Ned McCormick	6:14 2-5
Herreshoff	Walter Emmons	6:21 3-4
Five miles, stock chassis, 231 to 300 cubic inches—		
Buick	Louis Chevrolet	6:10
Maxwell	Ed Crane	6:22
Five miles, stock chassis, 301 to 450 cubic inches—		
Buick	Louis Chevrolet	5:45
Pullman	H. Hardesty	6:09
Maxwell	Ed Crane	6:14
Ten miles, stock chassis, 451 to 600 cubic inches—		
Buick	Louis Chevrolet	10:59
Buick	Arthur Chevrolet	11:20
Thomas	Ed Crane	11:30
Five miles, free-for-all, handicap—		
Maxwell	Ed Crane	5:15 2-5
Herreshoff	Ned McCormick	5:30
Buick	Arthur Chevrolet	5:37
Pullman	H. Hardesty	5:42
Herreshoff	Walter Emmons	6:11

Five miles, free-for-all—

Car	Driver	Time
Buick Special 60	Louis Chevrolet	4:59 2-5
Buick	Arthur Chevrolet	5:47
Thomas	Ed Crane	6:12

SATURDAY'S EVENTS

Five miles, stock chassis, 160 cubic inches or under—

Car	Driver	Position	Time
Herreshoff	Ned McCormick	Won	6:39
Herreshoff	Walter Emmons	2	7:42
Five miles, stock chassis, 161 to 230 cubic inches—			
Buick	Louis Chevrolet	Won	6:11 4-5
Maxwell	Ed Crane	2	6:15
Five miles, stock chassis, 231 to 300 cubic inches—			
Buick	Louis Chevrolet	Won	5:35
Pullman	H. Hardesty	2	5:50
Maxwell	Ed Crane	3	6:19
Five miles, stock chassis, 301 to 400 cubic inches—			
Buick	Arthur Chevrolet	Won	6:20 3-4
Buick	Louis Chevrolet	2	6:55
One mile exhibition—			
Buick Special 60	Louis Chevrolet		:55 2-5
Ten miles, stock chassis, 451 to 600 cubic inches—			
Buick	Louis Chevrolet	Won	11:50 2-5
Buick	Arthur Chevrolet	2	12:65
Five miles, stock chassis, $1,201 to $1,650—			
Pullman	H. Hardesty	Won	5:09 4-5
Herreshoff	Ned McCormick	2	6:11
Herreshoff	Emmons	3	6:17
Herreshoff	Smith	4	6:52
Maxwell	Ed Crane	5	6:54
Free-for-all, five miles—			
Buick	Louis Chevrolet	Won	5:08
Buick	Arthur Chevrolet	2	5:55
Five miles, free-for-all, handicap—			
Herreshoff	Ned McCormick	Won	5:18
Pullman	H. Hardesty	2	5:27
Buick	Louis Chevrolet	3	5:47
Herreshoff	Emmons	4	6:17
Maxwell	Ed Crane	5	6:25
Buick	Arthur Chevrolet	6	6:33

Minneapolis State Run Has Eighteen Entries

MINNEAPOLIS, July 25—The second annual reliability run held under the auspices of the Minnesota State Automobile Association started from the St. Paul Hotel at 7.30 o'clock Friday morning, to cover 658.2 miles of fine roads to Sioux Falls and back to Minneapolis. Dr. C. E. Dutton refereed the event to Sioux Falls.

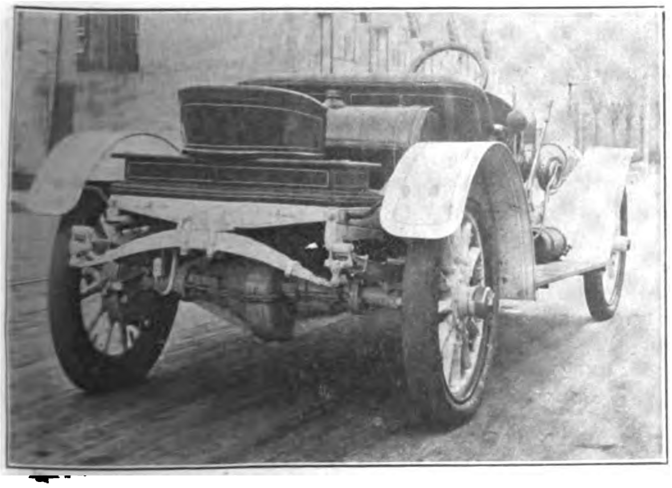
The final entry list showed 18 cars contesting and six making the run as non-contestants. The pilot car left the St. Paul Hotel at 6.15 a. m. Reuben Warner, Jr., president of the Minnesota Automobile Association, in a Pierce-Arrow car driven by Julius Huckow, was the first to follow the pilot. He started at 7.30. After him trailed the 16 other contestants and the six non-contestants, press machines, pilot car, pacemaker and two others who did not signify their intention of starting in time to be classified.

The list of entries follows:

No.	Car	Owner	Driver
1	Pierce-Arrow	Reuben Warner, Jr.	Julius Huckow
2	Stearns	Stearns Auto Co.	J. C. Littlewood
3	Hupmobile	Electric Vehicle Co.	Fred Starr
4	Reo	Fawkes Auto Co.	C. A. Lewis
5	Staver	Heaney Auto Co.	Floyd Duis
6	Halladay	Heaney Auto Co.	O. A. Talmland
7	Cadillac	Rudstenstad	W. Rudstenstad
8	Auburn	Ranger Auto Co.	W. Y. Ranger
9	Regal	Haynes Auto Co.	Arthur La Roche
10	Cole "30"	Cole Auto Co.	T. J. Seifert
11	Cole "30"	Cole Auto Co.	W. A. Alson
12	Ford	Northwest'n Auto Co.	A. A. Hanson
13	Franklin (n.-stop)	Western Auto Co.	A. W. Clark
14	Hudson	H. L. Smith	O. E. Martin
15	Ind. Auto Co.	Independent. Auto Co.	T. W. Shannon
16	Glide	G. L. Sylvester	C. E. Sylvester
17	Chalmers "30"	Brictson Mfg. Co.	C. J. Gilbert
19	Cartercar	Selcey Garage, St. Paul	

Six non-contestants were Apperson, pilot car; Corbin, pacemaker; Pierce-Arrow and Studebaker, press cars, and others.

The run for Friday was from St. Paul to Owatonna, 69.2 miles, and from Owatonna to Mankato, 93 miles, making the total run for the day 162.2 miles.



Showing rear axle of Collins Axle Mfg. Co., of Pittsburg

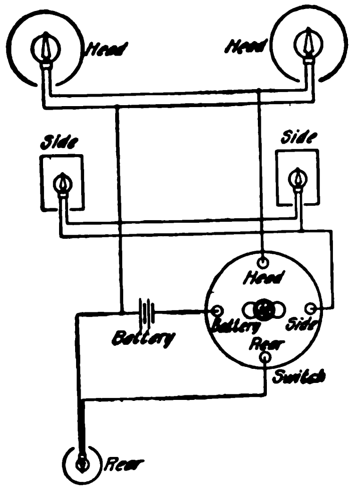
The Cohn "Special" party in a White stops at Tallac, Cal.

Accessories Occupy a Prominent Place

ELECTRIC LIGHT FOR GASOLINE CARS

THE adoption of electric lighting for gasoline cars is indicated by the safety of such a system, if for no other reason. Additional advantages to be claimed for it are, among others, "lighting up" from the driver's seat and un-blow-out-able lights. In the accompanying illustrations are shown several designs of lamps now being marketed by the National Electric Lamp Association, and a wiring diagram of a five-light system. Limousine lights and trouble lamps are also among the equipment furnished by the company. Although storage batteries furnish the most simple means of obtaining current, various generator systems have been introduced by the company for users who desire to enjoy the unstinted use of electric illumination.


Neat electric side lamp

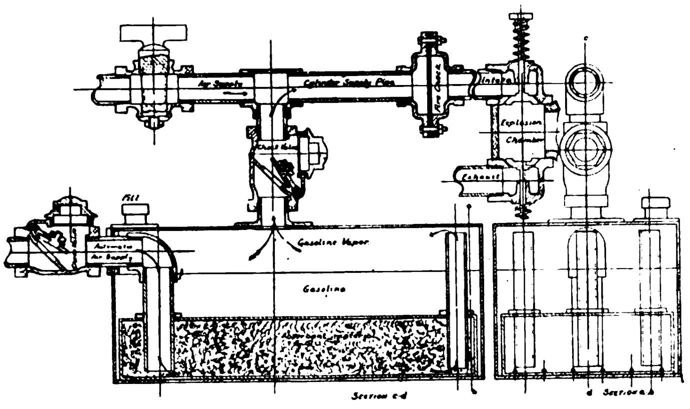


Five-light wiring system for automobile

A NEW FLOATLESS CARBURETER

WORKING without floats and having a carbureting chamber so arranged that it does not flood or become diminished with the variation of the fuel supply are among the advantages claimed for the Steward Carbureter, which is made by L. & J. A. Steward, of Rutland, Vt. The surface principle, which obtains in this device, allows of large pipes and a consequent ample supply of mixture at high speeds. In this carbureter the circulation increases the evaporative effect by allowing the saturated vapors to more rapidly mix with the less saturated; the globules of gasoline are allowed to settle out, and the mixture is "dry"; heat is kept more uniform throughout the apparatus and contents, and sudden demands for large quantities of gas are easily met.


Electric headlight, compact and sturdy



Sectional view of the Steward carbureter

TO BAR THIEVES AND MEDDLERS

PROTECTING one's car against the wiles of the thief and the foolishness of the meddler is an easy proposition, and not at all costly, with the Connecticut Automobile Lock, made by the Connecticut Tel. & Electric Company, of Meriden, Conn. All that is necessary for the driver, on leaving his car, is to apply the brake lever and place the lock in the adjacent notch of the segment on the release side of the same. On cars where the clutch is disengaged by the first movement of the lever before the brake is applied, the car can be locked without the brake being applied and with only the clutch disengaged, allowing of being moved about, as in a public garage. The lock is small enough to be easily carried in the vest pocket.

A HANDY POCKET REPAIR TUBE

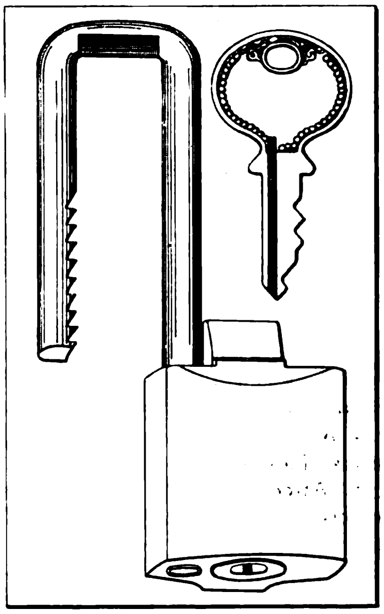
A VEST-POCKET convenience like Gray's Handy Repair Tube, made by the Standard Leather Washer Manufacturing Company, 24-26 Boudinot St., Newark, N. J., should appeal to every motorist. It costs but a trifle, and contains tire chalk, tube of cement, patches, emery cloth and other tire-repair needfuls.

These outfits come in 7-inch tubes, each 1 1-4 inches diameter.


Another side lamp

A FENDER FOR CARS DE LUXE

The New Jersey Tube Company, of Newark, N. J., has designed the Conover Bumper, which would appear to be a policy of insurance against broken radiators, lamps, etc., not to mention lawsuits resulting from accidents.


The Connecticut automobile lock

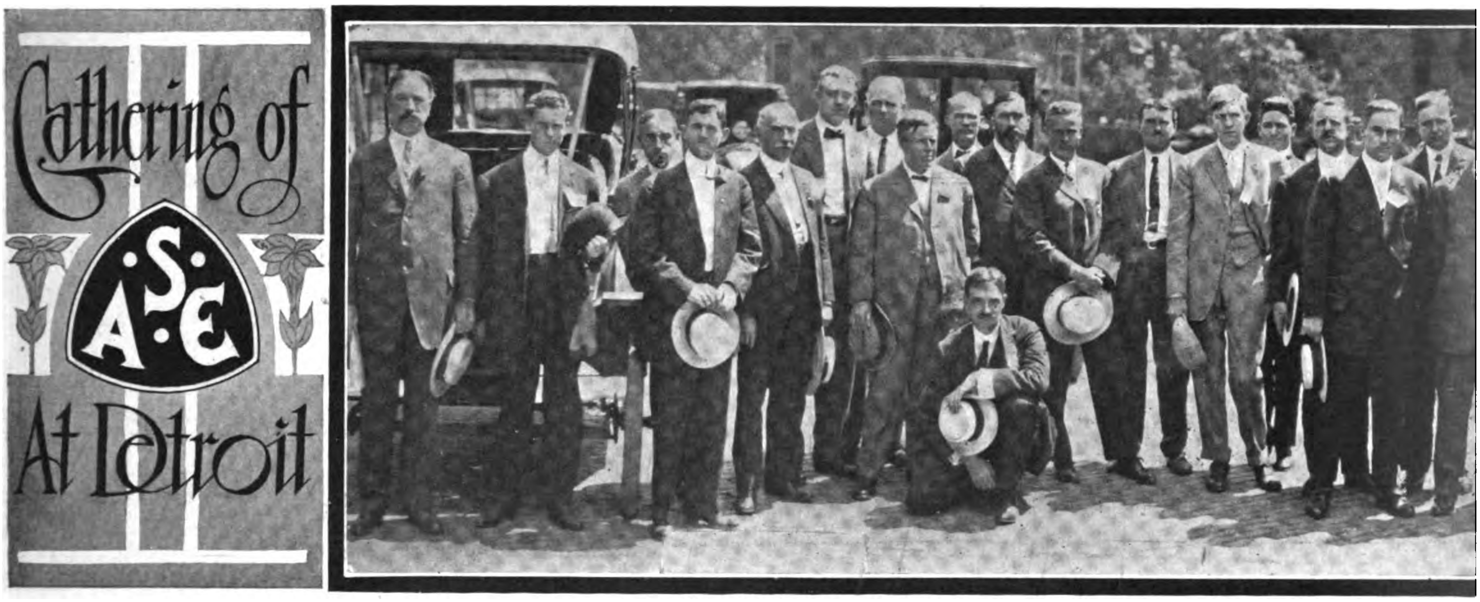
Handy vest-pocket tire repair outfit

XXIII New York—Thursday, August 4, 1910—Chicago No. 5

THE AUTOMOBILE

Detroit Extends Welcome to Largest S.A.E. Gathering

DETROIT, July 30—Five years of painstaking effort on the part of the automobile engineers of this country reached a fitting culmination at the Summer meeting which opened on July 28 with headquarters at the Hotel Tuller, and so largely attended that the accommodations of this establishment were far below the demand of the occasion, and many of the visiting engineers sought accommodations at the Pontchartrain, Cadillac, and elsewhere. It would be impossible to say just what the real attendance was. Of the membership proper, perhaps there were no more than 300 of them registered, but the new and aggressive policy of the Society, as laid down by President H. E. Coffin, which is being carried out to the letter by Manager Coker F. Clarkson, has attracted such wide notice that the engineers, who have not heretofore seen fit to ally themselves with the work, found it convenient to journey to Detroit and examine into the situation for themselves. Despite the care with which the programme was prepared, the entertainment committee, comprising President H. E. Coffin (ex officio), H. W. Alden, chairman; George W. Dunham, Russell Huff, H. M. Leland, F. E. Watts, E. T. Birdsall, A. P. Brush, F. H. Floyd, G. M. Holley, and G. E. Merryweather, found ample opportunity to tax its executive ability, which proved adequate for the needs, ending in the largest and most profitable meeting that was ever held by the Society.

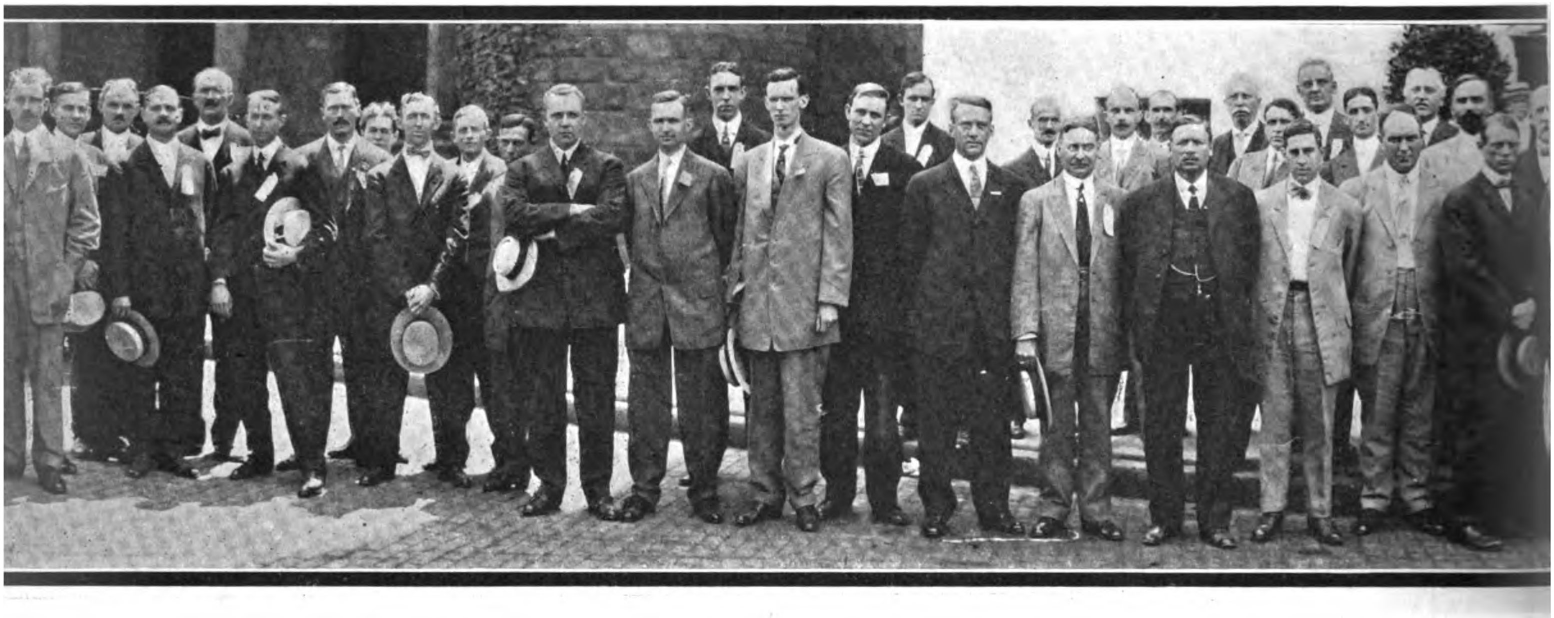


The programme was a large one, including ten set papers, covering extremely important subjects, all of which were read and discussed, excepting a paper in relation to a Franklin air-cooled motor test, which was deferred owing to the absence of Professor Rola C. Carpenter, the idea being to give to this paper the attention it deserves at the next annual meeting of the Society. The papers which were presented and discussed are printed in this issue of The Automobile in somewhat revised form. In addition to the set papers there were a series of discussions on various important phases of the automobile situation, but in addition to the formal discussion indulged in there were many informal talks and comparisons of notes that will go far to unravel the tangle that stands in the way of further refinement of the more advanced problems leading to finality in the automobile art.

Experience has shown that formal discussion of papers presented is very meagre, as a rule, and oftentimes the most pertinent points are brought out at informal gatherings of groups of the members after the meeting. As an illustration of this phase of the situation the matter referred to in the paper entitled "The Specification and Heat-treatment of Automobile Materials," by Henry Souther, will serve very well. In Mr. Souther's paper it was pointed out by him that a single type of steel, if heat-treated in view of the work to be done, might serve for all the purposes to which steel is put in the building of automobiles. Mr. Souther pointed out that the modulus of elasticity is scarcely different for the hardest alloy steel as compared with mild steel. He said that the only reason for using a higher type of steel than that presented in a Bessemer bar for crankshaft work is represented in the difference between the elastic limits of the respective products. Attention was called to ore from Cuba, that is said to be rich in nickel and chromium. Mr. Souther claimed that this ore carried about 1 per cent. nickel and about 4-10 of 1 per cent. chromium. Informal discussions involving this material brought out two or three points that will have to be reckoned with in the long run, among which is the fact that the

The crowd at the E-M-F factory

chromium content of this ore is apparently not relied upon as sufficiently near the point named to make it possible for fabricators of steel to claim that it would be a nickel-chrome steel product. It is even a question, according to some debaters, as to whether or not the nickel content is reasonably constant. Other engineers raised the question as to the efficacy of 1 per cent. nickel in steel, and some were quite positive in their declaration to the effect that 4-10 of 1 per cent. chromium is of small value, while one metallurgist pointed out that one of the big steel companies, in coping with this particular ore, "blew" the chromium because they had no use for it. There was one other point brought out by Mr. Souther which raised quite a little discussion, some of it formal, but for the most part in an informal way. It was claimed that open-hearth steel is relatively a poor product, and that it would be very capable were it to compare favorably with crucible steel. What Mr. Souther intended to convey apparently was the impression that crucible steel is a sort of "micrometer" to be used as a gauge or measure to go by in rating steel in general. Mr. Souther did not have the undivided support of the members present, and the metallurgists who were willing to express an opinion on the subject made it quite plain that a crucible pot cannot serve as an instrument of precision in gauging the quality of steel, due to the fact that good steel cannot be made by this process unless good raw materials are employed therein. It is generally admitted that the crucible process, despite its faults, is capable of great things, but there is no way known to the art by which the carbon of which the crucible is made can be kept out of the steel, nor is it possible to tell with accuracy how much of the carbon of which the pot is made will be absorbed in the steel. The average automobile engineer, in selecting crucible steel for his work, favors the contention that the carbon is likely to be relatively high, and regrets that he cannot be sure that it will be uniformly present. It is not believed that Mr. Souther carried conviction on this point. There is one other matter that came out in this particular paper that did not find favor. Mr. Souther said it was an old-fashioned idea to contend that in the process of cementation it was necessary to use low-carbon steel. He seemed to think that automobile engineers generally labored under the impression that 50 carbon steel could not be cemented. It was pointed out by some of the members present that there was nothing old-fashioned about the ideas of automobile engineers as they are constituted; they realize perfectly that carbon can be added by the cementing process even up to the point of saturation, and that if the steel, when it is subjected to the cementing process, is not up to the point of saturation more carbon will be taken up. The great question in automobile work is to pursue a safe plan, and safety lies in using a true grade of cementing steel in which the carbon content is below 16 points. Failure comes when the carbon in the core of the cemented section is relatively high, but no matter how low the carbon may be in the core, the shell will have the requisite quantity thereof as a result of cementing. It was the consensus of opinion of such of the members as favored discussion, that it is very necessary to standardize steel and to arrive at more definite conclusions, but they did not take kindly to the idea that it has to be crucible steel, or that heat-treatment will serve in the capacity of a cure-all in the absence of good steel.

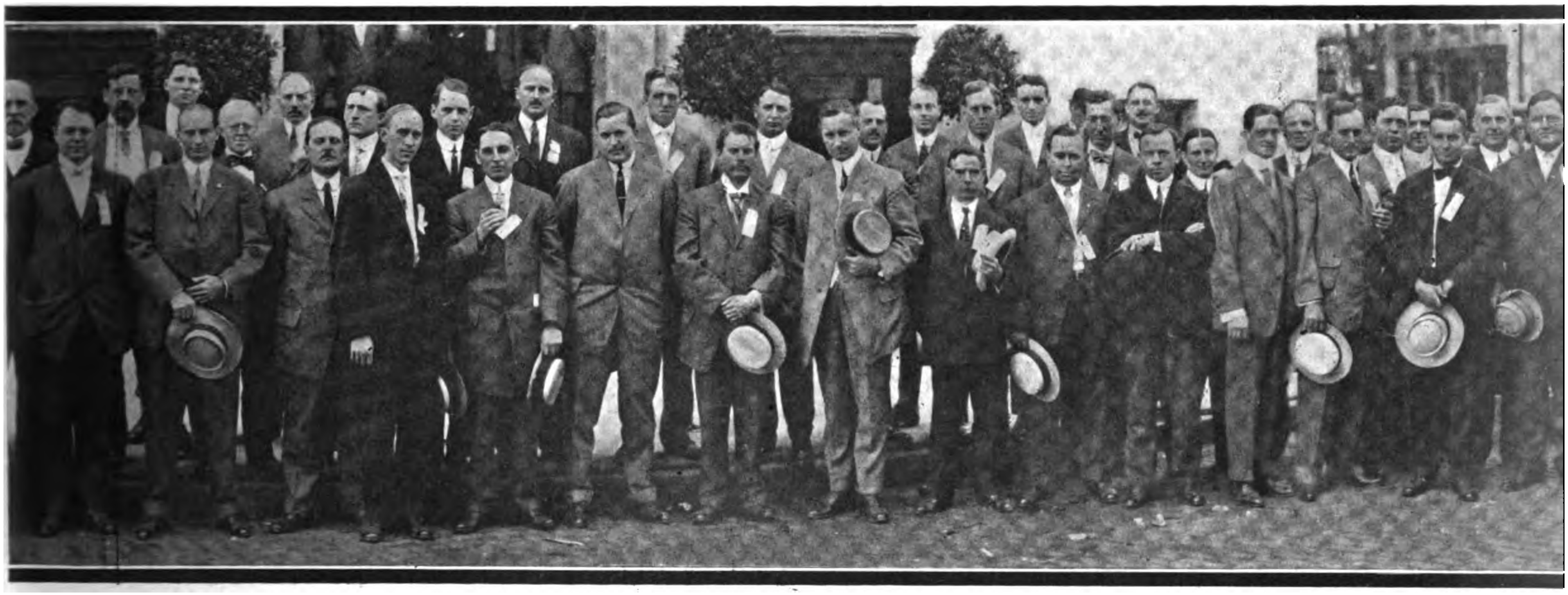


At the Timken-Detroit Axle Co.

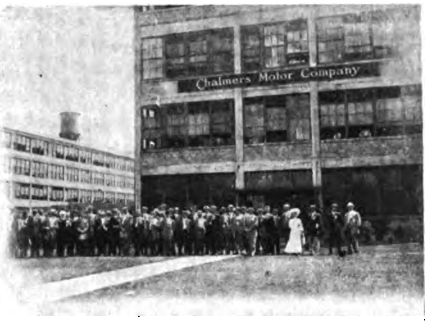
Testing the hardness of metals is a subject that attracted much notice, and was very aptly presented by F. A. Shore in his paper descriptive of the Scleroscope. The instrument in question has been quite considerably exploited in the literature of the subject for some little time, so that the main points in the discussion that took place

At Detroit Steel Products Co.

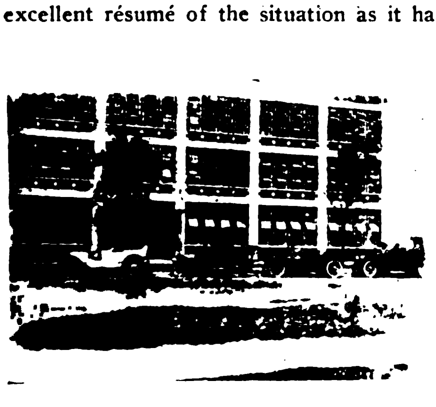
will be of more interest here than to present the paper in its entirety. Mr. Shore stated in his paper that the Brinell test is very limited in the conclusions that can be reached with safety. The falling tup hammer as used in the scleroscope is preferred by Mr. Shore, although he fails to explain how one would know the thickness of the shell of a cemented section by any reading that can be taken on this instrument, whereas in the Brinell test a small steel ball is pressed with sufficient force to indent the metal to whatever depth the operator desires, and among other information afforded thereby the thickness of the crust of the cemented section may be ascertained. Discussion brought out a rather peculiar situation which will require elucidation, it being the case, according to one member, that the readings for hardness are not the same when measurements are taken on balls of different sizes. It was stated that in a certain comparative test a ball 1 1-8 inches in diameter measured 100, whereas a ball of the same character of material and subjected to the same treatment measured 60, the only difference being that the latter ball was 1-2 inch in diameter. Against this situation stands the statement of another member who pointed out that the smaller the ball the less difficulty there will be in hardening it, but this statement does not jibe with the readings as above indicated, because the larger ball has the higher reading. It will be necessary to clear up such points as these before engineers will understand completely just what the scleroscope does indicate, although it was quite generally conceded that it has many nice uses in the plant, serving in the capacity of an instrument for quickly making comparative tests.



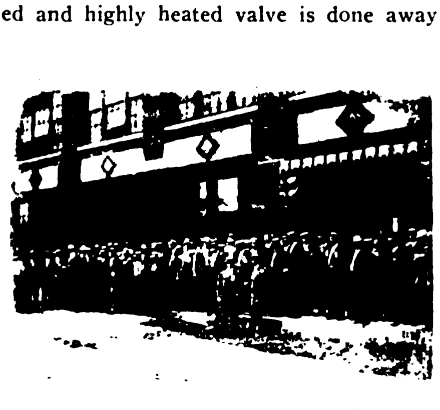
The paper by Eugene P. Batzell entitled "Slide, Rotary and Piston Valves Versus Poppet Valves for Gas Engine Service" was received with evident satisfaction, and it proved to be an excellent résumé of the situation as it has developed in automobile work, barring specific reference to the performance of the silent Knight type of motor, and the headway that was made in its exploitation. During discussion, David Ferguson pointed out that adverse criticism of the Knight sliding-sleeve scheme to be effective must overcome the force which is represented by the fact that the Knight type of motor is working extremely well, has proven to be of great advantage to the British Daimler Company and is being taken up by important Continental makers of automobiles, among which are the Panhard in France, Mercedes in Germany, Minerva in Belgium, and others. In response to a direct inquiry in relation to the performance of the Knight motor bearing upon the question of gas performance involving the mean effective pressure, Mr. Ferguson stated that the best indication of the advantage to be derived by water-jacketing the ports is shown by the high mean effective pressure realized, and that the thermal efficiency is high is proven by the fact that the radiator required in conjunction with the Knight motor is relatively small. Mr. H. G. Chatain pointed out that the thermal efficiency of the Knight motor is 23 per cent. and that in his judgment there was no reason why poppet valve types of motors should not deliver a near approach to this stated thermal efficiency. Mr. Chatain was of the opinion that if the shape of the cylinders, degrees of compression, and the other conditions are made to conform to the Knight practice in designing, the results obtained should be the same. In this discussion, however, the point was made that in the Knight type of motor the unjacketed and highly heated valve is done away with; the incoming mixture in the Knight type of motor is kept cool, due to the fact that the ports are water-jacketed, and the other advantage of the Knight type of motor lies in the fact that with two sleeves it is possible to time the motor in any desired way, duplicating the timing



Visiting the Chalmers plant

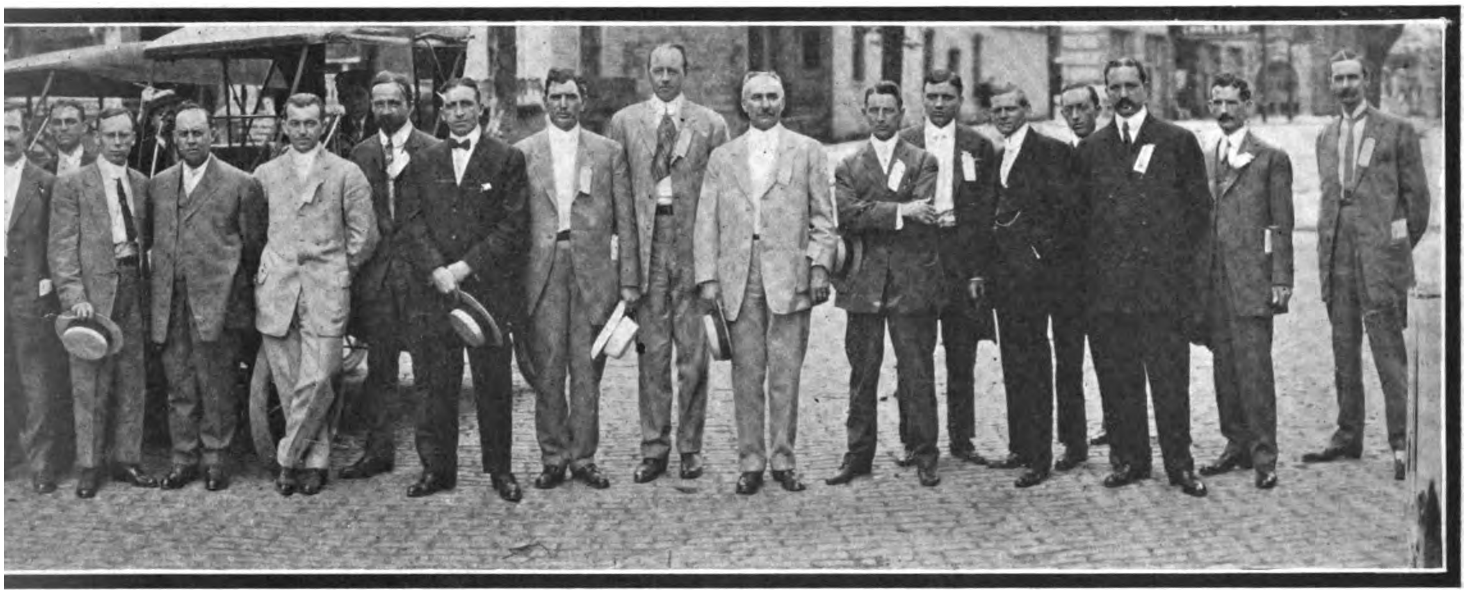


At the Aluminum Castings Co.



At the McCord Company's plant

of the poppet valve system if it is found to be the most advantageous. In discussing the merits of rotary valves, very little information of a positive character was extracted excepting that Mr. Ferguson said that a motor should be known by its performance. He went on to say that poppet types of motors are well known by their performance, which is decidedly good considering the mess of complication involved, and that the Knight type of motor was placed beyond the realm of speculation, due to its well-known good performance. According to this method of reasoning, the other types of motors may properly be judged after they generate a reputation of a substantial character. Mr. Brown, in pointing out that the struggle with other than poppet types of valves was for the purpose of eliminating noise, seemed to think that the undertaking might be carried beyond the necessities of the occasion; as he said, mudguards make noise, underpans rattle, transmission gears clatter, and the whole equipment is prone to become noisy as the road becomes rough, and the speed is increased sufficiently. It was Mr. Brown's contention, under the circumstances, that a little noise from the valve motion would scarcely prove discommoding. Other opinions on this point deprecated Mr. Brown's idea, culminating in an expression which, if re-written, might appear thus: Noise, due to the presence of ill-contrived members in an automobile, can scarcely be regarded as a license to put up with additional noise-producing tendencies. As one member stated, what customers want above everything else is silence of performance.



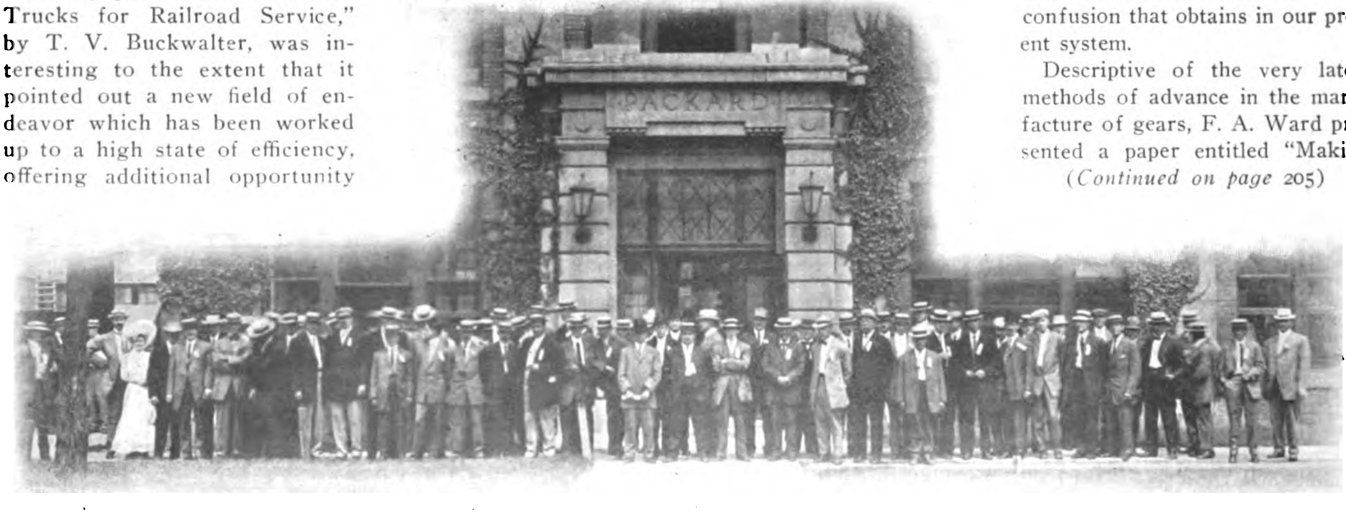
The paper entitled "Motor Trucks for Railroad Service," by T. V. Buckwalter, was interesting to the extent that it pointed out a new field of endeavor which has been worked up to a high state of efficiency, offering additional opportunity to automobile engineers to test their skill and widen the scope for investment.

It is rapidly being realized that the nomenclature of the automobile art is in a sad state of repair, and F. E. Watt at the request of President Coffin fired the first gun in what will probably prove to be a long and distressing task. Mr. Watt's paper, entitled "A Standard Automobile Nomenclature," was limited to a clever statement of the crimes that are being perpetrated daily, and he illustrated by means of a list of assembly groups some of the problems that must be solved in the long run, ending by recommending that a committee be appointed for the purpose of working upon this problem.

The patent situation, which is as acute as ever, was touched upon by E. J. Stoddard, in a paper entitled "The Establishment of a Court of Patent Appeals," which paper was sufficiently broad in scope to discuss the engineer's social relations. This paper adds substantially to the literature of the day, and it bears upon this important subject, bringing out pointedly the fix in which the average inventor finds himself and the fact that a patent is a mere license for a lawsuit. The most conspicuous point made was that a law-abiding citizen finds himself unable to determine whether or not he is infringing on a patent when he makes a machine, nor is he able, by any process of law, to put himself clear upon this point. The recommendation is for a Patent Court of Appeal, with power of last resort, as a proper substitute for 9 or 10 Courts of Appeal, which was said to be the foundation of the confusion that obtains in our present system.

Descriptive of the very latest methods of advance in the manufacture of gears, F. A. Ward presented a paper entitled "Making

(*Continued on page* 205)



This group view was taken by the Packard photographer on arrival at the factory, and a copy given to each participant before departure

Single-Cylinder Motor King at Boulogne

MOST distinctive in the mixed races at Boulogne-sur-Mer was the remarkable showing made by the single-cylinder, 3.9-inch bore, by 10-inch stroke Lion-Peugeot racers in competition against four-cylinder racing cars of very much larger bore. In the one-mile hill climb Boillot, driving one of the long-stroke machines, was clocked in 1 minute, 29 4-5 seconds, against 1 minute, 16 seconds for Camille Jenatzy's four-cylinder, 150-horsepower Mercedes of 6 4-5 by 6 1-5 inches bore and stroke. Although beaten by this leviathan, the Lion-Peugeot, while rated at only 6 horsepower, according to its bore, defeated the Benz, Prince Henry type, of 4 1-2 by 6 4-5 bore and stroke, driven by Heinz, a six-cylinder racing Rossel, a 4-inch bore Metallurgique, and was able to give 22 seconds to the Motobloc and Porthos, Grand Prix winners of 1908.

In the 300 metres hill climb, standing start, Camille Jenatzy made a record in 14 1-5 seconds, using the same Mercedes as for the mile climb. On the shorter distance the single-cylinders did not do so well, Giuppone, driving one of the Lion-Peugeots, making exactly the same time as the Grand Prix Motobloc racer, namely 19 4-5 seconds. This was better time than that of any of the big touring cars, with the exception of a Pipe of 6 1-5 bore by 7 inches stroke, driven by young Ferriol Jenatzy, who is the first example of a second generation of professional automobile racing men.

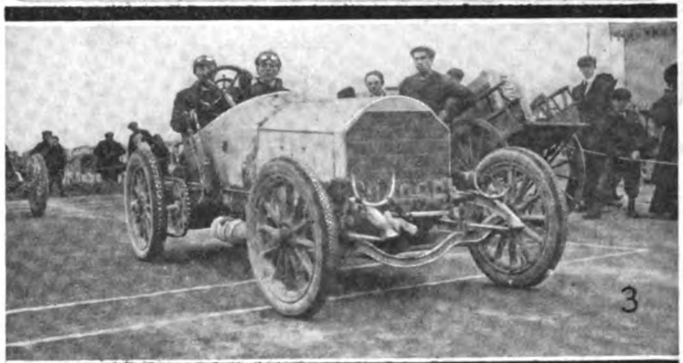
The event was a two-days' meet, opening with 7-kilometer straightaway tests over a switchback road with three sharp curves. The older Jenatzy's Mercedes was first in 2 minutes 55 1-5 seconds, equal to a speed of 89 1-2 miles an hour. Gaste on a six-cylinder Rossel, came second in 3 minutes 30 2-5 seconds, In the single-cylinder section Boillot came first in 4 minutes, 0 2-5 seconds, with his team-mates Giuppone and Goux, on similar cars, very close second and third. In the touring car section the fastest time was made by Joerns, on the Prince Henry type Opel, time 3 minutes, 29 1-5 seconds. Ferriol Jenatzy, in his Pipe, was second in 3 minutes, 34 1-5 seconds, with all the others in very poor position.

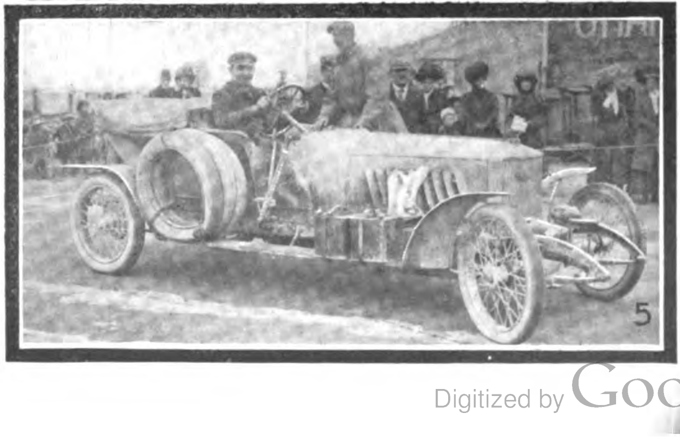
On the second day the road had become so sodden with heavy rain that Jenatzy did not dare start in his powerful Mercedes. Gaste on a six-cylinder Rossel, made the fastest time for the 1 4-5 miles straightaway, standing start. His time was 1 minute, 41 4-5 seconds. He was followed home by Heinz, on the Prince Henry Benz, in 1 minute, 42 3-5 seconds. All the others in this racing class were over two minutes covering the distance.

Boillot went over the course on his Lion-Peugeot in 1 minute, 53 1-5 seconds, followed by Giuppone on a sister car in 1 minute, 55 4-5 seconds. Among the touring cars best times were made by Ferriol Jenatzy's Pipe (6 1-5 by 7 inches), in 1 minute, 22 3-5 seconds, and Joerns' Opel (4 1-2 by 6 4-5 inches), in 1 minute, 43 1-5 seconds.

The mile hill climb placed Jenatzy's Mercedes first in 1 minute, 16 seconds; Heinz's Benz second in 1 minute, 31 seconds; Gaste's Rossel third in 1 minute, 38 4-5 seconds. In the one-cylinder class Boillot, on Lion-Peugeot, won in 1 minute, 29 4-5 seconds; Giuppone, on Lion-Peugeot, 1 minute, 37 3-5 seconds; Goux, Lion-Peugeot, 1 minute, 52 2-5 seconds. Ferriol Jenatzy's Pipe made the fastest time in the touring class, being clocked home in 1 minute, 22 3-5 seconds, with Joerns' Opel second in 1 minute, 30 1-5 seconds.

The 300 metres hill climb, standing start, placed Camille Jenatzy first with 14 1-5 seconds, beating the previous record held by Rigal on a Bayard-Clément. Best time for this hill climb in the single-cylinder class was 19 4-5 seconds. Ferriol Jenatzy's Pipe led in the touring class—time, 17 1-5 seconds.





1—Meeting at Boulogne. General view of start
2—Giuppone's Peugeot starting in the Gouy Prix race
3—C. Jenatzy in his Mercedes, which made best time
4—Ferriol Jenatzy's Pipe, which won the City of Boulogne prize
5—Opel, which won Carman, Chimay and Papillon Imperial cups

Chicago Athletics Win Back Club Cup

CHICAGO, July 30—The third annual interclub reliability team-match between the Chicago Automobile Club and the Chicago Athletic Association, an amateur affair, was run July 28-29, going to St. Joe, Mich., and return, a distance of 132 miles each way. As a result, the Chicago Athletic Association regained the trophy which it won the first year and which was taken the second time by the Chicago Automobile Club. The C. A. A. team won because it had the fewest points against the thirteen cars which ran—55.3—while the C. A. C. had 77 points for eleven cars. Because of the uneven sides the former was penalized only 11-13 point per point.

The twenty-four cars got away promptly Thursday morning from the Chicago Automobile Club and the first day's itinerary included checking stations at Valparaiso, 60.4 miles; La Porte, 84.2; Buchanan, Mich., 110, and St. Joe, 131.8.

The second day's running brought penalizations only to six cars—two on the C. A. A. side and four on the C. C. C. Chamberlain and Thorne were the Cherry Circle unfortunates, while on the losing side N. H. Van Sicklen drew 5 points for work on the jackshaft; Charles Bosch had a motor stop; J. T. Brown an engine stop and L. E. Myers drew 20 points because of a clogged gasoline line. Chamberlain of the C. A. A. was the only one penalized the second day for being late—44 points.

1—The contesting cars parked at Edgewater Club
2—Buchanan, Mich., gave the run a great reception
3—N. H. Van Sicklen, Sr., and Chas. T. Knisely
4—Stopping at garage at Edgewater Club, St. Joe

Twenty-four cars lined up for the start from Chicago

While most of the towns along the route displayed interest in the match, it remained for Buchanan to outdo itself. Mayor Hamlin had banners across the street and halted the procession long enough to hand out refreshments. Summaries:

CHICAGO ATHLETIC ASSOCIATION

No.	Driver	Car	1st Pen. Day	2d Pen. Day	3d Pen Day
1	—C. T. Knisely	Palmer-Singer	5.06	0	5.06
3	—S. W. Hamm	Locomobile	0	0	0
5	—A. H. Coon	Stoddard-Dayton	0	0	0
7	—W. F. Grower	Diamond T	0	0	0
9	—C. C. Ireland	Stoddard-Dayton	0	0	0
11	—W. H. Chamberlain	Rambler	0	44	44
13	—R. B. Wilson	Franklin	3.1	0	3.1
15	—H. H. Latham	Rambler	1.65	0	1.65
17	—C. A. Briggs	Chalmers	0	0	0
23	—W. C. Thorne	Palmer-Singer	0	1.5	1.5
25	—F. W. Wentworth	Rambler	0	0	0
27	—H. G. Jackson	Locomobile	0	0	0
31	—L. T. Jacques	Peerless	0	0	0
	Total				55.3

CHICAGO AUTOMOBILE CLUB

2	—N. H. Van Sicklen	Apperson	5	5	10
4	—Charles Bosch	Stearns	0	1	1
6	—W. C. Atwell	Stoddard-Dayton	7	0	7
8	—Carroll Shaffer	Stevens-Duryea	0	0	0
10	—E. T. Franklin	Moon	17	0	17
12	—N. H. Van Sicklen, Jr.	Apperson	0	0	0
16	—R. O. Evans	Apperson	2	0	2
18	—P. J. McKenna	Pierce-Arrow	0	0	0
20	—F. X. Mudd	Ford	0	0	0
22	—J. T. Brown	Velie	1	1	1
24	—L. E. Meyers	Apperson	18	20	38
	Total				77

Parade and Races at Opening of Beach Boulevard

JACKSONVILLE, FLA., July 30—The new Atlantic Boulevard, connecting Jacksonville with San Pablo Beach, was formally opened with an automobile pageant and parade on Friday. The road is 20 miles long and is considered one of the finest bits of road construction in the South. The surface is of cement, brick and gravel, and several concrete bridges have been installed. Work on this road commenced 20 years ago, but was abandoned and taken up several times before it was finally completed. Miss Marie Hyde christened the new road with a bottle of wine just before the start of the parade.

With an attendance between 7,000 and 10,000 the first racing of the season at the beach proved to be a success. The opening of the new road was the occasion of the meet. Before the races a parade was given around the city of Jacksonville and then the cars went out the new road, which had never been used before. More than 500 machines took part in the parade.

Three events were run off. The first, for cars in Class D, at two miles, was won easily by W. A. B. Worley in a Hupmobile in 2 minutes and 55 seconds.

The feature event of the afternoon was the second, in which there were five starters. Dr. Stinson's Oldsmobile won in 8

The third event, between an American, belonging to F. W. King, and the National of J. J. Logan, went to the latter, which covered the distance in 14 minutes and 27 3-5 seconds. Following are the summaries of the events:

Miss Marie Hyde christening the new road

Class D—

Car	Driver	H. P.	Time
Hupmobile	W. A. B. Worley	20	2:55
Ford	Dexter Kelley	20	......
Hupmobile	J. E. Johnson	20	......
Empire	F. C. Miller	..	......

For Class A—

Car	Driver	H. P.	Time
Oldsmobile	Dr. Stinson	40	8:36 1-5
Premier	C. B. McNair	40	......
Overland	J. J. Ahern	40	......
Marion	H. C. Hare	40	......
Pratt-Elkhart	G. T. Parson	35	......

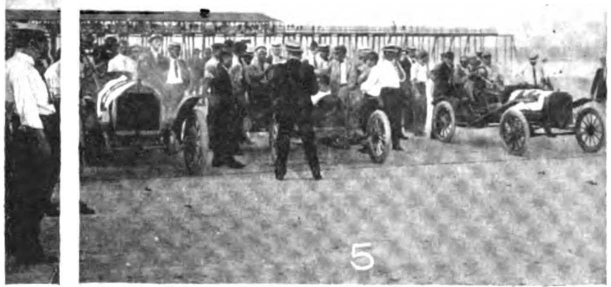
Class C—

Car	Driver	H. P.	Time
National	J. Gilbert	40	14:27 3-5
American	F. W. King	50	......

Georgia's New Automobile Association

JACKSON, GA., July 31.—An addition to the growing list of Southern automobile associations was made here when the Middle Georgia Automobile Association was launched. The objects of this organization are to encourage the building of good roads and the promoting of race meets.

The officers elected were: W. H. Mallet, Jackson, Ga., president; Paul Turner, of McDonough, first vice-president; R. A. Franklin, Jackson, treasurer; J. D. Jones, Jackson, secretary.



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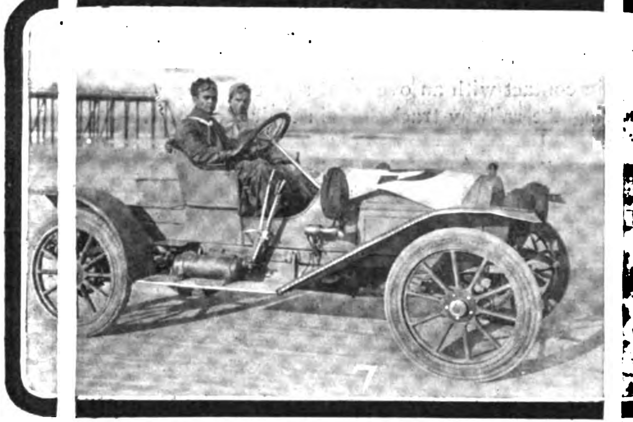

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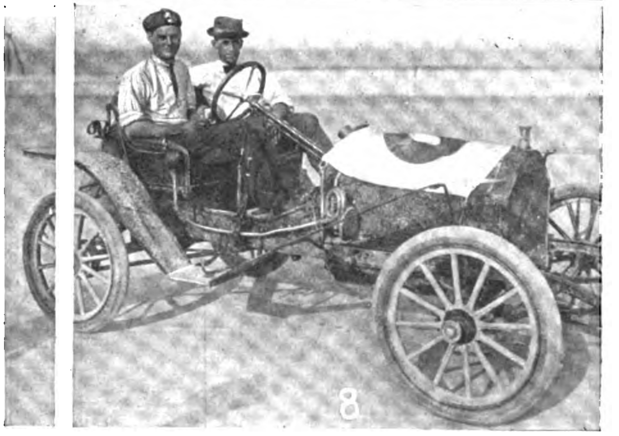

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5—Start of the first event, for little cars
6—The National which won the Class C event
7—The Cadillac "30" which made fast time
8—The Hupmobile which performed well in first race

Motor Trucks for Railroad Service

EXTRACTS FROM A PAPER READ AT THE S. A. E. CONVENTION BY T. V. BUCKWALTER, MEMBER SOCIETY OF AUTOMOBILE ENGINEERS.

The substitution of motor-propelled for horse- and hand-drawn trucks in railroad freight and baggage service is progressing rapidly, the Pennsylvania Railroad being especially interested along these lines. A field of usefulness for these trucks is also opening in railroad shop work.

THE development of the motor truck is the result of the demand for more rapid and cheaper transportation in industrial plants, in large terminal stations, and on our public thoroughfares. Manual labor and the horse have long been the sources of power for the operation of trucks, and the development of the steam locomotive in the last century has strengthened, rather than weakened their position, by greatly reducing the cost of transportation and increasing thereby the volume of freight. Steam, however, is performing the long end of the haul between distant points, leaving to the horse the shorter hauls of collecting and distributing goods at freight stations, and to manual labor the trucking between train and wagon platform. It is in these latter two fields that the motor truck is becoming, within certain limits, a successful competitor.

As applied to railroad service, motor trucks may be classified into three groups as follows:

First. Trucks utilized to replace box cars in the transfer of freight between different stations in the same city.

Second. Trucks to replace horse-drawn vehicles in the transportation of both passengers and merchandise on the public highways.

Third. Trucks to replace manual labor in the handling of baggage and mail in large stations, machinery and supplies in railroad shops, and in the transfer of freight in large freight and transfer stations.

The first group is limited to trucks of large capacity, and includes two general types, comprising, first, trucks propelled by either gasoline or electric motors and adapted to operate only on streets or other paved surfaces, and secondly, trucks driven by electric motors which normally obtain their power through a trolley in contact with an overhead street railway wire, but which on leaving the railway tracks obtain their current from a storage battery.

The second group, namely, trucks directly in competition with the horse, comprises taximeter cabs for the transportation of passengers at our large stations, as well as the general class of motor trucks used for freight delivery and for general service in our shops and offices.

The most important field for the operation of motor trucks is in the delivery and collection of freight, generally spoken of as "store door delivery." It includes the collection of freight from the sidewalk of the shipper and delivery at the door of the consignee, all handling being done by the transportation company or a subsidiary company acting as its agent.

Motor trucks in which power is brought into competition with man are represented by three general types, according to the service in which they are used. These are electrically operated baggage and mail trucks, shop trucks and warehouse trucks. All of these are for inside service, and therefore electricity is the only form of motive power available, on account of fire risks and odor.

The handling of mail and baggage in large terminal stations has increased to such an extent as to seriously hamper the expeditious movement of passengers and baggage, and requires the service of a large and constantly increasing force of men.

Recognizing the desirability of motor-propelled mail and baggage trucks that would decrease the time required to transfer baggage and mail from the receiving room to the train, and vice versa, the Pennsylvania Railroad Company about six years ago purchased two electric trucks and placed them in service at the Jersey City station. These trucks had a capacity of 4000 pounds, the weight of each truck being approximately 8000 pounds, but they proved too long and too heavy to operate to advantage.

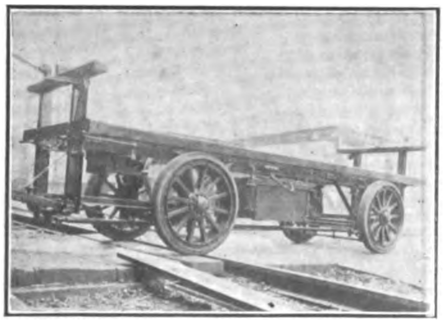
The next experiments were along the line of applying power to the standard hand trucks. About four years ago the company constructed two electrically operated mail trucks and one baggage truck and purchased a similar truck from another company.

The baggage truck consists of a standard baggage truck, with the exception that the front wheels are mounted on a knuckled axle, as used on automobiles, in place of the ordinary fifth wheel.

A twenty-volt motor is applied to each wheel, through double-reduction spur gearing; the motors are connected in parallel and act essentially as one motor; but the use of two motors obviates the necessity for a differential gear. Each motor is provided with an electric brake mounted on the armature shaft, consisting of a bronze disc, which rotates between a magnet and its housing, this disc being clamped between these surfaces by compression springs. In starting, the brake is released by passing current through the magnet.

The controlling apparatus consists of a master controller mounted in the steering handle of the truck. This master controller has three positions and is operated with one finger by being pulled forward against the action of a spring which tends to return it to the inoperative position. The first notch releases the brake; the second notch connects the battery with the motor through resistance; the third notch cuts out this resistance, allowing the truck to run at full speed. A reversing switch, mounted in the contactor box, is operated by a rod extending to the front of the truck. The speed of this truck is three miles per hour empty, and two and one-half miles loaded; its weight is approximately 2000 pounds.

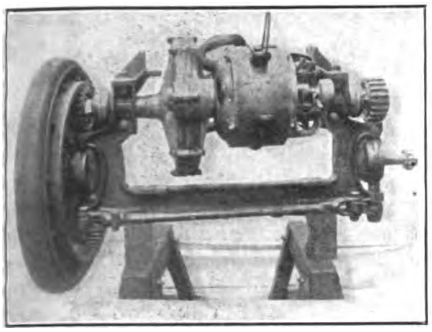
The mail truck consists of a standard mail truck with knuckled front axle. This truck, however, was provided with a single El-



Chassis of Buckwalter straight frame truck

Buckwalter straight-frame truck with load

Buckwalter drop-frame truck with load of baggage



Driving unit of Buckwalter truck showing "universal pinions," and steering-knuckle

well-Parker motor, driving through spur gear to the countershaft and by double side chains to the rear wheels. It is provided with a disc brake similar to that on the baggage truck. An indirect controller is used, consisting of three contactors operated by two drums in the master controller, one being used for forward movement and the other for reverse. The truck was also provided with a current-limit switch, to prevent the operator from starting the truck too quickly. The speed of this truck was about 4½ miles per hour empty, and about 3½ miles loaded, and its weight 2300 pounds. Neither the mail nor baggage trucks had provision for carrying the driver, it being necessary for him to walk in front as with the ordinary hand truck.

The principal characteristics of the new double-end electric mail trucks now in use at the Washington Terminal are as follows:

1. Arrangement of controlling apparatus to be operated with equal facility from either end, avoiding the necessity of turning on narrow platforms and runways.

2. Provision for driver to ride for the purpose of running at a higher speed; as a means of conserving his energy for transfer of baggage at his destination, and to give him more positive control of the truck.

3. Operation of brake with least effort and in a manner most natural to inexperienced men.

4. Reverse motion in natural manner.

5. Ease of steering, resulting in more positive control.

6. Flexible frame, on 4-point support to provide greatest stability, with each wheel carrying its quota of load.

7. Increase of tread so that wheels are just within protection of side sills and reduction of hub projection to rim of wheels, to reduce possibility of collision with railroad equipment, columns and other trucks.

8. Flexible suspension of batteries.

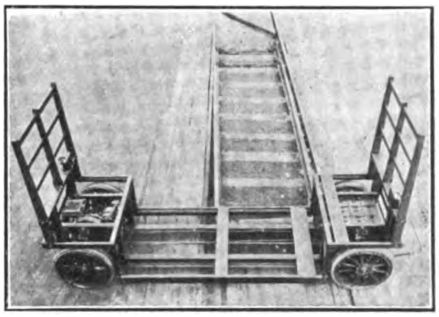
9. Direct operation of controller.

10. No projection of controlling apparatus beyond end sills of truck when not in use.

At the Jersey City Terminal there are now in use double-end electric baggage trucks with a length of twelve feet over the end standards. The height of the floor has been reduced to thirty inches, and the height over the end standards and the width were increased to seven feet and forty-four inches respectively. The carrying capacity has been approximately doubled, the trucks carrying eighteen to twenty-four trunks. The capacity expressed in pounds is 4000, while the weight of the truck is 2390.

On account of the limited space beneath the body it was found inconvenient to use the folding platform for the driver. A platform about eighteen inches square is provided at each end of the truck, and hinged to the end standards. These are connected by means of cable, so that when one platform is lowered to the operative position, the other platform is drawn up against a stop, thereby determining the position of the platform in use. The four-wheel steering arrangement is retained, the operating links, however, being considerably simplified. A single steering lever is provided which may be inserted in taper sockets mounted at each end of the truck.

Three speeds are provided in each direction, the second and third being made running speeds. The second speed is from four to five miles per hour, and the third from five to seven miles per hour, depending upon the load and grade.



Plan view of Buckwalter drop-frame truck

Practically no change has been made in the method of driving the new trucks, with the exception that the countershaft and motor gearing are enclosed within an aluminum housing and run in oil; furthermore, on account of the limited space available, the universal pinions engage with internal gears which are an integral part of the rim of the driving wheels. The strength of the gear teeth is greatly increased by utilizing the twenty-degree stub tooth.

The brakes are of the internal-expanding type, but are mounted on the trailing wheels instead of the driving wheels as on the Washington trucks. The introduction of a divided expanding pin in alignment with the steering knuckle has resulted in a uniform application of the brake regardless of the direction the truck is running or the end from which the brake is applied. The same size motor is used, but the capacity of the battery has been increased to 196 ampere-hours. The battery is composed of twelve cells, mounted in one tray, which is spring-supported and readily removed. A battery transfer system is in use at Jersey City, by means of which it is possible to change batteries and keep the trucks in operation twenty-four hours a day.

The wheels are twenty-seven inches in diameter, of the artillery type, with malleable hubs, wood spokes and steel rims, fitted with three and one-half-inch solid rubber tires. The rim is made in two sections and clamps the spoke in such a manner as to avoid reducing the size of the spoke, where it is ordinarily tenoned in a wood felloe. This arrangement permits of using any of the standard methods of tire fastening and is a stronger and lighter construction than the standard artillery wheel.

The steering-knuckle is of a special form which reduces the projection of the hub beyond the side sills of the truck to only three-fourths of an inch. The side sills are also of a special section of pressed steel that provides a round metal roll on the top of the floor line, to take the wear of loading and unloading baggage. This construction also permits the removal of one floor board without disturbing the others. The end construction is also of pressed steel.

The trailing axle is interchangeable with the axle on the driving unit, but brake-hangers are provided in the bearings, which on the driving axle carry the countershaft housing. A wheel with the brake is shown in position, while on the other end of the axle the wheel is omitted to show more clearly the relative position of the brake band and steering-knuckle.

The use of motor trucks in railroad shops may be considered as a logical development from electrically-operated baggage trucks. Manufactured articles and supplies must be hauled from storehouses to engine houses; rough castings are carried from casting-yards and forgings from smith-shops to various machine shops, where, in the case of complicated pieces, they may be still further transferred from machine to machine, and finally be hauled either to the erecting shop or a storehouse. In addition to this, there is a considerable transfer of supplies and manufactured articles between the various storehouses. It is the practice to do most of this hauling with four-wheeled hand-operated trucks, but with the development of the electric baggage truck an extensive field for motor trucks to handle this industrial service is opened. Instead of four men to a truck with a load of possibly one ton, one man can easily operate an electric truck with a load up to 4000 or 5000 pounds, at about double the average speed of the hand truck. Space, however, is more restricted in shops than on baggage platforms, passageways more narrow, which renders a somewhat smaller truck desirable.

Establishment of a Court of Patent Appeals

Extracts from a Paper Read at the S. A. E. Convention by E. J. STODDARD.

THE engineer and scientist is being summoned, with the inevitable and irresistible force of the "mill that grinds so fine," to bear an important part in regulating social relations. Fully half of our educated men are educated scientifically. A quality of masculine strength and steadiness is recognized in them that promises a building up with adequate and substantial foundation that shall secure efficiency and permanence.

The organized bodies of engineers are recognizing the call to public duties. The American Society of Mechanical Engineers, for instance, has a number of committees on public relations.

The applied sciences are fairly well intrenched as to their general rights, but the "remedies" are lacking, imperfect, inapt, or inefficient in their application. Attention should be especially given to a limited field capable of fairly definite formulation, where some sort of a legal remedy is provided by statutory law to perfect a long recognized "general right" of the engineer.

Intellectually, the engineer may be of service in two ways: by bringing into use existing knowledge, or by bringing into existence a new idea. The last is called invention, to which all good acquired by the effort of man is to be ascribed; its accomplishments are the just measure of civilization.

Public sentiment has forced legislation, but its expression in legislation and by the courts has been somewhat imperfect, as far at least as the engineer is concerned. The formulators of the laws have not been effectively advised by those who are most concerned.

In the *North American Review* for January, 1905, Mark Twain, writing upon the "Copyright Laws," touches also upon the patent laws, and brings out distinctly the contrast between the intention of the laws and their results. His article is in the form of questions and answers. He says:

"Q. Certainly there is something most grotesque about this. Is this principle followed elsewhere in our laws?

"A. Yes, in the case of inventors. But in that case it is worth the Government's while. There are a hundred thousand new inventions a year, and a thousand of them are worth seizing at the end of the seventeen-year limit. But the Government can't seize the real and great immensely valuable ones—like the telegraph, the telephone, the air-brake, the Pullman car and some others—the Shakespeares of the inventor-tribe, so to speak; for the prodigious capital required to carry them on is their protection from competition; their proprietors are not disturbed when the patents perish. Tell me who are of the first importance in the modern nation.

"Q. Shall we say the builders of its civilization and promoters of its glory?

"A. Yes, who are they?

"Q. Its inventors; the creators of its literature; and the country's defenders on land and sea.

"A. I think so. Well, when a soldier retires from the wars the Government spends $150,000,000 a year upon him and his, and the pension is continued to his widow and orphans. But when it retires a distinguished author's book, at the end of forty-two years, it takes the book's subsequent profits away from the widow and orphans and gives them—to whom—"

He concludes that these subsequent profits go, not to the public for whom they were intended, but to the publishers who give no adequate return.

It is the will of a generous people that the road to honor and wealth should be free and open to the intellectual creator. The expression of this will is confused and indistinct. What can be done about it?

A distinct step in that direction, which specially concerns the engineer, may be taken in the immediate future, and bids fair to be embodied in a law even by the present Congress.

It is proposed to create a court of practically final resort to hear appeals in patent cases, to take the place of the nine or ten Courts of Appeals now existing, with their conflicting decisions and numerous disadvantages.

The necessity of such a court is obvious and pressing. The bill creating it has been favorably reported on by the House Committee on Patents and by the Senate Committee on Patents. It has been referred to the Judiciary Committee of the House, and is now before that committee.

The bill provides for the appointment of a Chief Justice by the President of the United States, in the usual way, and that the Chief Justice of the Supreme Court of the United States shall designate four Federal Judges to sit as Associate Justices, for a term of six years.

There are certain technical difficulties that the establishment of this court will surely cure. These are ably set forth in a printed argument prepared by the Committee of the Patent Branch of the American Bar Association. This argument is plain, unanswerable, and it will be sufficient to carry the bill through. But no effort ought to be omitted.

There are, however, outside of strictly legal matters, a number of considerations that should appeal to a society of engineers.

There are many complaints of the present administration of our patent laws. Such complaints are in a large measure just, and the faults remediable. But in remedying existing faults we do not want to introduce greater faults or destroy a right that should be the most sacred and firmly based of all rights to property.

In establishing this court the service of the whole people must be kept in view, not that of any class or profession. It should not be a court in the interest of manufacturers, of engineers, or of lawyers, but a court that shall administer justice intelligently and carry out the will of the people as a whole.

In patent cases the questions of fact are questions of mechanics, engineering and science, and they are so interwoven with questions of law that the dividing line vanishes. The value and meaning of a decision as a precedent depends, often, upon the facts.

The American Bar Association Committee on the Court of Patent Appeals says in part in its argument, referring to the confusion due to the conflicting decisions of our nine or ten Courts of Appeal:

"The truth is that the worst effect of the existing situation is that it undermines confidence. It demoralizes the bar. A lawyer does not know how to advise his clients. It tempts both attorney and client to take chances. The law-abiding citizens who want to obey the law, who want to respect valid patents, but do not want to be terrorized into acquiescence in invalid patents, do not know what to do and cannot find out. There is but one remedy, and it is in a single court of last resort in patent causes."

Professor John Perry says that in England the inaptness of their judges in scientific matters is threatening confusion and disaster in this line. If this court is established, America will be taking the lead in providing for the creation of a just and rational system of jurisprudence relating to intellectual property. We believe this is as it should be and in the line of precedents.

Engineers generally should use their best efforts to have the bill in its present form enacted into a law, and watch with friendly interest its working when established, recognizing special ability in any of its judges, when it shall be shown, and being ready to advise if it shall be necessary to take any measure to increase its efficiency.

They say to properly state a problem is to half solve it. When we shall have established this court we will have something definite upon which to concentrate our influence, and to hold responsible. The problem will at least have been stated.

Rejuvenating the Old Automobile

By G. J. Mercer

This effort, following along lines involving the rejuvenation of other makes of cars, has for its subject the Haynes "Thirty" model, with a view to changing it over to a Cruiser type, utilizing the old body to the extent of its adaptability.

As in previous undertakings of this character, the new body is shown in Fig. 21, and the details for the guidance of the repairman are given in Figs. 22, 23 and 24. Glancing at Fig. 23, it will be observed that the speed-changing lever falls to the inside of the body, and the emergency brake lever is given a kink at a point just above the quadrant to bring it outside of the body line. The relations of the levers are also indicated by dotted lines in Fig. 22, which figure has the further facility of indicating the dimensions and scheme of framing for the new front door, while the plan, Fig. 24, helps in the proper understanding of the case. The pillar A, Fig. 22, is bent to form the outline of the door, the moulding around the door covers the screws that are used for fastening, and No. 16-gauge aluminum is specified for the panel. The hooded dash is flared from the contour of the hood and brought out sufficiently to accommodate the door which swings to the front and should be fitted with hinges and a handle of the same style as used on the tonneau doors. The right side of the frame is similar to the left, minus the cut for the door, remembering, however, that there is an opening to be provided for the change lever. It is fortunate that the change lever does not have to be altered in any way to bring it within the body in the manner as shown. The quadrant, however, comes rather high above the chassis, and the body must be cut away to accommodate the same. In the framing process, the workman will understand that the offset of the pillar A, Fig. 22, is only 1 1-2 inches out from the underbody at the bottom, and the finish corresponds to that of the rear doors. The amount of work involved in the conversion of the old body to conform to the new requirement is relatively slight, and in the hands of a capable workman the cost should not be high. It will of course be necessary to refinish the whole body, and in this undertaking it will be worth while to do the work so well that it will not be possible for an observer to pick out the new from the old work. The best way, perhaps, is to start from the ground and work up, making the finish uniform over all of the surfaces, and the slight extra cost involved in the more pretentious process will be compensated for by the extra time of service under conditions of a satisfactory appearance of the body.

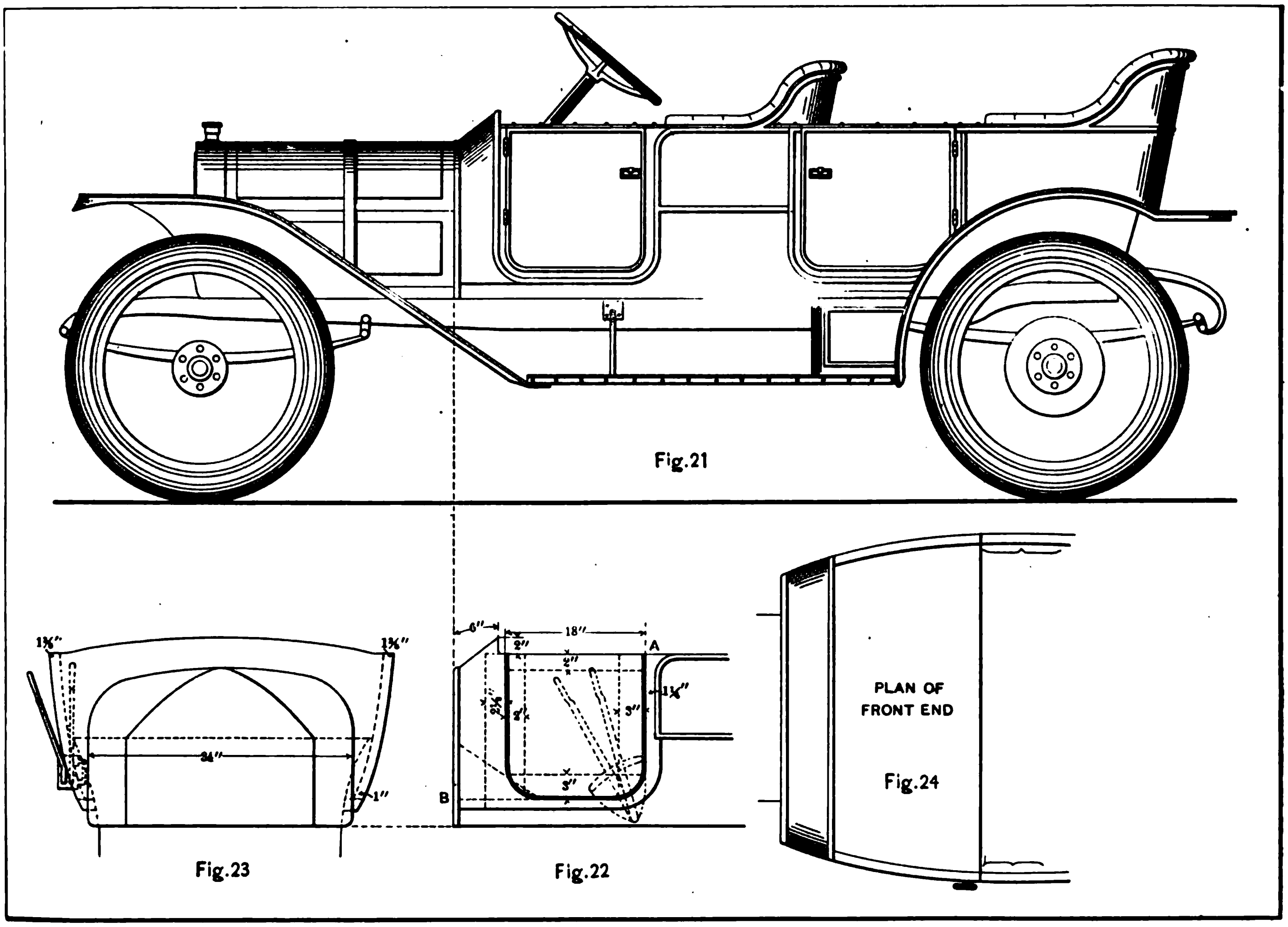


Fig. 21—Haynes "Thirty" model, with new fore-door type body replacing old touring style. Fig. 22—Detail of new fore-door. Fig. 23—Front elevation. Fig. 24—Plan of front end

A Good Finish for Refurbishing the Old Car

After selecting the desired color mix it with raw linseed oil and turpentine in the proportion of one part oil to eight parts turpentine, using a good camel's hair brush to apply it to the surface. After thoroughly dry, lay on a generous coat of heavy body-finishing varnish.

Letters Interesting, Answered and Discussed

Effect of Time and Temperature on Hardening

Editor **The Automobile**:

[2,337]—I run a small garage in a country town and have to make repair parts frequently requiring hardening, and desiring to deliver better satisfaction than that which can be afforded under ordinary conditions, I have installed a small gas furnace for hardening purposes, but find myself in a quandary in relation to the time I should take in the hardening process and to the temperature required for the best results. There probably are other small garages with similar problems to cope with and a little information on this subject should be timely. A. C. S.

With the advantages offered by a small gas furnace, it remains to either employ a pyrometer in the determination of temperature or become familiar with the color which corresponds to a given temperature, judging by the eye. The effect of time, considering temperature, as it relates to penetration, is shown in Fig. 1. The curve marked 850 degrees centigrade represents the results obtainable with the lowest temperature of cementation, and the curve marked 1000 degrees centigrade gives the penetration, also the highest temperature which should obtain. It will be understood, however, that some one temperature should be held to throughout the carbonizing operation. Just what temperature to adopt depends upon the composition of the steel. If it is very low in carbon the temperature may be relatively high, but if the carbon content is relatively high, the temperature during carbonization should be more carefully regulated. As the curve shows, a penetration of 0.030 of an inch will be had inside of about 1 hour and 50 minutes, if the temperature is maintained at 1000 degrees centigrade, whereas at 850 degrees centigrade the same penetration would require about 3 hours and 55 minutes. These values are relative. If the steel is the usual low carbon product of the market with a carbon content of about 10 points, the temperature should not exceed 1,000 degrees centigrade and good result will come if the same is limited to 900 degrees centigrade. In no case should the steel have more than 20 points of carbon if it is to be subjected to the casehardening process. This process is described in various ways as "casehardening," "cementing" and "Harveyizing"; it is sometimes described as "carbonizing." By penetration is meant the depth to which the carbonizing process is carried in the steel. If the steel is high in carbon the core will not remain soft, nor will the case be dynamic. The way to obtain a soft core and a dynamic case is to start out with mild steel, limiting the carbon content below 16 points in any event (20 points as an absolute limit) and holding to approximately 10 points if possible. The core of the cemented steel will then have the softness and dynamic ability of 10-point carbon steel, whereas the shell or case will have the hardness due to 100 points of carbon, it being true that in the carbonizing process, while a point of saturation is never reached, the carbon content does increase to even a higher level than 100 points of carbon.

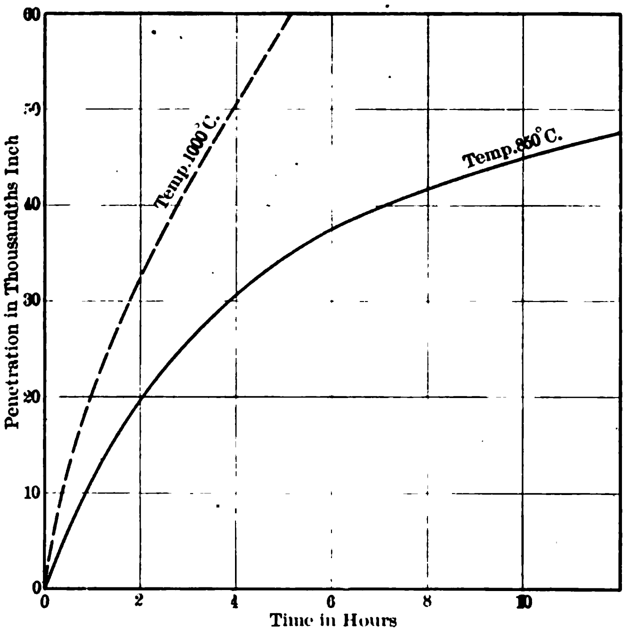


Fig. 1—Diagram showing effect of time, considering temperature, as it relates to penetration, in hardening metal in a gas furnace

Judging temperature by color is not an exact science, especially when the room is more or less flooded with light; if comparison is made in a dark room the results will be more satisfactory. The following tabulation is generally accepted as satisfactory in work of this character:

TEMPERATURE CORRESPONDING TO COLOR DUE TO HEAT

Temperature Deg. F.	Color
977	Incipient red heat
1,292	Dull red heat
1,472	Incipient cherry red
1,650	Cherry red
1,832	Clear cherry red
2,021	Deep orange
2,192	Clear orange
2,372	White heat
2,552	Bright white heat
2,732	Dazzling white heat
2,912	Sweating white heat

To find the equivalent temperature in degrees centigrade for the temperature as measured in degrees Fahrenheit proceed as follows:

$$\text{Degrees centigrade} = \frac{(\text{Degrees Fahrenheit} - 32) \times 5}{9}$$

To find the equivalent temperature in degrees centigrade for the temperature as measured in degrees Fahrenheit—

$$\text{Degrees centigrade} = \frac{(1{,}832 - 32) \times 5}{9} = 1{,}000$$

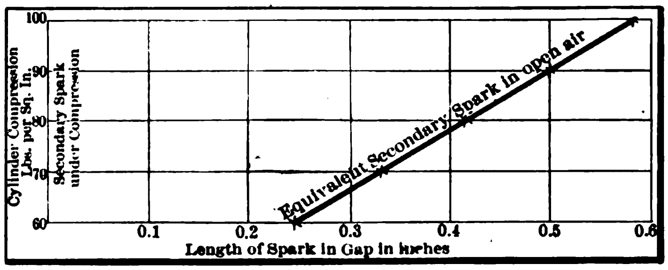


Fig. 2—Diagram showing increase in resistance of spark gap under gas compression in cylinder as compared with same in open air

Thus it will be seen that the highest temperature desirable for cementation is that which corresponds to the clear cherry red, i. e., 1,000 degrees centigrade, the equivalent of which is 1,832 degrees Fahrenheit.

It is believed that the depth of the carbonized shell should be at least 1-32 of an inch, and if the operator does not know the composition of the steel he may find out whether or not it is suitable for this work by proceeding as follows: Heat the steel to a clear cherry red temperature, at which temperature quench it in a bath of salt water, after which if it shows no perceptible increase in hardness as tested by a file it will be suitable for casehardening work.

Resistance of Spark Gap Rises With Compression

Editor **The Automobile**:

[2,338]—In struggling with ignition trouble on my motor I was much puzzled, due to the fact that when I took the spark plugs out of the cylinders and tried them, I noticed distinctly that there was a spark, but when I put them back in place there

seemed to be no result. After trying everything else I finally substituted a new set of dry cells, when, to my astonishment, the motor worked beautifully. It strikes me that I am confronted by a condition that I do not understand, and I refer it to you with the full assurance to myself that an explanation will be forthcoming.

Red Wing, Minn. SUBSCRIBER.

The amount of information afforded with which to arrive at an accurate conclusion is rather meagre, but the probabilities are that what you needed was a new battery, and the reason you obtained the spark in the open air, but not after the spark plugs were put back into the cylinders, is due to the considerable increase in resistance of the spark gap under gas compression in the cylinder as compared with the resistance of the same in the open air. Fig. 2 as here given shows the relation, in which it will be observed that for a compression of 60 pounds per square inch the equivalent secondary spark in the open air must be about 25-100 of an inch long. This equivalent secondary spark in the open air must be increased in length as the compression increases in the cylinder in order to be sure that there will be a spark in the cylinder under compression; for instance, a spark in the open air 1-2 inch long will barely assure that there will be a spark in the cylinder sufficient for the need under a compression of 90 pounds per square inch.

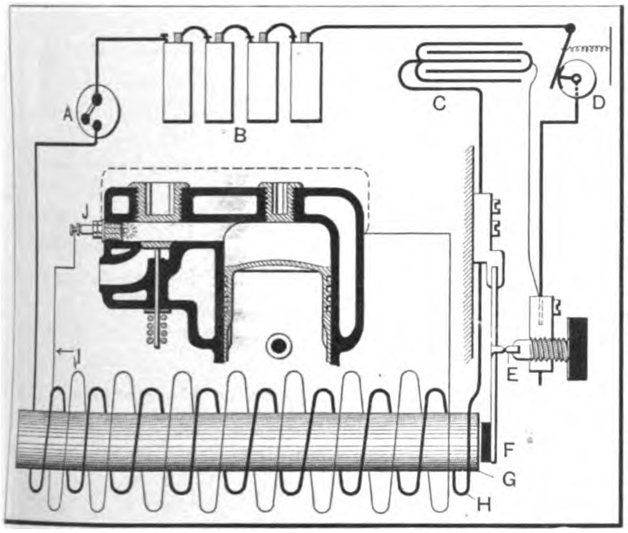


Fig. 3—Diagram of the connections in an ignition system

Cylinder in Question Holds 40 Gallons of Gas

Editor THE AUTOMOBILE:

[2,339]—You stated on page 114 of THE AUTOMOBILE of July 21 that a cylinder measuring 3 1-2 x 13 inches contains about 14 gallons of gas. This looks to me too low a figure.

Hartford, Conn. OXYGEN.

According to James S. Madison, the author of this article, the right figure for the capacity of the tank in question is 40 gallons.

Wants Push Button on the Steering Wheel

Editor THE AUTOMOBILE:

[2,340]—I have a four-cylinder, air-cooled motor to which I wish to add a push button to make the engine start on the spark. I would thank you to tell me how to go about wiring same in the simplest way, so that by pushing a button (separate from the coil) a spark will be obtained at all the plugs at one and the same time.

Jeanerette, La. C. R. P.

Automobile supply dealers are in a position to furnish well-contrived forms of push buttons which may be placed on the steering wheel, and a very good way to make the wiring connections is to take the ground wire from the battery, lead it to the push button on one side and ground the push button on the other side on the steering wheel. It will be understood that what is technically designated as a "ground," is accomplished when the ground wire is led to any part of the metal framing of the chassis or motor, so that the framing itself, being a conductor, becomes a substitute for one of the electrical connections. The battery being grounded on one side will be grounded in just the same way if one of the leads from the push button is connected to the metal steering wheel.

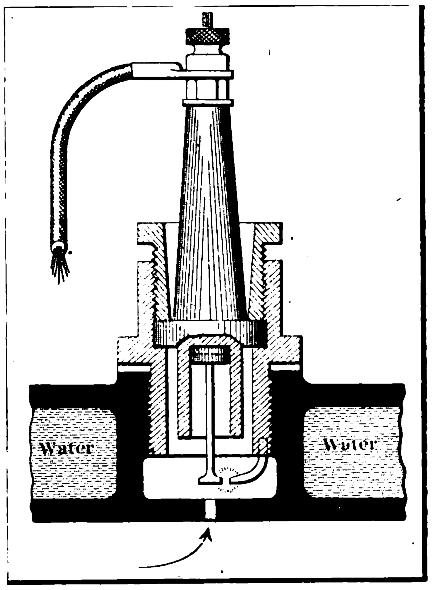


Fig. 4—Spark plug in cylinder head cast with perforated wall at bottom of plug well to protect spark points against fouling.

Connections for Condenser in Ignition System

Editor THE AUTOMOBILE:

[2,342]—I understand in a general way the necessity of employing a condenser as a part of the equipment in an ignition system, but it looks to me as if the condenser as connected up in my car acts to short-circuit the system. One lead from the condenser traces to one pole of the spark gap, and the other lead seems to me to go directly to the other pole. Does this not short-circuit the spark gap of the trembler?

White Plains, N. Y. R. C. N.

According to Fig. 3, a diagram that fits your case, the condenser C is in parallel with the contents E of the trembler. When the switch A is closed, current is supplied by the battery B when the circuit is closed by the timer D, and with the first rush of current across the contact E the core G is magnetized, and due to the change in magnetic flux an electromotive force is set up in the primary wire H, and by induction an electromotive force is impressed on the secondary wire I, thus causing a spark at the spark plug J. When the magnetic flux in the core G is strong enough, it draws the hammer F on the end of the tongue at the trembler, thus opening the circuit at the contacts E, and the condenser C, being in parallel, absorb energy at one point in the wave, delivering it back again to the circuit at another point.

Protection of Spark Plugs the Idea

Editor THE AUTOMOBILE:

[2,341]—I have an air-cooled motor with the spark plugs placed in direct contact with the flame in the combustion chamber, and I use either poor lubricating oil, or the spark plug is in the wrong place. It occurs to me that I might protect the spark plugs to good advantage by not permitting direct flame contact.

Kansas City, Mo. IGNITION.

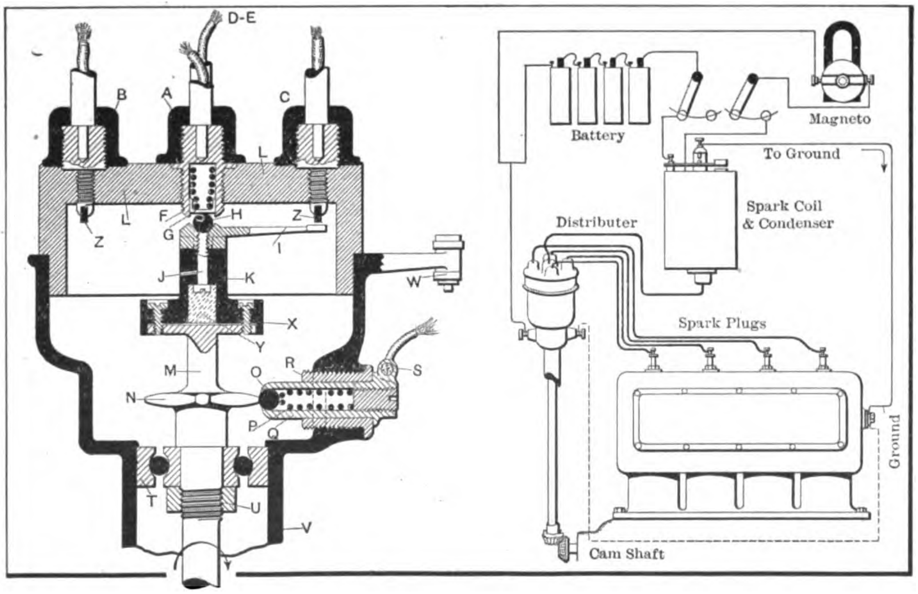
The first thing to do is to acquire the habit of using good lubricating oil. A poor grade of lubricant is likely to "crack" under conditions of high temperature. Fig. 4 shows a plan that seems to work very well indeed, but it may not be possible for you to rearrange your cylinders in order to enable you to take advantage of the ignition chamber as shown. The diameter of the hole leading from the ignition chamber is about 1-8 inch.

Questions That Arise—General In Scope

Discussing single coil for sparking systems; fuel value of gasoline in B.t.u.; relations between air and metal in cooling systems; relation between diametral and circular pitch of gears; gasoline combustion products.

[187]—In some sparking systems for automobile motors a coil is used for each cylinder, but in a few examples one coil is made to serve for four cylinders. How is the single coil connected up to do the work ordinarily requiring four coils?

When one coil is employed for four cylinders instead of one coil for each cylinder, the high-tension distributor must be employed and the connections are as here shown. The current passes from the battery through a switch to the coil through the trembler with the condenser in parallel across the contacts of the trembler. From the coil a single high-tension lead passes out of the bottom and to the central terminal at the top of the high-tension distributor. The high-tension current is distributed to the four spark plugs on the motor, and connections are completed through ground returns as indicated by dotted lines on the diagram. A better understanding of the functions of the high-tension distributor will be realized by examining the section to the left in the illustration which is of the same. This distributor performs two independent functions, one of which is that of a timer which closes the primary circuit in accordance with the relations fixed in timing the motor, S being the terminal of the primary circuit, R is the insulating bushing, and O is the contact which is held into relation by means of a spring so that when the four high spots N on the enlargement of the shaft rotate with the shaft, they make contact 90 degrees from each other. The shaft is vertical and the bearing T in the housing V centers the same, it being held on the shaft by the locking ring U. The upper end of the shaft M has a flange Y at an insulating piece X fit thereto. Screws K hold the insulating piece to the flange, and the finger I is fastened to the upper end of the insulating piece, being held in place by the screw J. Contact is made between the finger I and the central lead E through the ball H and the terminal piece F into which the terminal of the lead E is soldered. A spring presses the ball H into the socket formed in the finger I. The cap of the timer L is of insulating material, and the terminals A, B, C and D are spaced equidistant around the same, with the central terminal E in proper relation. When it is desired to advance or retard, the spark motion is imparted to the distributor by the lever W, which, by suitable links and motions, connects with a lever on the steering post. The finger I makes the connection from the central electrode E to the electrodes A, B, C and D respectively, which in turn are connected to the respective cylinders of the motor, so that a high-tension current is delivered to the respective cylinders with an equal measure of time between sparks, but since only one coil is employed it must serve as a transformer of the step-up character for four cylinders, whereas in the unit coil work there is a step-up transformer for each cylinder, thus eliminating the necessity of using a high-tension distributor. It will be understood, of course, that the high-tension distributor eliminates the need of three of the four coils.



Cross-section of high-tension distributor and plan of wiring for a four-cylinder motor

[188]—What is the fuel value in British thermal units per pound of the contents of gasoline?

According to accepted authority, these values are as follows:

Carbon burned to carbon monoxide....................	4,100 B.t.u.
Carbon burned to carbon dioxide.......................	14,500 B.t.u.
Hydrogen burned to water............................	62,032 B.t.u.
Hydro-carbons burned to carbon dioxide..............	20,000 B.t.u.

From the above it will be seen that a small proportion of hydrogen in the exhaust products of combustion of a motor represents an enormous weight. It will also be noted that unburned gasoline in the exhaust represents a very considerable waste, and that carbon monoxide, if it exists instead of carbon dioxide, lowers the thermal value of the fuel as used from 14,500 to 4,100 British thermal units.

[189]—To what extent is incomplete fuel combustion present due to load changes in a motor?

One test as reported shows changes in a thermal efficiency due to different loading as follows:

EFFECT ON THERMAL EFFICIENCY OF CHANGES IN LOAD

Products	Full Load	Part Load
Carbon monoxide....................	3.31	6.9
Hydrogen	1.19	2.4
Hydro-carbons	0.30	0.9
Carbon-dioxide	11.90	9.9
Oxygen	0.23	0.3
Nitrogen	83.07	79.6
Total	100	100

It will be seen that the carbon monoxide content is nearly doubled with the part load as compared with the full load. Hydrogen is also nearly doubled, under the same conditions, likewise the hydro-carbon is wasted on a considerably increased basis. The carbon dioxide content is maximum under full load, as it should be, and is reduced considerably with part load, which is a misfortune. The amount of oxygen present is maximum under part load, but in excess under both conditions; this, under the circumstances, is probably a necessity since it seems to be impossible to burn automobile gasoline excepting with an excess of oxygen present. The excess of oxygen was apparently greater under full load conditions than it was with the part load because the nitrogen content is greater with the full load. The ratio of oxygen to nitrogen being constant, it is a fair inference that the amount of air used under the part load conditions was less in proportion than under the full load conditions. From the information thus afforded it is reasonable to expect that the thermal efficiency of a motor will be difficult to maintain when the load is reduced, and that there is some one point in the range of speed and load of a motor at which the thermal efficiency will be maximum.

In other words, the thermal efficiency is not constant under conditions of changing speed and load.

[190]—What are the relations between the air as it is propelled by a fan by the radiating surfaces of a cooler, and the conducting ability of the metal used in making the cooler?

As compared with any metal, air is a poor conductor of heat; it follows therefore that any metal as used in radiator construction is capable of delivering more heat to the radiating surface than the air can take away unless the difference in temperature between the cooling air and the metallic surface is relatively great. The ability of air to absorb heat is of course limited to its specific heat, and to the difference in temperature between the entering and leaving air. The specific heat of air is very low, and the real problem is to have a very thin sheet of same spread out over the cooling surface. In order to increase the efficiency of the air current as it involves the cooling surface, circulation is set up; this is but another way of disregarding the poor conductivity of air for heat. Instead of the heat having to traverse the air body, the molecules of air are brought successively into contact with the heated surface of the radiator, and as each molecule of air absorbs its quota of heat, it is borne away in the stream. The efficiency of the process depends upon the number of molecules of air that are successively brought into contact with the heating surface.

[191]—What is the relation between diametral and circular pitch of gears?

The circular pitch may be ascertained as follows:

$$\text{Circular Pitch} = \frac{\pi \times \text{Pitch Diameter}}{\text{A number of teeth}}$$

Conversely,

$$\text{Diametral Pitch} = \frac{\text{Number of teeth}}{\text{Pitch diameter}}$$

Numerically,

RELATION OF DIAMETRAL TO CIRCULAR PITCH

Diametral Pitch	Circular Pitch
4	0.785
6	0.524
8	0.393
10	0.314

[192]—What are the products of combustion of automobile gasoline, and in what proportions?

When the gasoline is burned completely, the products of combustion are carbonic acid and water with a small percentage of ash. As a general rule combustion is not complete and carbon monoxide, hydrogen, carbon and hydro-carbon compounds are found in the exhaust. The percentages of the contents of the exhaust vary over wide ranges depending upon the conditions, but according to Bertram Hopkins (paper read before the Institute of Mechanical Engineers at London, England, February 10, 1909) the following exhaust analyses were made, and they should afford an insight into the subject sufficiently for the purpose here. The engine used was a Siddeley.

REPORT OF TEST KNOWN AS TABLE VI

	A1	A2	B
Speed	530	535	930
Gasoline per thousand revolutions (lbs)	0.42	0.375	0.333
Reported Exhaust Analysis:—			
Carbonic acid (CO_2)	13.55	13.4	13.1
Oxygen (O_2)	0.55	1.8	1.3
Carbon monoxide (CO)	0.8	0.0	0.3
Residuum	0.5	0.35	0.7
Air per suction per cylinder	0.041	0.0395	0.0335

It is claimed that under the above conditions the air per suction stroke is about 20 per cent. greater at 530 revolutions than at 930 revolutions per minute. The ratio of air and gasoline vapor to stroke volume is 83 per cent. at the former against 69 per cent. at the latter speed. This condition is due to the better "filling" of the cylinder at the lower speed.

Making Gears Quiet by Grinding

By F. A. WARD

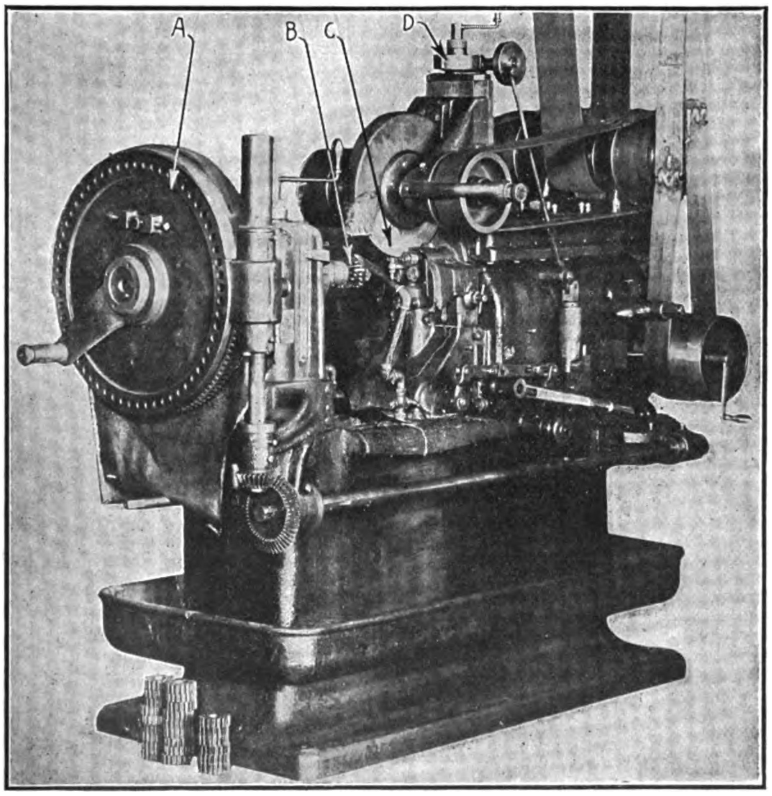


Fig. 1—A, indexing wheel; B, gear to be ground; C, grinding wheel being trimmed; D, automatic device for feeding wheel down as it wears away

THE automobile engineer in considering the gear problem faces several conditions. The gears used must be sufficiently strong and so designed as to withstand not only a constant operating load, but also sudden shocks that may arise from inexperience or other causes. Also, the public demand a quiet-running gear. There must be skin-hardening of the surface of the gear to give commercial life. After determining the load factor some suitable pitch is chosen, and the form of tooth and the pressure angle are decided upon. The material to be used is also determined. With the above data perfect gears could be secured to meet all conditions except as to wearing life. The hardening of gears sets up inaccuracies which it has been impossible for the engineer to overcome.

Gears may be heat-treated and casehardened and allowed to change in physical form to the fullest extent, but a machine must be devised to restore them to perfect form at a commercial cost. Prior experimenters have generally tried to use a thin abrasive wheel, whose revolving perimeter would trace up and down the curve of the gear tooth. But the wear on such a wheel was marked, and it was found impossible to maintain it continuously to form. The basic idea was to use a unit area of grinding wheel to the unit area of surface to be ground and to maintain this unit area of grinding wheel to the constant form desired by means of some trimming device. A first experimental machine was completed in 1907. From then until the latter part of 1909 the

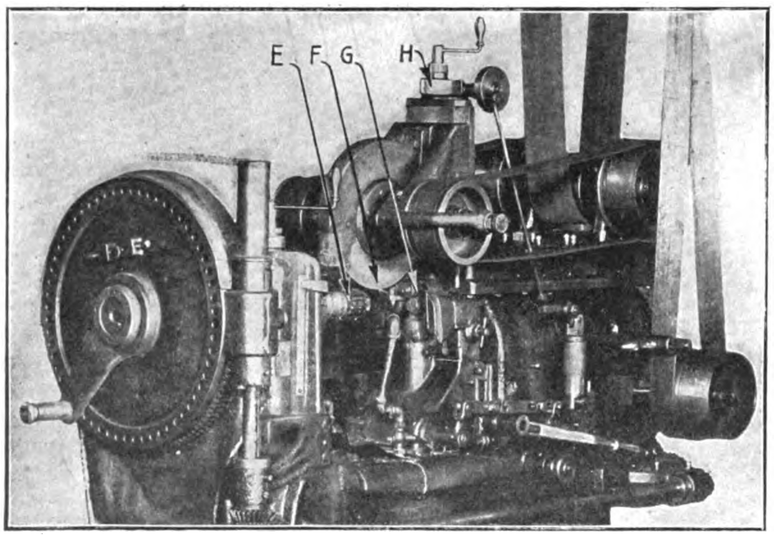


Fig. 2—E, gear to be ground; F, grinding wheel just before entering gear; G, grinding wheel automatic trimming device; H, automatic device for feeding wheel down as it wears away

machine was in process of development. During the early part of this year it was the practice to grind rough-cut hardened gears with such a degree of accuracy that in measuring a group of teeth the variation from theoretically absolute accuracy has been less than .001 inch or less than .0002 inch per tooth. The machine has also obtained such speed as to make it a success.

There are here illustrated the present Type A grinders, which are designed to handle a line of gear work from the smallest up to and including 12 pitch diameter, as heavy as 4 pitch and with a face dimension up to 4 inches. The gear, rough-cut or as the case may be, with stock allowed for finishing in the grinder, is mounted upon an arbor in a manner similar to that employed in gear-cutting. By means of a number of well-known mechanical movements the grinding wheel, revolving at a proper rate of speed, is brought forward and passes with a shaperlike movement between the gear teeth. This grinding wheel is of a grade suitable for grinding the material of which the gear is made, and is kept continuously to the required form by means of an automatic forming device.

In order to grind gears successfully the indexing device is of the utmost importance, as the extreme of accuracy is required. A newly developed indexing device has eliminated the common trouble arising from friction driven indexing devices and is now used upon the machines.

For obtaining the required number of divisions the common method of change-gears is employed.

The forming device is a simple combination of mechanical movements. Any standard form of spur gear teeth and many so-called freak forms are easily developed upon the sides of the grinding wheel and rapidly reproduced upon the gear.

Within this device, not visible in the illustrations, is a master form, which is mathematically calculated and laid out in advance, and by means of the mechanical movements regulates and controls absolutely the curve through which the trimmer diamonds pass.

To change the form upon the periphery of the wheel for grinding different types and forms of teeth, the operator simply replaces the controlling form in use with the one desired and retrims the grinding wheel, operations which require but a few minutes.

The foregoing has treated more particularly with the production of gears for use in automobile construction.

The use of these machines for the production of gears for automobile work has been an afterthought. The making of gears for the industrial field from materials which have hitherto been commercially impracticable on account of many difficulties, has been one of the influences in the development of these machines. There are materials from which there can be cast roughly to form gears, which, after being finished by the grinding process outlined, will show easily from five to seven times the life of the ordinary forged and heat-treated gear. The only method by which it has previously been possible to finish the teeth of such cast gears is by hand through the use of emery.

No comment need to be made as to the long step forward which this gear-grinding machine shows in the art.

A Standard Automobile Nomenclature

A PAPER READ AT THE S. A. E. CONVENTION BY F. E. WATTS, MEMBER SOCIETY OF AUTOMOBILE ENGINEERS

THE automobile business has grown far too rapidly for its "dictionary" to keep pace with it. Probably all of us who have helped in the production of detail drawings, in the making of parts in the factory, in sending repairs to agents and owners, or in writing about any of these, have noticed the lack of uniform names for parts and operations, and have wished that we had at command words sure to be understood.

Feeling the needs of such specific works in the conduct of his own business, and judging that others have experienced the same difficulties, the president has asked me to bring the matter before this society in the hope that some steps may be taken looking toward the adoption of a set of standard automobile terms.

Of course, we already have a sort of glossary, but it has grown so rapidly that there are often several names for the same part. For instance, the piece which supports the front wheel is varyingly called "steering pivot," "knuckle," "front wheel spindle," etc. The rod fastening these together is known as "drag-link," "steering-link," "reach-rod," "steering cross-connection," "cross-rod," "tie-rod." As to the motor, we have "wrist-pin," "gudgeon-pin" and "piston-pin" for the same part; while the piece which connects this with the crankshaft is sometimes called the "pitman," though more often known as the "connecting-rod." Scores of similar examples will suggest themselves to the engineer.

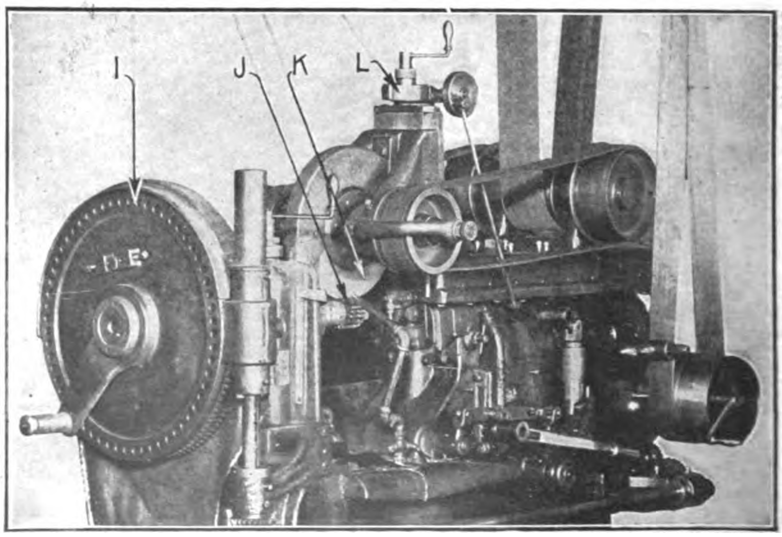


Fig. 3—I, indexing wheel; J, gear to be ground; K, grinding wheel entering gear; L, automatic device for feeding wheel down as it wears away.

We know that words are merely collections of letters, and that most of them have a good many meanings, according to the nature of the sentence they are used in; and, moreover, that there are few words which mean the same thing to a speaker as to his hearers. Nevertheless, it is probably possible to standardize at least the nouns which denote the principal parts of motor cars. We probably would not care to try to standardize the adverbs and adjectives which are applied to the nouns, especially those used in a break-down "forty miles from home."

While the alphabetical order of arrangement of parts is the most natural, there are so many pieces to an automobile that such a list is too long for handy reference, unless it is subdivided. Fortunately, the manner in which cars are assembled naturally provides such divisions, which are used in making up parts lists in all motor car factories.

The following headings are those taken from the price list of repair parts of the Chalmers 30, 1909 model. This parts list was selected because it is unusually complete and also illustrated with sketches of the parts. We will refer to the proposed use of these sketches a little later.

List of Assemblies, or Groups

Accelerator Assembly.
Axle Assembly (Front).
Axle Assembly (Rear).
Propeller-Shaft Assembly.
Body Assembly.
Clutch Assembly.
Dash Miscellany.
Dust-Pan Assembly.
Equipment Miscellany.
Fan Assembly.
Frame Assembly.
Gasoline-Tank Assembly.
Gear-Shift-Guide Assembly.
Hand Lever Assembly.
Hood Miscellany.
Ignition Miscellany.
Motor Assembly (which includes)
  Camshaft Assembly.
  Carbureter Assembly.
  Connecting-rod Assembly.
  Crankcase Assembly.
  Crankshaft Assembly.
  Cylinder Assembly.
  Oil Pump Assembly.
  Timer Assembly.
  Valve Rocker-arm Assembly.
  Water-pump Assembly.
Mudguard and Running-board Miscellany.
Muffler Assembly.
Muffler Cut-out Control Assembly.
Pedal-control Assembly.
Radiator Assembly.
Rock-shaft and Pull-rod Assembly.
Sight-feed Oiler Assembly.
Spark-control Assembly.
Spring Miscellany.
Starting-crank Assembly.
Steering-gear Assembly.
Steering-reach-rod Assembly.
Transmission Unit Assembly.
Transmission-brake Assembly.
Wheel Assembly (Front).
Wheel Assembly (Rear).

The majority of these groups will be found on any gasoline car and the parts included in any of them are not too numerous to handle readily. So if we should take each of these groups and name the principal parts which compose it, the rest would follow easily enough.

Location as Distinction in Terms

The smaller parts, which differ more in the various cars than the larger ones, can be named by a system somewhat as follows: Where there are several parts which are very similar (perhaps performing the same functions on opposite sides of the car), they can often be distinguished by their location in the car. These locations should probably be referred to from the point of view of a person sitting in the car, facing forward. Common words of location are: *Front and rear, right-hand and left-hand, upper and lower*, etc. Usually the smaller parts can be named after the part or parts they are used with. This applies to shafts, bushings, washers, collars, bolts, nuts, studs, pins, pipe-plugs, oil and grease cups and similar small parts. Where several small parts somewhat alike are used with the same large piece, distinguishing prefixes can usually be readily thought of, such as: *Long, short, large, small, round, square, castellated, flanged, lock, retaining, thrust, felt, rubber*, etc. A standard set of such locating and distinguishing terms can probably be developed.

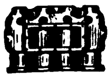
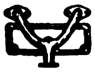
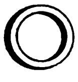
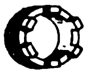
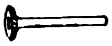
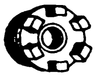
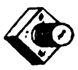
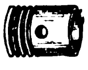
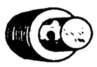
The foregoing suggestions will be of little practical benefit unless some method can be found for collecting and arranging standard terms and bringing them into general use. It has been suggested that a committee be appointed to take this matter in hand, and that it should have enough members that the work can be divided, each covering some small field. The list of standard names should, of course, include at least the principal parts of all kinds of gasoline, electric and steam automobiles.

After these lists shall have been compiled and approved by the society, it is proposed that they shall be printed in the form of a pamphlet, each piece being illustrated by a sketch, so as to make identification certain. A method of arrangement of names and sketches is illustrated in the following "Cylinder Assembly List," taken from the Parts List before referred to; by courtesy of the Chalmers Company.

Possibly volunteers for this work of parts naming can be found among the chief draftsmen of the larger automobile companies; for probably there is no place where standard names for automobile parts will be more appreciated than in the larger drafting-rooms, where new men must be constantly broken in to work according to the necessary rules.

The repair departments of all automobile companies will appreciate this work. For with this "dictionary" in the hands of the engineering department and in the hands of every agent, and of every motor car owner, it is clear to see that an endless amount of confusion will be avoided in the placing and filling of repair orders.

The following should be sufficient to arrest the attention of the society to the matter, which is the only object of this paper. Very likely the work may with advantage be extended so that adopted nomenclature will include a set of definitions of the more common automobile terms and phrases.

Sketch.	*Name.*	*Sketch.*
	CYLINDER ASSEMBLY.	
	Cylinders en bloc. Cylinder priming cock.	
	Inlet manifold. Inlet manifold pipe-plug.	
	Inlet manifold bolt. Inlet manifold bolt lock-washer.	
	Inlet manifold-flange bolt. Flange bolt lock-washer.	
	Inlet valve. Inlet valve-cage.	
	Inlet valve-cage gasket. Inlet valve-cage nut.	
	Exhaust valve. Exhaust valve-guide.	
	Exhaust valve-bonnet. Exhaust valve-bonnet plug.	
	Valve spring. Valve spring-seat.	
	Valve spring-seat—recessed. Valve spring-seat, recessed, split washer.	
	Exhaust manifold stud. Exhaust manifold stud nut.	
	Manifold stud lock-washer. Exhaust manifold gasket.	
	Spark-plug. Spark-plug gasket.	
	Piston. Piston-ring.	
	Piston-pin. Piston-pin set-screw.	
	Fan-lever stud.	

Cork Inserts for Automobile-Making Machinery

PAPER READ BY LAWRENCE WHITCOMB, AT THE DETROIT CONVENTION OF THE SOCIETY OF AUTOMOBILE ENGINEERS.

EVERY element of cost entering into the production of a motor car is an important factor. Therefore, the following in regard to the use of cork inserts is worth consideration.

An economical, efficient and almost indestructible means of eliminating losses in power transmission is a matter of interest.

Leading engineers have repeatedly made the statement in engineering publications that the amount of power lost in mills and factories, between its source and the point of delivery, through the slipping of belts and other friction devices, is far greater than is usually supposed, in some cases running as high as 30 per cent.

Automobile factories in which, owing to the constant growth of the industry, changes and additions are made from time to time, undoubtedly contain many places where there exists such loss of power, which should be eliminated by the purchase of new pulleys or the corking of existing pulleys.

Cork is made up principally of an aggregation of minute air cells, having thin, air-tight, water-tight and very strong walls. If compressed, the resistance to compression continually grows stronger, in a manner more like the resistance of a gas under compression than that of an elastic solid, such as a spring.

It is the elasticity of cork, coupled with its high coefficient of friction and its remarkable ability to withstand heat and wear, which makes it a valuable material for frictional purposes when used under compression as an insert. But it is a peculiarity of cork that while having much elasticity and strength when confined under pressure, it is brittle when not so compressed; and the very grade of cork that proves to be most indestructible when used under compression as inserts, wholly fails, owing to its brittleness and other peculiarities, if used for frictional purposes in its normally expanded and thus weakened condition. It is this fact that has made its successful use for frictional purposes impracticable until the present method of using it under compression was devised.

To obtain this desired compression, sockets are drilled or cast in the face of a pulley, clutch or brake to be thus equipped, and into these sockets are forced corks of a certain grade and of much larger diameter than the sockets themselves. The corks are allowed to dry and are then trimmed and finished so as to have the right amount of projection above the surface of the material surrounding them.

The amount of this projection depends on the nature of the work required of the friction surface. There are, however, two distinct methods of construction.

Consider first the so-called all-cork contact. In this method of construction the sockets are so spaced that the corks occupy a relatively large area and the corks are allowed to protrude above the surrounding surface one-sixteenth of an inch or more, so that they alone come in contact with the opposing surface and transmit all the power. This drive is most efficient and satisfactory where power is transmitted by means of a large area of cork used at light pressure, as is customary on the frictions of looms and similar machinery and in certain types of plate and multiple disc automobile clutches. In this service the pressure and the power transmitted per square inch of cork are so small that there is practically no wear upon the corks, and thousands of automobile and loom clutches thus fitted have been in constant operation for years without requiring repairs.

Second, the so-called composite construction. In this method of construction the corks are allowed to protrude above the surface of the material, in which they are embedded, but one thirty-second of an inch, as in the case of pulleys, automobile clutches, street railway brake-shoes, etc. This method gives an almost indestructible combination surface, of high frictional efficiency and great wearing qualities. At low and medium pressures the corks, with a coefficient of friction of say 0.35, work alone; while at high pressures the inserts are compressed into their sockets, and the surrounding metal, wood or fibre, also comes into engagement to supplement and protect the corks.

Under these conditions the tendency of the cork to yield to compression is greater than its tendency to wear, and when the pressure applied overcomes the rigidity of the cork, the inserts are pressed into their sockets practically flush with the face of the pulley or other friction surface in which they are set, but do not lose any of their efficiency, up to their full frictional limit, since they remain in contact with the opposing surface and present the same face area as before they were compressed. This tendency of cork to submit to compression and thus protect itself from wear is undoubtedly the reason for the excellent wearing qualities of combination surfaces in which the corks occupy a sufficient proportion of the frictional surface to render efficiently the service for which they are installed.

Two important facts to be remembered are that it is the compression of the cork in the sockets which causes them to protrude again above the metal, wood or fibre surface, in which they are embedded, whenever the opposing surface is released; and that the natural physical properties of this material are such that rapid wear is almost impossible.

That cork inserts used under the so-called composite construction will withstand heaviest loads, constant abuse and excessive heat, is shown by their present use in more than 40,000 motor car clutches and by the adoption of this construction by more than sixty automobile manufacturers.

Having treated the matter rather generally, let us now consider how cork inserts are applicable to the automobile manufacturing industry.

Practically all your power is transmitted by means of pulleys driven by belts, and it is generally acknowledged that the capacity of a belt of given dimensions is greater than the capacity of the pulleys over which it runs; therefore, pulleys having high frictional efficiency are most desirable.

The loss that occurs from the slipping of belts reduces product, reaches back to the coal pile and means waste, while on the other hand the failure of certain machines to operate at the desired speed means loss, and in some cases a defective product.

To eliminate these difficulties, pulleys are lagged and relagged, belts are run under excessive tension to the injury of the belt and with an increase in journal friction far beyond economical operating conditions, and belt dressing is purchased—sometimes in large quantities and to an extent that means an appreciable yearly charge to expense account.

If cork inserts are used in pulleys such lagging, excessive belt tension and belt dressing are unnecessary.

That the cork insert pulley exceeds all others in efficiency is shown by tests made by Prof. C. M. Allen, M. S., at the Worcester Polytechnic Institute, a full report of which is too voluminous for this paper, but from which report we copy the following extracts:

"The object of these tests is to compare the relative power-transmitting properties of the various standard pulleys with those of iron and wood pulleys fitted with cork inserts. The standard pulleys used were the smooth iron-face pulley and the ordinary wood pulley.

"All of the pulleys were new to start with, but were in prime running condition when the principal tests were made.

"The belt used was leather and was kept in good running condition during the test.

"The belt speed was about one thousand feet per minute; the revolutions per minute of tested pulley were about two hundred.

"The conditions of atmosphere were such as to give a good variety of tests, being made during the months of July and August.

TABLE OF RESULTS

Load on Dynamometer	Per Cent. Slip Iron with Cork Inserts	Iron
105.0	0.00	1.30
115.0	0.10	1.37
125.0	0.18	1.44
135.0	0.28	1.51
145.5	0.38	1.58
155.0	0.47	1.65
165.0	0.56	1.72
175.0	0.65	1.79
185.0	0.74	1.86
195.0	0.83	1.93
205.0	0.92	2.00
215.0	1.01	2.06
225.0	1.12	2.13
235.0	1.19	2.20
245 0	1.28	2.26
255.0	1.37	2.33
265.0	1.46	2.40
275.0	1.55	2.50
285.0	1.64	2.60
295.0	1.75	2.73
305.0	1.86	2.88
315.0	2.00	3.03
325.0	2.18	3.18

"From the average results of over one hundred tests, the iron pulley with cork inserts at a point of 2 per cent. slip (which is considered allowable in commercial practice) shows a gain in power-transmitting capacity of 51 per cent. over plain iron pulley."

Subsequently to the above reported test it was deemed advisable to make a test of the relative efficiency of several types of small high-speed motor pulleys; and again tests were made by Prof. Allen. The pulleys were all five inches in diameter with three-inch face, and were: (1) Cast-iron, (2) cast-iron with cork inserts, (3) fibre faced with cork inserts.

Appended is the table of results showing the relation between slip in per cent. and horsepower transmitted by the various pulleys tested by Prof. Allen. This table was made up from curves.

Horsepower	Per Cent. Slip Cast-Iron	Cast-Iron and Cork	Fibre and Cork
1	0.23	0.217	0.155
2	0.46	0.43	0.310
3	0.70	0.65	0.465
4	0.95	0.86	0.620
5	1.20	1.085	0.775
6	1.50	1.30	0.930
7	1.85	1.55	1.085
8	2.35	1.80	1.240
9	3.35	2.10	1.395
10		2.43	1.55
11		2.85	1.72
12		3.40	1.90
13			2 12
14			2.35
15			2.70
16			3.18
17			3.95

As certain parties in Lowell, Mass., wished to have a demonstration of the comparative efficiency of cork insert pulleys and pulleys not so equipped, and did not care to rely on the laboratory tests reproduced in part above, it was decided to run a series of tests at the Lowell Textile School, and to invite agents, superintendents, engineers and all other interested parties to participate.

The report in part follows:

"The pulleys tested were all eighteen inches in diameter, six inches face, and were of the following types:

(A) Wood-rim pulley.
(B) Wood-rim pulley, with cork inserts.
(C) Wood-rim pulley, lagged with leather.
(D) Steel pulley.

"The initial belt speed in all tests was about 1,560 feet per minute, and the initial belt tension was approximately 50 pounds per inch of width of belt.

"The comparison of power transmitted at 2 per cent. slip, which is considered a commercial allowance, is given in the first column of the following table:

Type of Pulley	H.P at 2 per cent. Slip	Maximum Horse-power Trans-mitted	Slip in per cent. at Maxi-mum H.P.	Relative Value 2 per cent. Slip
Wood-rim pulley with cork inserts	11.8	13.2	4.6	100 per cent.
Wood-rim pulley, leather lagged	8.7	12.4	4.7	73 "
Steel pulley	8 3	12.7	6.0	70 "
Wood-rim pulley	7.8	9.6	4.3	65 "
Percentage of gain of wood-rim pulley with cork inserts over same without inserts				51 "
Percentage of gain of wood-rim pulley with cork inserts over plain steel pulley without inserts.				42 "
Percentage of gain of wood-rim pulley with cork inserts over leather-lagged pulley without inserts				35 "

"Other tests were made, which would indicate that the percentage of gain for the cork insert pulleys under conditions of less belt tension than that maintained throughout these tests would be even greater than shown above.

"(Signed) G. H. PERKINS"

The several reports from which these quotations are made show that main driving pulleys, receiving pulleys and motor pulleys, and, in fact, all pulleys which may be overloaded or on which slipping may occur will yield better service if equipped with cork inserts than otherwise.

Both wood pulleys and wood-rim iron-arm and hub pulleys now in use may be equipped with cork inserts.

Variation of Current Practice in Anti-Friction Bearings

PAPER READ AT S. A. E. CONVENTION BY D. F. GRAHAM, MEMBER SOCIETY OF AUTOMOBILE ENGINEERS

By anti-friction bearings is meant ball or roller bearings. This paper is not a discussion of the relative merits of bearing types, but a summary of the variation of sizes in use in present models of cars, so far as it has been possible to secure data. An accurate comparison of ball with roller bearings is impossible at the present time, as there is no accepted standard of measure common to both. This paper is therefore largely confined to a comparison of annular ball bearings.

Where a comparison of the cup and cone type is made, the size of the balls only is recorded, and no account is made of the number of balls in each bearing.

In averaging bearings it is essential that a common dimension be secured—the 300 size is used as standard, the 200 sizes reduced to 300 by the subtraction of 2, and the 400 sizes by the addition of 2. This gives a very nearly correct basis for comparison, namely, the load carrying capacity of the bearings.

There has been received from the various parts manufacturers a number of layouts of axles and gear-sets, but in most cases the horsepower allowed for each type was omitted; so no comparison of these could be given.

There is great need of standardizing plain bearings for motors, as to shaft diameter, thickness and length of bearings, etc. At the present time there are about as many sizes as designers.

In the following tables it seemed best to group the cars according to weight, each group including cars of no greater variation than 500 lbs. In the maximum and minimum columns only the bore of the bearing is taken into account, as giving the most important information, viz.: the shaft diameters.

The tables will show a wide variation in bearing sizes for cars of the same weight and power. An analysis of the conditions which surround some of these variations shows that in most cases where a large bearing is used, it is either on account of a peculiar construction, or in an attempt to use a single row annular where others use an annular and thrust or a double row combined thrust and radial. This practice not only makes the housings and all parts larger and heavier, but also costs more.

There are certainly great possibilities from both an engineering and a manufacturing standpoint in the selection of proper bearings for each place in the car, not only as to size, but as to type.

Another distinct advantage arising from the standardizing of bearings would be from the fewer sizes manufactured, the larger stock carried of each size and more rapid filling of rush orders.

GROUP 1—CARS UNDER 1500 LBS.

Three models—Hupp, ABC (Model K), Duryea Buggyaut.

Type of Bearings—Annular, and cup and cone, 1; roller, and cup and cone, 1; cup and cone, 1.

	Size		
Position	Max.	Min.	Average
Front wheel, outside	7-16" Balls	3-8" Balls	17-32" Balls
“ “ Inside	9-16" “	1-2" “	17-16" “
Semi-floating rear axle, outside	1-2" “	1-2" “	1-2" “
Differential	1-2" “	1-2" “	1-2" “
Drive pinion	9-16" “	9-16" “	9-16" “
“ “	305 Annular		

GROUP 2—CARS 1500 LBS. TO 2000 LBS.

Halladay (Models E, F & G), Pioneer (Model B), ABC (Model O), Regal (Model F), Overland (Models 39 and 40), Franklin (Model G), Currier (Models 10, A and 1).

Type of Bearings—Annular, and roller, 2; annular, and cup and cone, 5; roller, and cup and cone, 3; roller, 1; cup and cone, 1.

	Size		
Position	Max.	Min.	Average
Front wheel, outside	1-2" Balls	1-2" Balls	1-2" Balls
“ “ Inside	5-8" “	5-8" “	5-8" “
Semi-floating rear axle, outside	406	406	308
Differential	207	207	305
Drive pinion	307	307	301
Transmission, rear	307	307	307
“ Front	209	208	306.6
“ Countershaft	305	305	305

GROUP 3—CARS 2000 LBS. TO 2500 LBS.

Twenty-nine Models—Buick (Models 19 and 2), Chalmers (Model K), Corbin (Model 18), Franklin (Models D, K, L3 and L4), Moline (Model M), Ohio (Models 40 B, 40 C, 40 D, 40 G and 40 F), Overland (Model 42), Selden (Model 29), L-Stevens (Model 15-30), Maytag (Models D, E and F), Armleder, Firestone-Columbus, Inter-State, Parry, Marathon (Model M 10), Vickers, Warren-Detroit, Stevens (Model 9).

Type of Bearings—Annular, 6; annular, and roller, 5; annular, and cup and cone, 13; annular, roller and cup and cone, 3; roller, and cup and cone, 2.

	Size		
Position	Max.	Min.	Average
Front wheel, outside	307	305	305.4
Front wheel, inside	309	307	307.6
Rear wheel, outside	211	306	306.8
Rear wheel, inside	311	308	309.3
Semi-floating rear axle, outside	308	407	309.5
Differential	214	208	308.8
Drive pinion	309	406	307.5
Drive shaft, front end	211	406	307.8
Transmission, rear	308	307	306.8
Transmission, front	210	306	306.5
Transmsision, countershaft	306	205	305.1

Cup and Cone

	Size		
Position	Max.	Min.	Average
Front wheel, outside	5-8" Balls	7-16" Balls	33-64" Balls
Front wheel, inside	3-4" “	5-8" “	11-16" “
Rear wheel, outside	1-2" “	1-2" “	1-2" “
Rear wheel, inside	3-4" “	5-8" “	41-64" “
Differential	3-4" “	1-2" “	9-16" “
Drive pinion	3-4" “	1-2" “	35-64" “

GROUP 4—CARS 2500 TO 3000 LBS.

Thirty-one Models—Oakland, Alco (Model 7-16), Apperson (Models O, M and 4-30), Buick (Model 17), Stoddard-Dayton (Models 11A, 11C, and 11S), Elmore (Models 36 and 40), Franklin (Model H), Knox, Moline (Model K), Selden (Models 35T, 35S, 35P and 35R), Great Smith (Models D, A, O and B), Stearns (Model 30-60), Croxton-Keeton (Model K). Sterling (Model O), Gabriel (Model 30), Cino, McCue (Model X), Devan (Model 106), Rider-Lewis (Model 8), Wisconsin.

Type of Bearings—Annular, 9; annular, and roller, 8; annular, and roller and cup and cone, 3; annular, and cup and cone. 7; roller, and cup and cone, 4.

	Size		
Position	Max.	Min.	Average
Front wheel, outside	306	404	305.8
Front wheel, inside	308	307	307 5
Rear wheel, outside	311	209	308.6
Rear wheel, inside	312	209	309.8
Semi-floating rear axle, outside	309	408	309.8
Differential	214	208	309.8
Drive pinion	311	307	308.3
Drive shaft front end	209	307	307.1
Transmission, rear	212	306	307.4
Transmission, front	212	308	308
Transmission, countershaft	307	305	305.6

Cup and Cone

	Size		
Position	Max.	Min.	Average
Front wheel, outside	5-8" Balls	5-8" Balls	5-8" Balls
Front wheel, inside	3-4" “	3-4" “	3-4" “

GROUP 5—CARS 3000 LBS. TO 3500 LBS.

Twenty Models—Alco (Models 11 and 12), Apperson (Models 4-50, 4-40, 6-50 and Jack Rabbit), Stoddard-Dayton (Models 10A, 10C, 10F, 10K, 11F and 11K), Rainier, Matheson (Model 6-18), Olds (Models 22L 22AB and 24AB), Pope-Hartford (Models S and T), Gaeth (Model 31).

Type of Bearings—Annular, 7; annular, and cup and cone, 5; roller, and cup and cone, 6; roller and plain, 2.

	Size		
Position	Max.	Min.	Average
Front wheel, outside	307	304	305.8
Front wheel, inside	309	308	308 1
Rear wheel, outside	211	209	310.4
Rear wheel, inside	312	310	311
Semi-floating rear axle, outside	312	311	311.5
Differential	312	209	310 1
Drive pinion	311	405	308.8
Drive shaft, front end	308	307	307
Transmission, rear	309	307	307.6
Transmission, front	210	308	308
Transmission, countershaft	308	305	306.3
Jackshaft (chain drive), outside	311	307	309
Drive pinion, inside	306	305	305.5
Transmission, end of broken shaft	305	304	304.5

GROUP 6—CARS 3500 LBS. TO 4000 LBS.

Ten Models—Alco (Models 9-60 and 12-40), National (Model 40), Olds (Models 22 and 23), Stevens-Duryea (Model S), Thomas (Models M, R and F), McCue (Model 30).

Type of Bearings—Annular, 4; annular and roller, 3; annular, roller, and cup and cone, 2; annular, and cup and cone, 1.

	Size		
Position	Max.	Min.	Average
Front wheel, outside	406	404	307
Front wheel, inside	310	308	309.2
Rear wheel, outside	212	308	309
Rear wheel, inside	312	310	311.1
Differential	312	311	311.2
Drive pinion	411	309	311.5
Drive pinion, inside	406	306	307.3
Drive shaft, front end	309	209	308
Transmission, rear	310	308	309.1
Transmission, front	212	307	308.5
Transmission, countershaft	310	306	308

GROUP 7—CARS 4000 LBS. AND OVER

Five Models—Royal Tourist (Model M), Welch, Thomas (Model K), Allen-Kingston, Houpt-Rockwell.

Type of Bearings—Annular, 3; annular and roller, 2.

	Size		
Position	Max.	Min.	Average
Front wheel, outside	307	307	306.3
Front wheel, inside	309	408	309.6
Rear wheel, outside	211	308	308.6
Rear wheel, inside	311	310	310.5
Differential	314	310	311
Drive pinion	310	310	310
Drive shaft, front end	308	308	308
Transmission, Rear	311	310	310.2
Transmission, front	214	309	310
Transmission, countershaft	407	307	307.5

GROUP 8—TAXICABS

Three Models—Ewing, Croxton-Keeton, Rockwell.

Type of Bearings—Annular, 1; annular and roller, 1; annular and plain, 1.

	Size		
Position	Max.	Min.	Average
Front wheel, outside	406	306	307
Front wheel, inside	409	308	309.5
Rear wheel, outside	210	210	308
Rear wheel, inside	310	310	310
Semi-floating rear axle, outside	408	408	310
Differential	212	309	309.3
Drive pinion	308	308	308
Drive shaft, front end	307	307	307
Transmission, rear	209	209	307
Transmission, front	309	309	309
Transmission, countershaft	307	307	307

GROUP 9—ELECTRICS

Eight Models—Baker (Models P, S and V), Babcock (Models 5, 6, 11, 12 and 14).

Type of Bearings—Annular, 7; annular and roller, 1.

	Size		
Position	Max.	Min.	Average
Front wheels, outside	304	302	302.8
Front wheels, inside	307	306	306.6
Rear wheels, outside	302	302	302
Rear wheels, inside	307	307	307
Motor	306	305	305.6
Countershaft	208	306	306
Semi-floating axle, outside	309	307	307.7
Semi-floating axle, inside	306	306	306

Summary

Total Number Models: 121

Type of Bearings

Annular	37	30 per cent.
Annular and roller	22	18 per cent.
Annular, roller, and cup and cone	8	7 per cent.
Annular and cup and cone	32	26 per cent.
Annular and plain	1	1 per cent.
Roller	1	1 per cent.
Roller and cup and cone	16	13 per cent.
Roller and plain	2	2 per cent.
Cup and cone	2	2 per cent.

SUMMARY OF AVERAGES

Group No.	1	2	3	4	5	6	7	8	9
Front Wheel, Outside	...	...	305.4	305.8	305.8	307	306.3	307	302.8
Front Wheel, Inside	...	...	307.6	307.5	308.1	309.2	309.6	309.5	306.6
Rear Wheel, Outside	...	...	306.8	308.6	310.4	309	308.6	308	302
Rear Wheel, Inside	...	...	309.3	309.8	311	311.1	310.5	310	307
Semi-fltg. Rear Axle. Outside	...	308	309.5	309.8	311.5	...	...	310	307.7
Differential	...	305	308 8	309 8	310.1	311.2	311	309.3	...
Drive Pinion	305	307	307.5	308.3	308.8	311.5	310	308	...
Drive Shaft, Front End	...	...	307.8	307.1	307	308	308	307	...
Trans'n, Rear	...	307	306 8	307.4	307.6	309.1	310.2	307	...
“ Front	...	306.6	306.5	308	308	308.5	310	309	...
“ Cr'shaft	...	305	305.1	305.6	306.3	308	307.5	307	...
Jackshaft. Outside (Chain Drive)	...	...	...	...	309	...	...	...	...
Drive Pinion. Inside	...	...	...	...	305.5	307.3	...	...	...
Transm'n End of Broken Shaft	...	...	...	...	304.5	...	...	...	...
Motor	...	...	...	...	....	...	...	...	305.6
Countershaft (Electric	...	...	...	...	...	...	...	...	306
Semi-fltg. Axle, Inside	...	...	...	...	...	...	...	...	306

Studies in Aviation Theory and Practice

By MARIUS C. KRARUP.

FACTS of experimental observation in connection with the curvatures of aeroplanes and of propellers are slowly grouping themselves in an orderly array in which the mind perceives a certain correlation betokening the genesis of a physical law, as yet unformulated, relating to thrusts applied against the free atmosphere by means of the surface of solids. The facts referred to are those now well established ones which have been mentioned in previous articles, dealing with the varying efficiency in power application according to the varying angles at which planes are moved through the air and according to the varying degree of concavity with which the pressure surfaces of these so-called planes are formed.

It is of course the great mobility of the air which makes it difficult to apply pressure against it. When it is confined, as in pneumatic apparatus, or when other equally mobile gases, such as steam or the products of a hydrocarbon gas explosion, are confined in the cylinder of an engine, no difficulty is experienced in transmitting pressure with great efficiency by means of the expansion or compression of these gaseous media. Whatever difficulty is met relates to their confinement. Their tendency to escaping has to be watched sedulously. But they respond faithfully to the law of Mariotte, returning a given pressure in inverse proportion to the volume to which they have been compressed. What is sought now, for aid in the development of aviation machines, both as to sustentation and as to propulsion, is a corresponding law relating to thrusts against the atmosphere at liberty.

Material is being gathered at the aerodynamic stations which will eventually permit the scientific establishment of the quantitative relations which must exist with regard to velocities, angles of incidence and shapes of the surfaces with which it is sought to apply thrusts against the atmosphere, but while this material is accumulating many persons in all parts of the world are straining their powers of intuition and of "scientific imagination" to anticipate the final disclosure of the complete law—to anticipate it at least qualitatively. A thesis or theory which has assisted the writer in classifying and understanding the facts recorded by various experimenters, and which has served to reconcile them with other observed facts relating to explosions, tornadoes, parachutes, boomerangs, baseball curves and certain sleight-of-hand tricks with cards, all of which phenomena are more or less intimately related to questions of thrusts against the free atmosphere, may perhaps be expressed as follows:

The free atmosphere opposes a resistance to displacement which is in inverse ratio to the density of the displacing body and in direct ratio to the squared velocity of the latter.

According to this theory the efficiency of a thrust applied by means of the surface of a solid and rigid body must depend upon the interposition of a body of more or less securely entrained air between this body and the atmosphere, and the question of angles of incidence and shapes (curvatures) is resolved into a new question as to what angles and what shapes will result in the formation of the most suitable body of entrained air acting as an efficiency-producer between the rigid surface and the highly mobile free atmosphere. Further, the most suitable body of such air should be one in which the gradation of compression, extending from the solid surface toward the atmosphere and determined by shapes, angles and velocities, reaches from a degree of density against which the solid surface can act with efficiency through successive stages to a lower degree of density, approaching that of the atmosphere itself, and of which these outer layers, being adapted to act against the atmosphere, assume the most favorable, presumably the flattest, form, most nearly parallel with the main extension of the pressure surface of the displacing body.

With regard to the direction of the resistance against displacement, it may perhaps be posited that it must be radial to the formation of entrained air, or extending in converging lines from the least compressed toward the most compressed portions of the same. This assumption would go far to explain the shifting of the centers of pressure under aeroplanes which occurs with changes of angles and speeds. The disastrous action of eddies in the atmosphere, which must be supposed to be formations of a rotary character and comprising layers of air of varying density, also seems to be brought into correlation with other facts by this theory.

In the case of aeroplane action it is well understood that the downward or sustentation thrust under favorable conditions greatly exceeds in lifting power the power of the propulsive thrust which causes it, and this has been considered inexplicable under the known physical laws. Assuming, however, under this theory, that the propulsion of the plane at a suitable angle merely causes the air which is in the path of the plane to arrange itself in a succession of what might be called aerial rollers or sliding blocks, which are hindered in escaping rearward by the lowered rear edge of the plane and downward by the action of the law here tentatively and provisionally formulated, it becomes evident that there is no more reason for demanding a power equal to gravitation for sustaining the moving machine than there is for demanding a power equal to sustaining the weight of an automobile for the purpose of moving the automobile over a road surface.

A paraphrasing of the theory makes this even plainer. Instead of speaking of the resistance of the air to displacement as being conditioned by the density and velocity of the displacing body (of which the entrained air is made to form a part, though one constantly renewed), one may formulate the theory with reference to the speed of displacement. It would then be as follows: **Free atmosphere yields to displacement with a speed directly proportionate to the density of the displacing agent and inversely proportionate to the speed of the latter.**

Now, when the aeroplane is propelled, skin friction causes the adjacent air strata under the plane to roll, in a manner analogous to that of wave formation in the ocean, and the shapes and dimensions of these rolling waves will be determined by the skin friction with the plane, by the intermolecular friction of air and by the chances for escape under the rear edge of the plane (which are again determined by the tilt, shape and speed of the plane). But the mobility and elasticity of air will cause the waves or rolls to form in layers of increasing density toward the axis of each wave, while many minor waves will form a large one as in the ocean, and the forward pressure of the moving plane will flatten and condense the waves on the side from which pressure is received. Assuming now, in accordance with the theory, that the air of a given degree of compression cannot displace air of the next lower degree of compression at more than a certain low speed, and that the velocity of the plane further reduces the speed at which one layer can displace another, it is readily perceived that the plane as a whole simply follows the lines of smallest resistance when it glides forward over the air rollers rather than dropping. No laws of gravitation are violated and no mystery is created, if a law such as formulated, or similar, with regard to the action of one body of air against another, one gas against another, is assumed to exist.

By applying this theory intuitively to all the various phenomena of aviation, the relations between flat and curved, narrow and wide, smooth and rough, flabby and taut planes seem to take on new significance. The accidents seem only natural, and even the somewhat incomprehensible contention of experimenters that a thick front edge reduces resistance to propulsion and increases sustentation begins to look perfectly reasonable—for the kind of planes for which they have found it true.

Abstracts from the 50 Best Foreign Papers

Digest Along Technical Lines for the Engineer

Quick identification of iron and steel materials by means of an emery wheel is the subject on which Erhard Fuchs of Saronno imparts some information more definite than that which is commonly offered. The writer stepped into a position in which he had to make the best of a lot of old steel material lying around the place unidentified as to analysis, price and origin. Trying the method proposed by Max Bermann (and also known in United States) of recognizing each steel by the sparks it emits when ground with an emery wheel, he found it at first difficult to distinguish the various spark figures, but after a little practice the eye grew accustomed to look for the isolated sparks rather than for the densest bunch of them and then it became easy to tell the typical lines resulting from a certain grade or composition of steel. It is advisable to cut off samples of known composition and use them for comparison. Any emery wheel may be used, but in the various trials it should always be of the same grain and hardness, and the wheel should be operated at normal speed, such as 25 to 30 meters per second. It is the metal torn from the sample which forms the spark, as the emery torn off does not reach red heat.

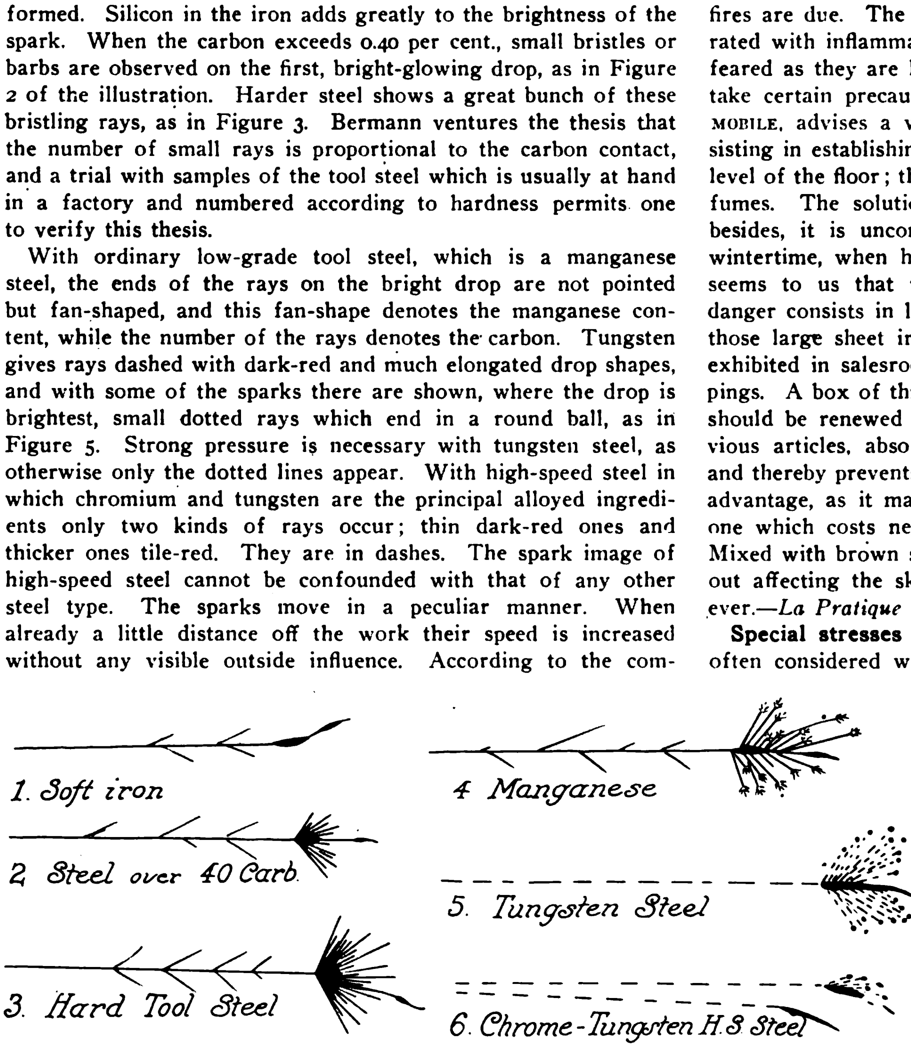
With soft iron, the spark forms a straight line whose end is shaped as an elongated drop which glows very brightly, and immediately in advance of it a smaller drop of dark red is formed. Silicon in the iron adds greatly to the brightness of the spark. When the carbon exceeds 0.40 per cent., small bristles or barbs are observed on the first, bright-glowing drop, as in Figure 2 of the illustration. Harder steel shows a great bunch of these bristling rays, as in Figure 3. Bermann ventures the thesis that the number of small rays is proportional to the carbon contact, and a trial with samples of the tool steel which is usually at hand in a factory and numbered according to hardness permits one to verify this thesis.

With ordinary low-grade tool steel, which is a manganese steel, the ends of the rays on the bright drop are not pointed but fan-shaped, and this fan-shape denotes the manganese content, while the number of the rays denotes the carbon. Tungsten gives rays dashed with dark-red and much elongated drop shapes, and with some of the sparks there are shown, where the drop is brightest, small dotted rays which end in a round ball, as in Figure 5. Strong pressure is necessary with tungsten steel, as otherwise only the dotted lines appear. With high-speed steel in which chromium and tungsten are the principal alloyed ingredients only two kinds of rays occur; thin dark-red ones and thicker ones tile-red. They are in dashes. The spark image of high-speed steel cannot be confounded with that of any other steel type. The sparks move in a peculiar manner. When already a little distance off the work their speed is increased without any visible outside influence. According to the composition of the high-speed steel other rays occur, presumably in correspondence with the contents of titanium, molybdenum or vanadium. By high pressure, the little thin dotted dark-red rays with ball-ends appear now and then.

Cementation steel shows the same image as manganese steel (this seems curious), and from under the hardened surface the same as iron. Cast-iron shows different images, according to its composition, the carbon and the manganese showing as before mentioned. A large number of grey iron samples from different makers gave as many somewhat differing spark figures, but the composition of each was not known. The brightness of the rays varied from dark-red to white and should prove one of the distinguishing means. Many applications of this ready test method should be possible. Old tools of unknown steel may be annealed, worked over and tempered at the right heat. Mixed and unmarked steel may at once be employed for its purpose. Cast pieces obtained in the trade may be compared with analyzed samples. The author expresses a desire that many others will step in and complete his observations.—*Werkstatts-Technik*, May.

If there is a pit under the vehicle in the garage, the danger of fire is no less great, says the author speaking of those accumulations of gasoline in gaseous form to which most garage fires are due. The soil and sides of the pit finally become saturated with inflammable products which are so much more to be feared as they are less in evidence. It is therefore necessary to take certain precautions. Our American colleague, The Automobile, advises a very judicious but rather costly method consisting in establishing a series of air vents in the walls along the level of the floor; there will then be no stagnation of inflammable fumes. The solution is elegant, but, as said, it is costly and, besides, it is uncomfortable for the feet of the mechanic, in wintertime, when he does the daily chores of the machine. It seems to us that the most practical means for avoiding the danger consists in leaving permanently under the vehicle one of those large sheet iron boxes which are used under automobiles exhibited in salesrooms to avoid soiling the floor with oil drippings. A box of this kind should be filled with sawdust and this should be renewed every day. Sawdust, as referred to in previous articles, absorbs a very considerable volume of gasoline and thereby prevents its evaporation. It offers moreover another advantage, as it makes an excellent soap for the mechanic and one which costs next to nothing and does not ruin the hands. Mixed with brown soap it removes grease from the hands, without affecting the skin, better than any other substance whatsoever.—*La Pratique Automobile*, July 10.

Special stresses caused by the use of gyroscopes are not often considered when it is proposed to employ gyroscopic devices for the balancing of automobiles or aviation machines. But light on this subject comes from unexpected sources and shows incidentally, with special reference to aeroplanes, that any attempt to endow them with a high degree of automatic stability, by gyroscopes or any other means, would be accompanied by strains upon the slender materials of these structures which are now obviated through their very mobility in and with the atmosphere. Speaking of the various means proposed for avoiding seasickness by reducing the pitching and rolling of vessels, the author in this case calls attention to experiments made with gyroscopes in British torpedo boats, not for



Typical lines in sparks drawn from various sorts of steel with an emery wheel—the colors are stated in the text avoiding seasickness, but to enable the gunners to point their deadly ordnance with more unfailing precision than is possible when the sea tosses the ship from side to side. The results, he records, were deplorable. The rolling was diminished, to be sure, but the yielding of the vessel to the waves was so much restricted that the latter broke with extreme violence against its shell and threatened to destroy it. It was considered useless to continue the experiments.—*Omnia,* July 2.

The designer's work is the basis on which the buyer and the business manager must work out their economies. They can seldom add anything to the value of his work, though they are in position to detract from it. Every error of judgment on the part of the designing engineer is most likely to be found in the finished product, while some of the virtues of his conception may have disappeared. The fault lies usually in lack of commercial and producer sense with the designer, but frequently it lies in the vagueness of the problem which he has been asked to work out. He is wanted to produce a certain type of construction "as cheaply as possible," while there should be given him a definite limit in mark and pfennig. His dormant economical sense does not wake up until the problem is clothed in exact figures. A simple matter, such as changing a three-speed transmission into a four-speed transmission, becomes much more interesting to the designer when the extra cost of production involved in the change is limited in advance to a scant sum, say 100 mark. It is true that the means for calculation will usually be accessible only to the designer in chief, and it will remain for him to instruct his draughtsmen in the most practical manner. The work of both will gain in depth, to themselves, and in utility. Working closely to a fixed budget is, moreover, nowadays a method outright necessary for commercial self-preservation. The horn of plenty no longer hangs over the automobile industry, in the sense that novelty, as such, may be presumed to compensate for the expenses due to lack of experience and expensive trials of new devices. There must be profits everywhere. And some decided changes in methods are necessary if the spirit of economy shall find satisfaction without deterioration of the products. It must be admitted that heretofore the decisions of husbandry have been more generous than just. Ignorance of the forces and stresses involved and general lack of experience caused the admission of high-priced materials in many instances when its adoption would not be justifiable to-day. Sometimes it was timidity and indecision which promised safe results with the expensive materials. And often it was reserved for the nickel-chrome steel at 1 1-2 mark per kilogram to cover up all sins of construction, and where the costly customer had once found lodgment it was always difficult to unseat him, always a matter of scrupulous hesitation. Few wish to retrograde in materials. For this reason the slowly rising new firms are as a rule working on a more rational economical basis than those who shared the blessings of the cornucopia period.

Taking bar material as an example, there mav be differentiated between the following groups, among which the normal open-hearth (Siemens-Martin) steel at 15 to 16 mark per 100 kilogram may be considered as the unit value.

Tensile strength per square millimeter	Elongation		Price Scale
1. Open hearth steel, 40 kg.	28%	Casehardening material	1
2. Open hearth steel, 45 kg.	22%	Forging steel	1
3. Open hearth steel, 50 kg.	15%	Tempers by quenching	1
4. Open hearth steel, 55 kg.	25%	Casehardening material	1 1-2
5. Open hearth steel, 60 kg.	25%	Casehardening material	2 1-2—3
6. Nickel steel, 75 kg.	20%	Tempers by quenching	3 1-2—4
7. Nickel-chrome steel, 80 kg.	18%	Casehardening material	6
8. Nickel-chrome steel, 95 kg.	15%	Casehardening material	8
9. Nickel-chrome steel, 110 kg.	8%		10

This makes nine different qualities to work with, and the first impression of this fact is deterring. The subdivisions are, however, justified, even at first glance, by the great price difference of the last material, which costs ten times as much as the first. This expensive material cannot be quite dispensed with for good automobiles, but it is of course advisable, wherever this material can be spared, to fall back upon a cheaper one, and on this basis even slight variations in the grades bring important economies. A bar of 50 millimeters diameter weighs about 15 kilograms per running meter. The difference in price by going from No. 9 to No. 8 involves two steps in price or 30 pfennig per kilogram. For one meter of material there is already 4.50 mark saved, and by choosing No. 7 the saving reaches 9 mark for one piece in the construction. In many instances attempts at economy of this order fail only because there are not enough intermediate grades, while it is not feasible to fall back as far as to No. 5. The lack of intermediate grades has been the rule until recent years. The material jumped from No. 4 to No. 8, and this fact conditioned a qualitative difference between the high-grade and the low-grade car. But to-day the steel mills furnish materials at prices from 0.50 to 0.80 mark of very excellent medium quality. With these on hand, the use for general construction of the top notch quality, which is intended only for special purposes, is sheer waste. The number of grades can therefore not be reduced without notable industrial losses. (The author's reasoning can of course not be properly applied to American industrial conditions without considerable modifications, in which the position of the partsmaker and the cost and difficulties in getting proper casehardening and heat-treatment for a large number of different kinds of steel in one factory are among the factors to be considered.)

Another factor in economy is frequently ignored. Many designers are still fired with an exaggerated ambition for light weight and sacrifice considerable differences in price for slight gains in this respect. It has become possible to-day, by reason of the developments of the foundry technic and the processes of mass manufacture, to build very light by the employment of tubular and pressed-steel parts and without any use of expensive materials. It is quite conceivable in some instances to change from No. 8 to No. 1, by considering elements which have been carried into new constructions year after year without new examination as to their fitness under changed industrial conditions. Let us consider a camshaft of 18 millimeters diameter, material No. 8. I use instead material No. 4, price 1 1-2. The strength is perhaps 30 per cent. smaller, so that I must choose a larger dimension. I go to 25 millimeters diameter. That makes the rigidity of the new shaft 1534 as against 572.6 for the old, so that safety no doubt is taken care of (with all allowance for fatigue due to alternation of stresses). The increase in weight amounts to 1.998 kilograms per meter. The saving in cost comes to 97 pfennig per kilogram, and, as the size of the cams renders integral cams desirable, the weight to be considered is that of a bar 50 millimeters in diameter and one meter long, which weighs 15 kilograms; cost saving 14.55 mark. By this saving the increase of 2 kilograms in weight should be justified, especially as it may be offset at other points. For example, a forged step bracket weighs about 2 1-2 kilograms, while a tubular one or one made of pressed sheet steel can be produced at a weight of 1 1-2 kilograms each, which for four brackets means a weight saving of 6 kilograms, aside from the price saving on the brackets. It is easily seen how fruitful a systematic examination of the possibilities extending to every piece of the whole construction may become, particularly if shared in by both the designer and the business manager or producing engineer. With these possibilities properly exploited, an economical decision at one point will frequently lead to an outright improvement in the whole construction. The saving safely effected at one point permits one to spend a little money at some other point which may have proved itself of doubtful security in practice. Out of the 14.55 mark saved on the camshaft, 4.55 mark, say, may be employed for such a purpose, and yet a saving may be recorded on the whole. The general rule of proceeding at every step with a specific examination of the possibilities applies of course to all materials in a car and not only to the question of adoption or non-adoption of the extra high-priced steels. Too much attention cannot be given to the fact, almost forgotten in some circles, that "common steel" after all offers tensile strengths as high as 50 kilograms per square millimeter with an elongation of 20 per cent.—From unfinished article by Diplom-Ingenieur N. Stern in *Der Motorwagen,* June 30.

The Carrying of Tools, Spare Tires and Supplies

EXTRACTS FROM PAPER READ AT S. A. E. CONVENTION BY H. H. BROWN, MEMBER SOCIETY OF AUTOMOBILE ENGINEERS.

Cleanliness, convenience and economy demand that there be a radical change from the present practice of carrying lubricating oil, tools, spark plugs, spare tires, etc. The author points out several practical methods of so doing which the autoist could follow with advantage.

WHILE it may seem to some that the consideration of the matter of carrying tools, tires and other accessories and supplies on a machine are beneath the notice of an engineer or designer, the subject is one which means a good deal to the comfort and convenience of both the passenger and driver. The designer should, in the course of time, overcome all of the weak points of the motor car. In the meantime, repairs of one kind or another must be made on the road. Than the engineer no one is in a better position to know what tools are most suitable for these repairs, and to state what shall be the outfit of the car in this respect, and to him this paper is particularly addressed.

Even granting that any car in question is perfect, yet the puncture fiend is always likely to be with us, and spark plugs will occasionally go out of business. Our prominent designers are, above all, practical men, having perfected their designs by good, thorough road try-outs. During this work, doubtless, many little ideas which would greatly minimize the time taken for a roadside repair have come to them, only to be put aside in the rush of more important details.

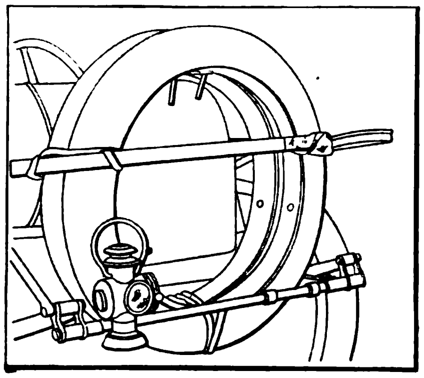


Fig. 1—Demountable-rim carrier on Alco car in 1909 Vanderbilt Cup race

One point that might easily be improved is the method of carrying lubricants. It is an open question whether there is nowadays any necessity of carrying a reserve supply of lubricants at all, other than that which is carried in the squirt-can for immediate use. However, on a long tour, while well-equipped garages at which oil of a good quality may be had are now available almost everywhere, a driver cannot be blamed for liking to stick to a brand of engine lubricating oil in which he has confidence. Therefore, a reserve supply of a gallon is a good thing to fall back on in case a particular brand is not available.

No particular place seems to have been chosen by either makers or users for carrying this reserve supply. The action of oil on rubber needs no comment. Oil cans are almost certain at some time to leak; or, if they do not, in pouring the oil to the motor or squirt-can, some of it will almost invariably slop over, and the chances are strongly against the can being wiped perfectly dry before being replaced in whatever storage place is assigned to it.

From this point of view the tool box on the running board is not so bad a place in which to carry this oil reserve. But one does not care to get the hands more or less covered with oil, whenever a tool is required for some simple adjustment such as removing a spark plug. A step in the right direction was made by a well-known dealer in oils. This maker provided, free to consumers, a little bracket, complete with strap, which could be affixed to the running board. Even if the can should spring a leak, the greatest damage that could result would be a slippery running board; and a liberal dose of sand or dust would easily remedy this fault.

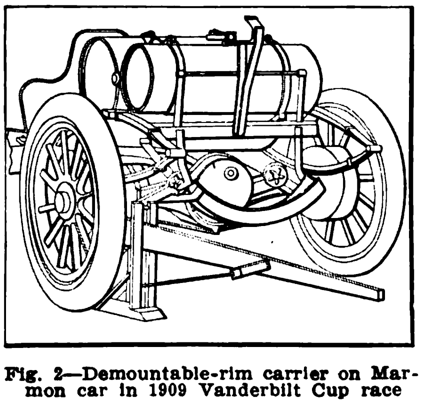


Fig. 2—Demountable-rim carrier on Marmon car in 1909 Vanderbilt Cup race

However, the best place for carrying the supply of reserve motor lubricant is either under the motor bonnet or under the floor boards. In either of these positions it would be near the place of use, would occupy room practically available for no other purpose, and in event of leakage, could do no damage. Of course, it might in some cases be necessary for the maker to provide a can of a special form, and with suitable brackets and fastenings, for holding the same securely in position.

The position and method of carrying tools should be such as to be of the greatest convenience to the driver and of the least annoyance to passengers and others when it is necessary to get at the tools, etc.

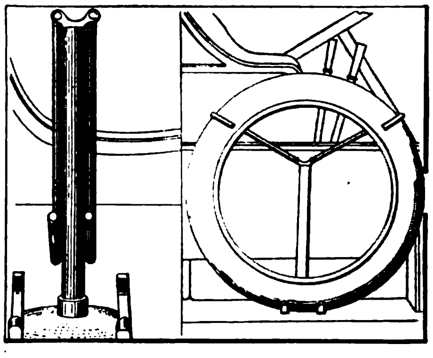


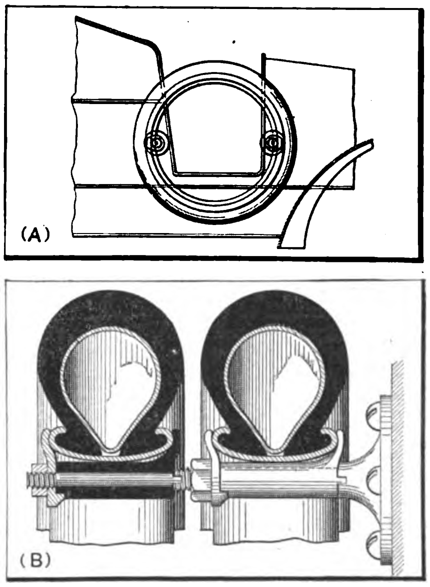
Fig. 5—G. P. M. demountable-rim carrier

Following this principle to its logical conclusion, the best place, if both places above indicated were equally available for carrying the lubricant, would be under the bonnet, out of sight and yet accessible.

For carrying tools the most satisfactory method, when all classes of cars are considered, is in a tool box on the running board. A box formed under the front seat is from many viewpoints an equally desirable place; but in a touring car which employs gravity feed this position is precluded, as it is desirable not to curtail the dimensions of the gasoline tank in order that the distances that one can travel on a filling of gasoline should be as large as possible. The back seat space may be made available for carrying tools and supplies without inconvenience to the rear seat occupants by means of an outside, side or rear door. However, this method has the drawback that things are much more liable to get lost, owing to either theft or leaving the door insecurely fastened.

One of the best methods of carrying tools is in a tray (or trays) having depressions for each individual tool. An experienced driver or mechanic knows in advance pretty nearly what tools are required for a particular job. With the tray system no time is lost looking for them. Then, again, when the job is done, a glance will show whether any tool which may have been left by the roadside is missing, and the same glance will tell by the shape of the depression just what tool it is that is missing. The only thing that can be said against this method is that it wastes considerable room and is, perhaps, somewhat expensive. Another method is the provision of a roll leather kit, with places for each tool. This method has the advantage that all tools can be carried to the vicinity of the job in question, and that a much smaller space is occupied by the tools as a whole. However, much more time will be occupied in getting out and putting away the tools, which are much more likely to get lost than in the former method.

One point seems to have been given very little thought by the makers: the methods of carrying spark plugs. Many plug makers provide secure mailing cases. As long as a plug is kept in one of these receptacles it matters little how or where it is carried. These receptacles, however, are bound to get lost or misplaced. One good scheme is that a wooden or metal block, threaded for the reception of the plugs, be secured to some part of the machine, in the interior of the tool box, or even under the bonnet. For instance, there might be provided on each cylinder a clip, into which a spark plug could be screwed. This would then act at the same time as a holder, in case one wished to test the spare plug or to test the plug in the cylinder by the method of "parallel gaps."



Figs. 3A and 3B—Demountable-rim carrier, support being applied directly to rim

It is probable that the matter of tire-tool equipment is the one in which American manufacturers have been remiss. The sole tire repair equipment as regards tools until recently was a pump, sometimes of more or less doubtful utility; two plain, straight flat tire-irons, a jack, which was generally too tall to place under the axle when the tire was deflated, and a box which contained a small tube of cement, some minute rubber patches and valve parts. While one can, on a pinch, get along with plain tire irons, yet to handle a clincher tire with facility others are desirable. The number and variety of these are legion, and most of them are good when once the proper method of handling is understood; but some appeal to certain users.

No experienced motorist will think of taking a trip of any length without spare tubes, nor will he rely on a cemented patch, unless he is forced to by stern necessity. Spare tubes should form part of the equipment of all experienced motorists. Careful driving, care and inspection of a modern car will make one practically immune from roadside stops, other than those due to tire troubles, against which no amount of care can entirely guard. The inconvenience of these troubles should be reduced to a minimum. One of the first things to effect this is to make all appliances likely to be needed readily accessible.

For all classes of cars the most convenient place to carry the extra inner tubes is probably the tool box on the running board. If some of the tools and supplies less likely to be used are arranged for in other places than the running board box, then room can be made for spare tubes in the tool box without greatly increasing its size, if at all. In the case of a town car, used as such, even with gravity feed gasoline system, the amount of gasoline needed is so limited as to allow of ample storage space for all tire tools and spare tubes under the front seat. The tire trunk is also a good solution of the spare tube storage space problem.

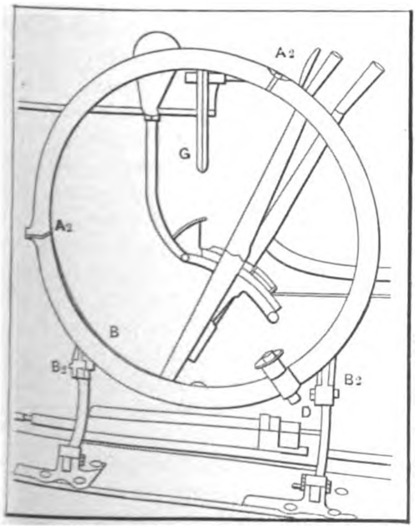


Fig. 4—Dunlop demountable-rim carrier. Pins A_2 and D on outer aluminum ring casting, support rim. Inner casting B is held to running-board by swing brackets B_2, B_2, and to body by shorter swing link G

The introduction of the demountable rim has reduced the number of tools needed on the road for tire troubles to two: the wrench, brace, or key, used in securing the rim to the wheel, and the jack. It is probable that an owner who has had demountable rims fitted to his car will, on getting his first puncture, meet with a good deal of disappointment as to the time required to effect the change. This is owing a good deal to the accounts he has heard of changes being made during races in between thirty and forty seconds.

In the case of a touring car, getting out and putting away tools, especially if they are kept in a locked tool box, will easily take a minute. There is generally one man, only, available for the work, and while he may have a pretty good general idea how to do the job, he has given very little thought as to the best sequence of operations; hence a further waste of time. It may, therefore, be laid down that with identically the same equipment a driver is doing well if a tire change is accomplished in anything like double the time taken by the change on a racing car.

On the Alco, driven by Grant in the last Vanderbilt Race, two tires were carried in the rear in a sort of frame or basket, each within a separate compartment of the frame (Fig. 1) and so arranged that no straps were needed, a tire when inflated fitting its compartment snugly. It is doubtful, however, if this method would be a good one for regular pleasure conditions.

A rather good method was employed on some of the Marmon cars; in this case one tire only being carried. A sort of trough being bent to the same radius as the tire served as a support, the upper part of the tire resting in a shallow Y-shaped piece, and being held securely therein by a single strap. (Fig. 2). This form of carrier has the advantages that it serves equally well to carry without movement an inflated or deflated tire, and requires little time for strapping and unstrapping.

Very little seems to have been done in this country toward the design of a carrier supporting the spares by the rim, although at least two patents have been granted on carriers which use this method. (Figs. 3A and 3B—McMurtry patent). The great advantage of this method lies in the fact that chafing of the tire is entirely eliminated. Figure 4 shows a device of this type marketed by the English Dunlop Company. This device will also serve as a holder while changing tubes, shoes, etc.

Two examples of what may be called automatic or semi-automatic demountable rim carriers are given. Figure 5 shows the G. P. M., in which two hooked arms are pulled down on to the tire by a spring concealed in an upright column.

Figure 6 shows the Rotax, another English device, in which the tire is retained in position solely by its weight. The action will be clear from the cut.

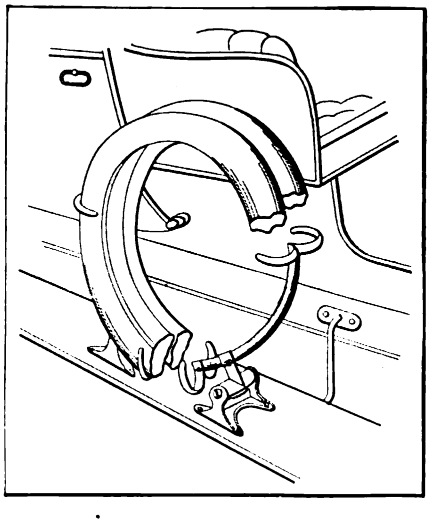


Fig. 6—Rotax demountable-rim carrier

The Pyrometer, Its Development and Use

By WM. H. BRISTOL

Opens with early history of pyrometers of the various types; discusses the laboratory side of the situation; refers to the Le Chatelier pyrometer as an instrument of precision for calibrating purposes; points out the necessity of a more sturdy instrument for practical work; describes the Bristol type of instrument for the purpose.

IN scientific research in the laboratories of manufacturing plants, and in connection with every-day operations in a factory where heat is employed, as in the treatment of steels for parts of an automobile, pyrometers have come to be considered a necessity. In the heat treatment of alloy steels in particular the range of temperature permissible is very narrow, and it is impossible to judge the small ranges of temperature required by the eye. A sensitive and accurate pyrometer, by means of which the product may be duplicated with certainty from day to day, is of the utmost importance. At a large automobile plant which the writer recently visited, the head of the hardening department said he would be unable to do his work without a pyrometer, it being to him what the mariner's compass is to a sea captain.

A man with no experience was placed in charge of a large hardening room with pyrometers connected to the different furnaces, and given directions for using the pyrometers in the treating of steels for the important parts of automobiles. For over a year this inexperienced man has successfully turned out material which has passed through his department.

With pyrometers it is possible to determine by experiment the proper method and temperatures for the working of a particular product to obtain the best results, and afterwards it is a simple matter to duplicate the results.

The thermo-electric pyrometer is the one which is the most generally adopted and in use at the present time, and as the author has made a special study of the development of this particular type of pyrometer, special importance will be given to these pyrometers in this paper.

Before describing and taking up the characteristic features of the thermo-electric pyrometer, brief sketches of different types of pyrometers will be given.

The first practical pyrometer was devised in 1782 by Wedgwood, an English potter, for use in operating his kilns. He depended upon the contraction of clay at high temperatures for his measurements.

In the ceramic industry Seger cones are used, having various degrees of fusibility. There is a tendency of these cones to curl over when certain temperatures are reached, but, of course, they are valueless to show if the temperature has fallen back.

Fusion-point pyrometers have been used, making use of the known melting points of different metals and other substances.

Metallic expansion pyrometers have also been developed in which use is made of the actual expansion of the metals, or the differential expansion of two metals fastened together. In this class of instruments, however, the metals take permanent sets and are not reliable.

Heat conduction pyrometers have also been developed, in which a current of water of known temperature flows at a constant rate through a tube placed in a furnace. The increase of the temperature furnishes a means of measuring the temperature of the furnace.

Specific Heat Pyrometer. If a body of metal of a known weight is transferred from the furnace to be tested and plunged into a quantity of water of known weight and temperature, the increase of temperature of the water will depend upon the temperature in the furnace and is a means of measuring the temperature. This type of pyrometer with a copper ball has been used until recently by very large works.

The air or gas pyrometer depends for its operation upon the expansive force of air or gas when heated to the temperature to be measured. This means of temperature measurement is used as a standard at the present time.

The Optical Pyrometer. In one type of the optical pyrometer the temperature is determined by the photometric measurement of radiations from substances heated. Another type of optical pyrometer depends upon the polarization and refraction of light by means of Nicol prisms.

Reprint No. 11 from Bulletin of United States Bureau of Standards, Vol. 1, No. 2, is on "Optical Pyrometry," by C. W. Waidner and G. H. Burgess, of the Bureau of Standards. In this bulletin different optical pyrometers are described and discussed.

Radiation Pyrometers. Pyrometers of this type have been developed recently by Professor Fery, in which the radiated heat from the body is focused upon a small thermocouple by means of a concave mirror. This type of instrument is being introduced commercially and is especially valuable for the measurement of temperatures above 3000 deg. Fahr., where the platinum, platinum-rhodium thermo-electric couples cannot be used. The introduction of electric furnaces makes this type of instrument particularly valuable.

Electric Resistance Pyrometers. This type of pyrometer was first suggested by Sir Wm. Siemens in 1871. He used platinum wire for resistance wound on clay, but it was found that the silica attacked the platinum, making it brittle. In 1887 Professor Callendar worked out a practical form of the resistance pyrometer with platinum resistance wire mounted on mica, and he developed the plan of using the Wheatstone bridge with a compensating lead which has proven of great commercial value for temperature measurements. The Callendar instruments were of the zero type, and depended upon restoring the balance of a Wheatstone bridge by a handle adjusting resistance. Professor Callendar developed a recording instrument which operated by means of two stops to close the circuit of one or another relay, which in turn operated the carriage for the recording pen. The resistance type of pyrometer is accurate and practical for ranges to 1200 deg. Cent. For the measurement of small changes of temperature it is particularly well adapted. In a paper presented at the Scranton meeting of the American Society of Mechanical Engineers in June, 1905, Dr. Howard F. Barnes, of McGill University, described a pyrometer of the resistance type, in which one degree covered a length of 8 inches on the scale, making it possible to estimate to 1-1/1000 of 1 deg. Cent.. In the resistance pyrometer the limit of accuracy depends on the limit to which resistances can be measured. In the resistance pyrometer for measuring high temperatures only platinum can be used for the resistance element, and therefore the parts that are applied to the furnace are expensive. In this type of instrument there are possibilities of error, due to thermo-electric couples being formed at various junctions and to the heating of the resistance wire by the current used to operate the instrument. It is also important that sufficient immersion be made when the temperature is measured, which is not always convenient to obtain. The construction of the resistance coil necessarily occupies appreciable space and, together with the insulation, produces a time lag that must be allowed for. The resistance pyrometer has its particular field of usefulness.

Reprint No. 124 from Bulletin of United States Bureau of Standards, Vol. 6, No. 2, is devoted entirely to the study of platinum resistance thermometry at high temperatures. This bulletin is by C. W. Waidner and G. H. Burgess, of the Bureau of Standards. In addition to the full description of platinum resistance thermometers there is given a list covering several pages of references to articles on the subject.

The Thermo-Electric Pyrometer

This instrument depends for its operation upon the phenomenon that an electric current is produced when the opposite junctions of two dissimilar metals or alloys are of different temperatures. This law of nature was discovered by Seebeck in 1820. The two dissimilar metals or alloys which are thus joined have come to be known as thermo-electric couples. As stated by Le Chatelier in his book entitled "High-Temperature Measurements," Becquerel was the first to make use of the discovery of Seebeck in applying the thermo-electric couple for measuring high temperatures. He used a platinum-palladium couple. Pouillet, in 1836, carried on further researches with thermo-electric couples. Other scientific experimenters have studied and carried on investigations with thermo-electric couples, using a great variety of metals and alloys to discover a couple which would resist high temperatures, and could be depended upon for constancy for the measurement of such temperatures. It was not until Le Chatelier, after doing a great amount of work with the thermo-electric and optical pyrometers, introduced the thermo-electric couple of platinum, platinum-rhodium that good results were obtained. This couple, which has been most widely used for over twenty years, has come to be recognized as a standard for measurement of temperatures from 300 deg. Cent. to 1600 deg. Cent.

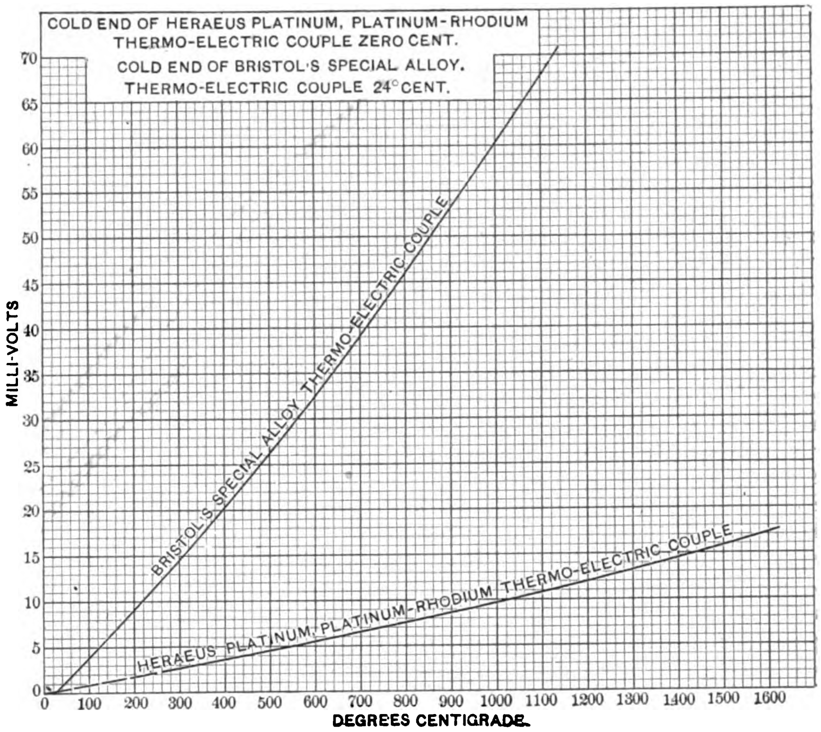


Fig. 1—Pyrometric records of Heraeus and Bristol thermo-electric couple pyrometers, from data given in tables 1 and 2

As thermocouples depend for their operation upon the difference of temperature between the hot and the cold ends, to have a standard basis for comparison, the electromotive force developed by the platinum-rhodium couple is based upon the supposition that the cold end of the couple is maintained at zero Centigrade. The following table No. 1 gives electromotive forces from a standard Heraeus platinum-rhodium couple for different ranges of temperature between 300 deg. Cent. and 1600 deg. Cent.:

TABLE NO. 1

Heraeus Platinum, Platinum-Rhodium Thermo-Electric Couple	
Degrees Centigrade	Electromotive force, Millivolts
...	....
...	....
300	2.31
400	3.24
500	4.21
600	5.21
700	6.25
800	7.32
900	8.43
1000	9.57
1100	10.74
1200	11.95
1300	13.19
1400	14.46
1500	15.77
1600	17.11
Cold end of Couple at Zero Centigrade	

TABLE NO. 2

Bristol's Special Alloy Thermo-Electric Couple	
Degrees Centigrade	Electromotive force, Millivolts
100	4.
200	9.5
300	15.
400	20.08
500	26.
600	32.5
700	39.
800	46.
900	53.
1000	60.05
1100	67.5
....	....
....	....
....	....
....	....
....	....
Cold end of Couple at 24 deg. Centigrade	

The relation between the electromotive force and the temperatures is very clearly shown by the lower curve in diagram No. 1, where the ordinates represent millivolts, and the abscissas degrees Centigrade. It will be observed that this curve is not a straight line, and, therefore, it is not possible to make any absolute rule for the correction that will be necessary when the couple is used with the cold end of the junction at any other temperature than zero Centigrade (freezing water). In practice, where the platinum-rhodium couples are employed in industrial operations it is not generally customary to maintain the cold ends at a constant temperature, or zero Centigrade, and, therefore, corrections should be made for the variation in temperature at the cold end of the thermocouple from zero Centigrade. This correction for the platinum-rhodium couple is approximately plus half of the Centigrade temperature of the cold junction for a limited range, and increases to unity as the temperature of the cold end increases.

From the above figures and curve it will be observed that the platinum-rhodium couple produces only a very feeble current, and, therefore, in order to accurately measure the current of electricity produced by the small electromotive forces for the different temperatures over the range, it is necessary to have an extremely delicate and sensitive instrument. The high-resistance suspension type of instrument has been adopted generally, the high resistance being necessary to eliminate the effects of temperature influence upon the resistance of the elements forming the couple, and upon the leads and coils of the galvanometer itself. For laboratory research and for standardization purposes the Le Chatelier platinum, platinum-rhodium couple with a high resistance galvanometer is the most convenient and accurate apparatus for measuring high temperatures. The delicate suspension galvanometer with the platinum-rhodium thermocouple of the Le Chatelier type may, therefore, be considered better suited for laboratory use than for shop service. The platinum wires are very expensive, and they also require expensive insulating tubes. Where the platinum couples are employed in a commercial way, sufficient attention is not given to taking care of the temperatures at the cold ends of the couple, as they are naturally made as short as possible to save expense, and thus the cold end cannot be carried away from the influence of conduction and radiation from the furnace where the temperature is to be measured. It is, of course, possible to provide artificial means for keeping the cold end of the couple at a constant temperature, but this adds expense, and is very troublesome.

To meet the increasing demand for pyrometers for every-day shop use which would be reliable and comparatively inexpensive, taking into consideration both the initial cost and the cost of maintenance, the low resistance type of thermo-electric pyrometer was developed in 1906.

(To be continued.)

Slide, Rotary, and Piston vs. Poppet Valves

By EUGENE P. BATZELL.

This paper was presented at the summer meeting of the Society of Automobile Engineers and is a resumé of the valve situation illustrating the various types in use and proposed, discussing in detail their respective merits. It is pointed out that poppet types of valves are difficult to maintain in noiseless condition and it is the claim of this author that questions of noise are at the bottom of much activity in favor of the elimination of the poppet type of valve.

DESPITE the seeming activity along lines involving other than poppet types of valves the author of this paper has pointed out that but few slide, rotary, and piston types of valves have found favor in practice. He goes on to say: "Still fewer have been subjected to tests. It is easily understood that the published test results of different silent valve motors all appear to be favorable; nevertheless, without gaining the favor of engineering circles and of the general public. The best proof of this is that only few of such valve systems are being built by others than those through whom they originated; and their comparative success is accountable largely to vigorous advertising campaigns. Probably some time will elapse before the silent valve systems will be used extensively, and compete successfully with poppet valves, because the latter are highly developed and reliable.

"On account of lack of dates and information upon the silent valve systems, it would be hard and of little value to discuss the practical lines of their construction. One would be compelled to guess, because the final word will be spoken after the motors have been in public use for a long time. There is, however, a possibility of investigating the subject theoretically, particularly as to motor power. Theoretically deduced results will have to undergo many corrections in practice.

"The discussion will be taken up here mostly as an investigation of valve-opening diagrams, together with their respective intake gas velocities. Let everything be referred to four-cycle single-cylinder motors of five-inch bore and six-inch stroke running at 1000 r.p.m., corresponding to a 1000 feet per minute piston speed. The cam-operated poppet valves only will be discussed, not touching the possibility of their being operated indirectly by some means.

"The rate and duration of opening of a poppet valve depend on the shape and size of the cam, and the type and size of the cam-follower. The most extensively used forms of cam-followers are the roller, the 'V'-shaped, and the flat or mushroom valve lifter foot. The valve-opening diagrams with the roller and the 'V'-shaped valve lifters depend upon the radii of the contact surfaces. Identical diagrams are obtained regardless of whether the cam-base circle or the follower-roller or spindle are made of a certain size, providing the relation between them remains the same. Therefore, only the flat and roller lifters will be considered.

"As to the cams themselves, they can be made in very different shapes. In Fig. 1 are represented three, which will be discussed here, 1 and 2 being designed for use with a roller-lifter and 3 for the flat. They are all inlet cams with same lift (five-sixteenths inch), and are shaped for the same duration of valve opening, namely, 210 degrees of crankshaft movement. The inlet could, for instance, start to open 5 degrees after the upper dead center, and close 35 degrees after the lower dead center, which is fairly good timing for high and medium speed. With roller-lifter cams there is a one-sixty-fourth-inch clearance between the valve stem and the lifter. The cam for the flat lifter is easier to shape with a greater clearance, which is made one-thirty-second inch on the drawing.

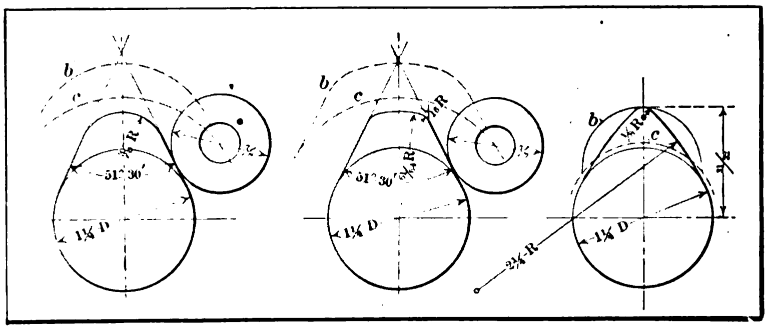


Fig. 1—Inlet cams, with 5-16-inch lift, shaped for 210 degrees opening; 1 and 2 for use with roller-lifter; 3 for flat

"The cam base circles are all 1 1-4 inches in diameter, and the roller is 7-8 inch in diameter. The flat contact surface of the valve lifter is one inch in diameter, and the cam is rounded in such a manner that contact with the edge of the lifter is avoided.

"The top portion of the cam is a single circle tangential to its straight flanks, which latter are determined by the position of the roller and the valve lifter clearance in the usual way; that is, the lines touching the roller and the cam-base circle at the moments when the inlet begins to open and close. The flanks of the cams are determined in the same manner, but the extremity of the cam is formed by an arc concentric with the base circle, and extended until it intersects the flanks. These intersections are rounded into a small radius. On the drawings, Fig. 1, the dotted lines 'b' represent the amount of valve lift. For each angular position of the cam the lift is equal to the distance between lines b and c taken in the direction of the center line of the valve-lifter. For cams 1 and 2 line c is a circle, passing through the center of the roller at the moment of valve opening, and for cam 3 it is the clearance circle.

"The valve lifts obtained in such a manner for different angles between the cam center and the lifter can be plotted against the angles of crank position, thus giving valve-opening diagrams. Such diagrams for the cams of Fig. 1 are reproduced in Fig. 2, and are indicated according to the cam numbers by 1, 2 and 3. They all give the following timing: Inlet opens at 5 degrees after the upper dead center and closes 35 degrees after the lower dead center. However, the area of valve opening at any particular crank position is a more important thing to know than the valve lift. Assuming that the gases flow through the valve opening parallel to the valve seat:

Let,

h = lift of valve in inches;

h_1 = distance between valve seat and face of valve in inches;

d = diameter of orifice below the valve seat in inches;

d_1 = outside diameter of conical valve in inches;

When,

$$S = \pi \times d_1 \times h_1 = \pi\,(d + h_1 \sin^{a})\,h_1$$

or substituting $h_1 = h \cos^{a}$

$$S = \pi\,(d + h \sin^{a} \cos^{a})\,h \cos^{a} \qquad (1)$$

"When the valve seat is flat the area S is proportional to the valve lift h, as then the second part in the parentheses disappears. Flat valve seats are seldom used, however, because they are hard to keep tight; they retard rather than promote the gas flow, making the gas change its direction suddenly, and besides they also become beveled in time. For bevel-seated valves the port area S is a function of the second degree, according to equation (1). However, this area may be considered directly proportional to the valve lift h in this case also, because the squared factor in equation (1) is relatively small and may be neglected. The error thus made is the slighter the smaller the horizontal angle of the valve seat. Assuming, then, that the valve lift and port area are directly proportional, we may also consider curves 1, 2 and 3 of Fig. 2 as representing the variation of this port area with the crank position, and it is only necessary to construct a diagram of the proper scale to get the port opening areas in actual figures. We will suppose that the motors in question have valves of 2 7-16 inches clear diameter, and that the valve-seat has a 30-degree horizontal angle α. As the lift was made 5-16 inch, the maximum valve port area is:

$S_{max} = \pi (2.4375 + .1355) \times .271 = 2.2$ square inches.

"If we make the valve lift of 5-16 inch in Fig. 2 correspond to 2.2 square inches, the scale for the port area curves becomes known, and it is then possible to draw from these diagrams a number of conclusions as to the motor characteristics with the different poppet-valve lifting mechanism.

"As may be seen from Fig. 2, the area enclosed by the curve 3 is slightly larger than that enclosed by curve 2, and these areas are both larger than the area enclosed by curve 1."

The author here introduced an equation involving the momentary valve port area in function of the crank position given by time, went on to state a method of arriving at gas velocity, and utilized the customary equation for piston speed, pointing out, however, that the same is not exact, and that the piston speeds may be found in the curve C, Fig. 2, assuming that the motor is traveling at 1,000 revolutions per minute. The paper deals next with the questions of motor power with different cams.

"Comparing these three curves in Fig. 2, we notice a maximum difference of about 10 per cent. between v_1 and v_2. Moreover, this difference occurs when the inlet openings are near their maximum, and when the gas velocity is much lower than at the beginning of the opening. Therefore, in respect to motor power cam 2 will show no great advantage over cam 1. (Fig. 1.) With slow-running motors, the difference between these cams may be absolutely imperceptible.

"With these cams under the assumed conditions, the inlet gases are strongly choked during the earlier part of the valve opening, and consequently there is considerable vacuum inside the cylinder during this period. This vacuum, besides causing direct loss of motor power, also sucks oil past the piston, which tends to cause carbonization. A point in favor of high intake velocity is a more complete vaporizing and mixing of the gas particles with the air when entering the cylinder. But normal gas velocities should be sufficient for that, so that any increase would be a pure loss.

"The theoretical gas velocity drops much more quickly with cam 3 than with cams 1 and 2, and consequently the intake gases are much less choked with this cam during the early part of the inlet. The difference in velocities with cam 3 and the roller cams, respectively, amounts to 20-30 per cent. during a crank motion of 45 degrees, and, furthermore, the choking effect is proportional to the second power of the gas velocity at least. The quantity of fresh charge admitted to the cylinder during the first half turn of the crank will be considerably greater with valve-lifting mechanism 3, and this will reduce the vacuum inside the cylinder, together with its bad results. This mechanism is decidedly advantageous, except that it requires very strong valve springs, because the first part of the curve of cam lift is very steep.

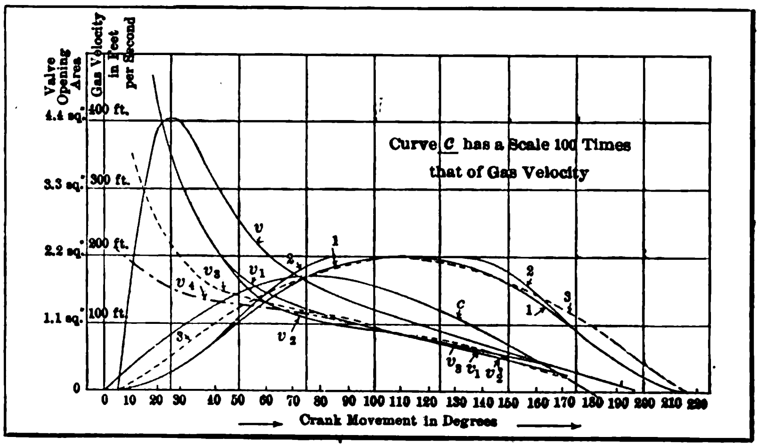


Fig. 2—Valve-opening diagrams of cams shown in Fig. 1

The stronger the valve springs are the more the valve seat and valve mechanism are subjected to wear, and constructions 2 and 3 are particularly disadvantageous because of the great sliding motion of the cam against the lifter. Of course, cams for roller lifters can be shaped to give the same quick opening as cam 3, but the objections to quick opening are then greater.

"With valves of the same weight and the same lift acceleration, the roller-lifter, being heavier than the flat one, requires stronger valve-closing springs. There is but little wear on the faces of cams and rollers due to the roller action, providing they are properly hardened and the springs are strong enough to keep them in contact. Therefore, the wear of them cannot be given here as an objection to strong springs, but the valves coming under action of the stronger springs, and with a quicker motion against their seats, cause more noise and become leaky more often, which is due to increased hammering into the seats of carbon particles.

"In curves v_1, v_2 and v_3 of Fig. 2 it will be noticed that the gas velocity also gradually drops during the period when the valve openings decrease, because of a more rapid decrease in the piston speed. From a velocity of 170 feet per second at the moment of greatest valve opening, the gas velocity drops to about 50 feet per second during the following 60 degrees of crank travel. At the lower dead center the inlet valves still have openings 0.7 square inch (cams 1 and 2) and 1 square inch (cam 3), respectively. The last 10 degrees of crank movement before the dead center need not materially influence the change of gas velocity, and during the following crank movement it cannot be greater than 50 feet per second, as it was at 170 degrees crank position.

(To be continued.)

Coming Events in the Automobiling World

Dec. 1............Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.

Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.

Jan. 16-21, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.

Jan. 28-Feb. 4, '11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.

Feb. 6-Feb. 11, '11.Chicago Coliseum, Tenth National National Automobile Show Under the Auspices of the National Association of Automobile Monufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill-Climbs, Etc.

Aug. 3-5.........Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 6...........Point Breeze, Track Meet, Quaker City Motor Club, Philadelphia, Pa.
Aug. 16..........Start of Munsey Tour.
Aug. 23..........Cheyenne, Wyo., Track Meet.
Aug. 26-27.......Elgin, Ill., Road Race, Chicago Motor Club of Chicago, Ill.
Aug. 31..........Minnesota State Automobile Association's Reliability Run.
Aug. 31-Sept. 8..Kansas City, Mo., Reliability Run, Auto Club of Kansas City.
Sept. 2-5.........Indianapolis, Ind., Speedway Meet.
Sept. 3-5.........Run and Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 7-10........Buffalo, N. Y., Reliability Run, Auto Club of Buffalo.
Sept. 15..........Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.

THE AUTOMOBILE

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"APACHES," among America's red men, represented the most unscrupulous and altogether bad Indians of the many tribes which infested the American continent, probably from the days of the mound-builders down to the time when the pressure of the white man produced extermination of all but a few degenerates who put in their time drinking fire-water and gambling.

* * *

QUOTING the New York *Herald* of August 2, this respected newspaper reminds us of the fact that the "Apaches," after having run the gamut in Arizona, took up their abode in Paris, where it was hoped they would remain under the enlightened guidance of the French. As the *Herald* states, "American financiers come in for virulent criticism in the reviews of the Bourse, which Paris newspapers publish at the end of the week. It has become a fashion here of late years to call all malefactors 'Apaches.' You will, therefore, understand the significance of the fact that, in commenting on the battle royal which big interests have been waging in Wall Street at the public's expense, French critics manifest a tendency to dub the leading spirits in it 'Financial Apaches.'"

* * *

ARE "Financial Apaches" trying to take the scalp of the automobile business?

AT the Summer meeting of the Society of Automobile Engineers just concluded, many points of interest were raised and discussed, and a close observer will have reached the conclusion that the attention of the body to some phases of the problem is timely.

* * *

GOOD steel is admitted to be a necessity, but the struggle for quality must await the coming of the time when automobile engineers may be permitted to know how to ask for what they want. For many years steel mills not only fabricated their wares, but they had time to expend in fabricating the literature of the day, to the confusion of their patrons, if not to the exclusion of quality product.

* * *

IF makers of steel were to succeed in packing the conventions, overawing engineers by their presence and a flood of questionable information, they would succeed in perpetuating the literature that has been fastened upon the industry, fostered by those whose interest lies in finding a willing purchaser, made the more so by being drugged to insensibility by statements that may be twisted and distorted until they mean anything that the victim's master dictates.

* * *

PLAINLY speaking, the good that any society can do depends upon the intelligence displayed by its management. The body politic is taught to abide by the decision of its accepted leaders, and to believe that they are acting in the best interests of all concerned. In the case of the Society of Automobile Engineers, should the leaders be swayed by a clique of steel men the body politic would find itself steeped in the dye of poor material, and the makers of foreign automobiles would be free to bid for the better class of trade.

* * *

IT is frequently claimed that foreign automobiles are superior because the material used in them is better than that obtained elsewhere. American makers of automobiles stoutly contend to the contrary, and it is one of the high aims of automobile engineers to justify this contention. In glancing over a daily paper of recent vintage, one of the items read substantially as follows: "The company just placed the largest order for cold-rolled steel that was ever given by any automobile company." If this statement was true, it is highly improbable that this company had any room in its product for anything but cold-rolled steel.

* * *

SPECIFICATIONS are about to be formulated under the auspices of the Society of Automobile Engineers, and a committee on standards is to be given charge of the work. That this committee should be made up of the agents of steel mills is not to be expected, but that the agents of steel mills would like to control the committee is a natural inference.

* * *

AGENTS of steel mills may be divided into two classes: the first admits it, but the second denies the soft impeachment.

Detroit Extends Welcome to the Largest S.A.E. Gathering

(*Continued from page* 178)

Gears Quiet by Grinding." Every automobile engineer appreciates the importance of this question; it is fully understood that gears have to be hard to serve well, and it is remembered that warping is a normal expectation in the hardening process. The gear grinder described by Mr. Ward takes the gears after they are hardened and refashions the teeth so that they conform to the involute with a 14 1-2 degree face angle. Mr. Ward, in response to query, stated that he had a preference for 6 diametral pitch gears and that an allowance of ten thousandths of an inch should be made for grinding, thus demanding the use of gashing cutters suitably sized to afford this allowance. Perhaps one of the most important details brought out in the discussion is represented in the fact that the depth of grinding will not be the same at all points in the diameter, so that the thickness of the case grown in the cementing process must always be sufficient to take care of the eccentricity. There seems to be no way of avoiding this difficulty and it stands to reason that unless the depth of the case is greater than under ordinary conditions there is an excellent chance of realizing "thin ice" at some point in the diameter, due to the grinding process. Quite a number of the members present failed to agree with Mr. Ward when he said that the gear grinders referred to were not to be sold outright by the makers, but that they preferred to do the grinding work for builders of automobiles, claiming that the cost is but slightly increased, all things considered, and that deliveries will undoubtedly be prompt. One member, however, made a rough calculation and was curious to know what might be expected if a company building 30,000 automobiles per annum, with upward of 300,000 gears to be hardened and ground, was to dump them at the door of the gear grinding establishment and ask for a prompt delivery. This one member may not have taken into account the fact that there are a large number of companies in this country, and that more than one of them would be in a postion to order 300,000 gears per annum.

The problem of standardization was given a boost in the right direction by D. F. Graham in his paper entitled "The Variation of Current Practice in Anti-friction Bearings." Mr. Graham's effort has the earmarks of a painstaking research, and in tabular form affords a wide variety of definite information bearing upon present practice. To what extent this effort will further the process of standardization remains to be seen. It is understood that there will be a committee appointed to deal with the process involved, and it is recognized that the committee will scarcely be able to deliberate at once upon all the subjects.

Lawrence W. Whitcomb presented a most comprehensive paper bearing upon the economical side of shop unkeep, having for its basis the elimination of power losses through the use of "cork inserts" in pulleys for the purpose of reducing slippage. It is well understood that there is a considerable loss of power during its transmission by belts running over pulleys and for many years millwrights struggled with the problem unsuccessfully. Cork inserts seem to be efficacious, due to the high coefficient of friction of cork, and to the peculiar fact that this coefficient is not materially reduced by lubricating oil. The paper affords a wide range of exact information and carried conviction sufficiently to abort discussion.

The paper by H. H. Brown, entitled "The Carrying of Tools, Spare Tires and Supplies," was the only one which recognized the necessities of the supporters of the industry in the form of users of automobiles, and while it deals tersely with some nice phases of the situation, it is nevertheless an inadequate tribute to be paid to the American citizens who have made the automobile industry possible. That President Coffin ultimately expects to lead the way to the direct benefits due to purchasers of automobiles, before the campaign is terminated, is quite well appreciated by those who have given the matter more than passing attention. President Coffin, in his opening address, discussed the lines along which the organization may be made of the greatest value to its members individually, and to the motor car industry. He made it clear to an attentive audience that standardization must begin at the bottom and work up. Every piece that enters into a car must be made of standardized material from designs by standard formulæ, and so processed that it will have the benefit of standard methods of heat treatment and other devices in finishing.

As a direct result of efforts at standardization, L. R. Smith, of the A. O. Smith Company, presented a large number of examples of side frames, cross bars, and other parts as used regularly in automobile work, giving chemical analysis and physical properties of the materials used, offering suggestions as to the methods to employ in designing, and pointing out how the best results will be obtained at the lowest cost of manufacture without in any way interfering with the original ideas of the designer who wishes to impress the imprint of his originality onto the cars of his design. Mr. Smith's splendid work was conspicuously supported by efforts on the part of the makers of steel tubing, who pointed out in a substantial way how it is possible to save cost, and arrive at a fitting conclusion by a no more difficult process than the mere selection of the sizes of tubing that are regularly made, rather than to create new sizes, which is frequently done in the drawing office in the absence of a table of standards to go by.

The whole situation, as one of the results of this meeting of the Society, will end in the appointing of a committee on standards, the same to be composed of 10 capable members, and to be subdivided sufficiently to bring about rapid conclusions, with the expectation that within a relatively short period of time the materials best to employ in automobile work will be given the mark of approval of the committee, and the standards so made, after being accepted by the Society as a whole, will be available to the makers of automobiles. It is undoubtedly true that the supporters of the industry, while they will find this process less spectacular than some other undertakings, will nevertheless observe that it will prove to be of the greatest benefit, ending in a lower cost of maintenance of the cars, if indeed the first cost may not be favorably affected as well.

Perhaps the most interesting paper from the engineer's point of view was that by Professor Bristol on pyrometers. The discussion of this paper will be given in full at the end of the same when it appears in THE AUTOMOBILE, but to indicate something of the value of the paper a portion of the discussion will be quoted here: "One thing he has not brought out is that in using a pyrometer there must be a great deal of common sense put into the use of it. For example, we have seen some pyrometers so installed that the heat junction, that is, the top of the pyrometer, was up by the brickwork, and the people could not understand when the furnace was red enough to anneal steel it did not show more than 800 or 900 deg. F. or something of that kind, and the reverse; they have put it in the hottest part of the furnace, perhaps over the bridge wall, where the flames pass over it continually, and the thermometer cannot by any possibility give the true temperature of work that is on the hearth of the furnace; so that is the reason we say that a whole lot of common sense must be used, and we think one of these arrangements as indicated is a good one."

Mr. Alden raised another question that proved to be of interest: "Will the Bristol pyrometer show more than one of the two or three critical points?" Mr. Bristol answered: "It will only show the first point." Just how nicely the first point was brought out by the Bristol instrument was a subject for demonstration, and many of the members expressed great satisfaction at what they observed.

Eighteen Perfect Scores in Cleveland Reliability

CLEVELAND, Aug. 1—Eighteen automobiles out of a total of 30 which made the three-day reliability tour under the auspices of the Cleveland News and the Cleveland Automobile Club, finished the run Wednesday night with a perfect score.

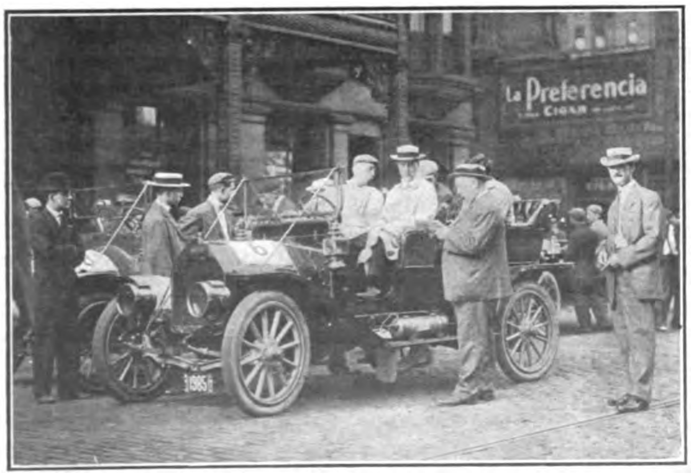
A drenching rain caught the party when it was a few miles out of the city, but had no effect on its enthusiasm. The motorists, traveled-stained and weary, formed into line, and with an escorting party of 50 automobile enthusiasts and a band at their head, paraded to the Hollenden hotel. On Friday night the party again met at the Hollenden to receive the announcement of scores and awards.

Besides the trophy cups awarded by the *News*, a trophy in the 1A class for cars selling under $800 was awarded to the Hupmobile driven by John Rauch. To H. C. Knudsen, who maintained a perfect score with his Overland, was awarded a Goodyear air bottle. John Stambaugh, in a Chalmers "30," was awarded a road map. The penalties incurred by the other contestants were, with only one or two exceptions, due to minor difficulties.

The first day's run ended in Columbus, O. The country was rich in natural beauty, but parched for want of rain, making the dust heavy and the going hard. The big Peerless with its $3,000 Gabriel organ, the Thomas flyer, the Oldsmobile Mudlark, the Chalmers and the 2-ton Garford truck attracted attention along the whole route.

The start on the second day was made at 6:30 in the morning. The route was from Columbus, via Lima, Findlay, Bowling Green to Toledo. The roads were good and there were few hills. Tire trouble was the severest affliction of the day's run. A number of cars were delayed on account of such trouble for much of which the excessive heat could be blamed. Residents along the route tossed apples and other fruits to the motorists as they hastened by.

A heavy thunderstorm during the night at Toledo cooled the air, laid the dust and made the last day's run the most comfortable of the three. As the route led nearer home the size of the welcoming parties in the various towns became larger and larger. At Norwalk where luncheon was had the mayor and other city officials were on hand to greet the party. The street in front of the hotel was blocked for nearly an hour while the crowd eagerly examined the machines. Between Norwalk and Elyria the cars were given their final test for sturdiness. The rain of the night before had filled the holes and ruts with mud and water which made it impossible to gauge the road. The big Studebaker "40," the pathfinder, blew a tire and the confetti was transferred to the following car, a White gasoline car driven by Willie Stutsen, A. A. A. representative.



The E-M-F was among the clean-score cars

The contestants pulled into Cleveland about 6 o'clock. The summary:

No.	Car	Driver	Score
1	Oldsmobile	J. C. Winters	1000
3	Studebaker "40"	Ira Fouche	1000
4	Palmer-Singer	Hugh Miller	1000
6	E. M. F.	Frank Grace	1000
7	Henry "35"	J. B. Sperry	1000
8	Regal	J. C. Hipp	1000
10	Gabriel	A. L. Soper	1000
11	Firestone-Columbus	H. McIntosh	1000
17	Cutting "40"	J. C. Koepke	1000
18	Maxwell	Frank Santry	1000
20	Columbia	C. G. Bleasdale	1000
22	Gaeth	O. Lindner	1000
25	Owen	F. Munroe	1000
27	Garford Truck	Ralph Kinney	1000
33	Oakland "24"	Fred Krum	1000
35	Overland	H. C. Knudsen	1000
36	Chalmers "30"	J. Stambaugh II	1000
39	Hudson	William McCalla	1000
34	Stoddard-Dayton	H. S. Moore	997
16	Hupmobile	John Rauch	990
12	Atlas	Harry Kortz	992
31	Hines Car	F. J. Moore	983
15	Pierce Racine	C. N. White	978
24	Krit	H. Gabriel	976
32	Norwalk "35"	H. B. Olds	967
30	Packard	F. J. Lentz	939
19	Brush	D. E. McCoy	930
28	De Tamble	W. W. Orndorfer	841
9	Hines Car	O. Alexander	805
26	National	D. E. Foote	

Owen, No. 25, also finished without a demerit

Franklin Wins "Little" Glidden Trophy

MINNEAPOLIS, MINN., July 30—Scores of the second annual tour of the Minnesota State Automobile Association were announced late to-day by Dr. C. E. Dutton, the referee. The high score was made by the Franklin, a St. Paul car, which carries with it the *Dispatch* trophy for the Automobile Club of St. Paul. The winner belongs to W. H. Kent.

The Werner prize was also taken by the Franklin. The Gregg trophy for small cars goes to either the Ford or the Reo. according to the maximum price set for the division line of small cars. The two winning drivers get gold medals, and Renville county is awarded the Louis W. Hill good roads prize. Summary:

No.	Name	Driver	Score
1	Pierce	Succow. Phillips	952
3	Hup	E. B. Stimson	896
4	Roe	G. A. Lewis	989
5	Staver-Chicago	Troy Duis	450
6	Halladay	O. A. Palmund	957
7	Cadillac	Rud Stensvad	957½
8	Auburn	W. J. Ranger	851
9	Regal	Arthur La Roche	704
10	Cole "30"	F. J. Seifert	884
11	Cole "30"	W. A. Alden	947
12	Ford	A. A. Hanson	979
13	Franklin	A. H. Clark	997
14	Hudson	O. E. Martin	936
15	Halladay	C. W. Shanno	899
16	Glide	B. E. Sylvester	268
17	Chalmers	J. S. Gilbert	943
18	Carter Car	R. H. Ivey	897

Atlanta's Local Speedway Meet a Big Success

ATLANTA, July 30—Despite postponement of a week, the meeting held to-day on the Speedway proved a success from every point of view. The program consisted of eleven races, six of which were according to piston displacement classes; three were free-for-all; one a pursuit race and the other a match.

The Flanders, Firestone-Columbus, National and Pope-Hartford entries won a majority of the events. The Fiat and Simplex divided the two free-for-all dash races, but the Firestone-Columbus won the open handicap.

The prettiest finish of the day was in the eighth race at 8 miles, when the E-M-F. won from the Firestone-Columbus by inches after being defeated by the same car in a preceding race.

The Fiat 60 belonging to Asa Candler, Jr., had a narrow escape from destruction when the steering arm broke and the front wheel buckled while making about 70 miles an hour in the second free-for-all. The summary:

Two mile time trials—

Car	H.P.	Entrant	Driver	Time
Fiat	60	Asa Candler, Jr.	W. J. Stoddard	1:34 3-5
Simplex	50	E. H. Inman	R. Church	1:37 3-5
Buick	30	W. E. Wimpy	E. W. Smith	1:55 4-5
Cadillac	30	A. Lemon	A. Lemon	2:07 3-5

Columbia, No. 20, one of the Cleveland "immaculates"

For 160 cubic inches and under, six miles—

Flanders	20	G. W. Hanson	H. A. Witt	6:38 3-5
Benz	18	G. W. Hanson	H. Cohen	
Hupmobile	20	E. D. Crane	H. H. Hall	

Match race, ten miles—

National	40	W. J. Stoddard	W. J. Stoddard	8:39
Renault	35	Asa Candler, Jr.	J. Woodside	

For 231 to 300 cubic inches displacement, twelve miles—

Pope-Hartford	25	F. Steinhauer	R. Church	11:53 4-5
Maxwell	30	Max.-Bris. S. Co.	J. Roach	
Maxwell	30	Max.-Bris. S. Co.	M. LaHatte	

160 cubic inches and under, ten miles—

Flanders	20	G. W. Hanson	H. A. Witt	9:20
Hupmobile	20	E. D. Crane	H. H. Hall	
Fiat	12	J. M. Nye	J. Taylor	

161 to 230 cubic inches, ten miles—

Firestone	30	E. D. Crane	McKinstry	8:35
E-M-F	30	R. W. Hanson	Cohen	
Maxwell	22	Max-Bris S. Co.	Rambo	

Free-for-all, ten miles—

Fiat	60	Asa Candler, Jr.	W. J. Stoddard	8:03 3-5
Simplex	50	E. H Inman	R. Church	
Renault	35	Asa Candler, Jr.	J. Woodside	

Australian pursuit race—

Renault won from Buick and S. P. O., Time 11:11.

161-230 class, eight miles—

E-M-F	30	R. W. Hanson	Cohen	7:34 3-5
Firestone-Columbus	30	E. D. Crane	McKinstry	
Oakland	30	J. L. Wright	Moss	

Free-for-all, ten miles—

Simplex	50	E. H. Inman	R. Church	8:16 3-5
Renault	35	Asa Candler, Jr.	J. Woodside	
S. P. O.	38	W. Candler	Toole	

231-300 cubic inches class, twelve miles—

Pope-Hartford	25	F. Steinhauer	R. Church	12:33 1-5
Parry	32	R. C. Howard	B. T. Phillips	

301-450 cubic inches class, twelve miles—

Car	H.P.	Entrant	Driver	Time
S. P. O.	38	W. Candler	Toole	12:38 2-5

Free-for-all, ten miles, handicap—

Firestone-Columbus	30	E. D. Crane	McKinstry	11.
Maxwell	22	Max.-Bris. S. Co.	Rambo	
Renault	35	Asa Candler, Jr.	Woodside	

Bad Roads Cost Farmers $225,000,000 in 1909

NIAGARA FALLS, July 30—The Third Annual Good Roads Congress adjourned to-day after three days of deliberation which were filled with consideration of projects that are of the utmost importance to the citizens of the United States and other American countries. The convention was not as well attended as had been hoped, but nevertheless it drew out a representative gathering of men high in business, finance and professional life. One of the most striking of the addresses was that of B. F. Yoakum, chairman of the Board of Directors of the 'Frisco System.

The gist of his speech was contained in the following remarkable statement:

> "On the basis of the government's estimate of the present excess cost of fifteen cents a ton for hauling in this country as compared with European countries, improved roads would have meant to the farmers on last year's crop an additional $225,000,000, thus increasing their $8,750,000,000 crop to $10,000,000,000.
>
> "Every detailed analysis of the government's business methods proves them to be wasteful. One of the ablest United States Senators recently announced that the government could be run for $300,000,000 annually less than it is now costing.
>
> "I can say as emphatically that $300,000,000 annually will give to this country 100,000 miles of improved public highways a year.
>
> "If you take up your work of better roads, to be paid for through a reduction of governmental waste, your work will be effective and for the general good of all."

The second day of the conference was devoted in large part to the needs of the South and Southwest. J. Hampton Rich and John Crafts of Alabama were the chief speakers.

The final day was given up in part to the consideration of a plan to build a great boulevard from New York to Niagara Falls. The other important work of the session was the action taken to secure federal co-operation in the matter of building roads.

The chief speakers of the convention aside from those named above were: Arthur C. Jackson, president of the association; Mayor Douglass of Buffalo; Congressman William F. Sulzer; Charles B. Matthews; the Mayors of St. Catherine and Guelph, J. A. Pennypacker, Jr., George A. Colley; former U. S. Senator Dodge of Ohio; A. G. Spalding and James L. Cowles.

The next important good roads meeting will be held at Oklahoma City, October 4 to 6.

Palmer--Singer, No. 4, was also unpenalized in Cleveland run

News Happenings of the Week in Detroit

DETROIT, MICH., July 31—The awarding of the Glidden trophy is not the only thing to cause the Chalmers Motor Company satisfaction, however. At a meeting of the company, last Tuesday, a cash dividend of 30 per cent. on the $300,000 capital stock of that concern, and a 900 per cent. stock declaration was made as a result of last year's operations. The stock dividend is represented by an increase in value of shares from $10 to $100, and the boosting of the capitalization from $300,000 to $3,000,000.

None of this increase is to go on the market, it being distributed pro rata among the present stockholders. Two years ago the Chalmers plant was comparatively insignificant. Since then it has been developed into an institution of the first magnitude, more than $1,500,000 have been invested in new buildings and machinery which turns out practically the entire car.

Considerable discussion has been indulged in locally because after purchasing a large tract of land in Detroit, the General Motors Company failed to begin operations on the immense plant it was promised would be located here. On the authority of John H. Johnson, president of the Peninsular Savings Bank, and closely identified with General Motors affairs, active building operations will begin as soon as track arrangements and some other details have been completed. Mr. Johnson also stamps as unfounded the rumor persistently circulated in local automobile circles that the Buick plant would be removed from Flint to this city.

The Aetna Investment Company, organized some time ago for the purpose of building a five-passenger touring car, has progressed to a point where it feels justified in increasing its capital stock from $5,000 to $20,000, this action having just been taken.

To date the State treasury has been enriched more than $51,000 by the sale of automobile and motorcycle licenses, something over 16,000 of the former and 867 of the latter having been issued. In addition orders have been placed for 23,000 tags to be delivered before Jan. 1 next.

The good roads sentiment worked up in Detroit and which promised to bear immediate fruit, must be nursed for a time yet because of legal obstacles in the way of securing an immediate submission of the question of a $2,000,000 bond issue for the purpose. The Board of Commerce had planned on having the question of bonding decided at once, but the law limits the county supervisors to two special meetings a year. These have been held, and the bond proposition will have to wait until the regular election in November, at which time it will be submitted to the voters.

Carload of Franklin branch managers and salesmen gathered at the Syracuse factory for the annual conference

The Grabowsky Power Wagon Company is preparing to move into the immense reinforced concrete plant it built at Mt. Elliott avenue and the Michigan Central Belt Line Railroad.

The Warren Motor Car Company has the first unit in its new plant well under construction; the Regal Motor Car Company will soon be able to occupy the great factory it is building on Piquette and Harper avenues, and the Metzger Motor Company is ready to break ground for its truck plant in the northern part of the city.

From Alpena comes the announcement that "Alpena Flyers," being manufactured there by the Alpena Motor Car Company, will make their appearance some time during August.

The Aero Club of Michigan has just had built for its use Michigan No. 1, a balloon of 45,000 cubic feet capacity.

The Cadillac Company plans to put out 12,000 cars for 1911. It has received from agents advance payments on 8,000 of these and the remaining 4,000 are also spoken for, although no advance payments have been made on them. Earlier in the year the Cadillac had some very pretentious building operations under contemplation. While all of the additions and new structures projected will be erected ultimately, only one of them will be built this year. This, with the old street-car barns recently acquired, will give the company all the additional facilities required for the immediate future, and will be in conformity with the conservative policy that has been followed by the Cadillac Company from the outset.

Frank Briscoe, chairman of the executive committee in charge of the Detroit division of the United States Motor Company, and president of the Brush Runabout Company, pointed to the extensive building operations the United States Motor Company now has under way in Detroit, as showing its confidence in the future of the industry as far as its own operations are concerned.

Overland "Wind Wagon," a cross between automobile and aeroplane, which covered five miles in 5:20

"The Brush Runabout Company is just completing its 1910 output," he said. "We are preparing to turn out at least 15,000 cars next season, and by Jan. 1 we may decide to increase the number to 20,000. The past season's business brought a satisfactory profit, which, we expect, will be trebled next season.

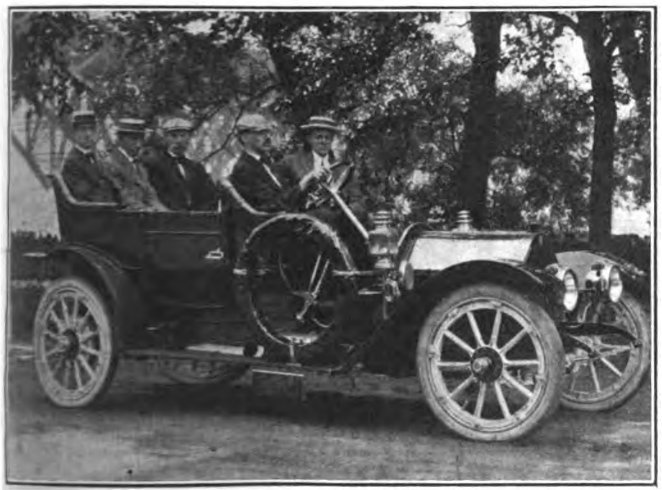
"The Briscoe Manufacturing Company has cut out its night work, but is running practically as strong a day shift as ever. Its sales of parts, exclusive of the Brush Runabout business, have amounted to $1,300,000 for the past year, and we expect they will be about $2,000,000 for the coming year. We have plenty of orders in hand and have had hold-ups but no cancellations.

"None of the constituent companies of the United States Motor

Company has had difficulty in disposing of its product, and each anticipates an increased production of cars the coming season.

"As to the general situation, I doubt if there is a concern, provided it is properly organized and managed, that is not as strong financially as any company of the same capitalization in any other line. There is, however, a general feeling of conservatism through the trade, and some of the wild plans for increase have been abandoned or modified."

Work on the Detroit factory of the Alden Sampson Company is progressing rapidly. The foundations are laid, the footings are in, and the entire building, measuring 150 x 1050 feet, will be completed by Sept. 15. The contract for the administration building was let during the past week. This will be 55 x 75 feet, two stories high, with outer walls of white pressed brick. General Manager Morris Grabowsky plans to start moving [redacted] main building as soon as the first 400 feet are com- hich will be about Aug. 10.



[redacted] Bergdoll "30" turned out of the factory—Vice-president nson at wheel, Technical Manager Willie Haupt beside him

[redacted] Motor Machinery Company has purchased a fac- 196 x 200 feet, on Franklin street, between Joseph venue and Chene street, and will build at once. The for the land was $14,000.

[redacted] nufacturers of the Houpt-Rockwell high-power cars ing to invade the Michigan field, and have engaged F. Bates & Co. as their Michigan distributors. It is to establish a garage and salesroom in Detroit, and a will be carried.

The Steely Auto Engine Company filed articles of incorporation with the Secretary of State last week. The company is capitalized at $150,000, and the principal stockholders are Michael G. Delowey and Charles M. Steely.

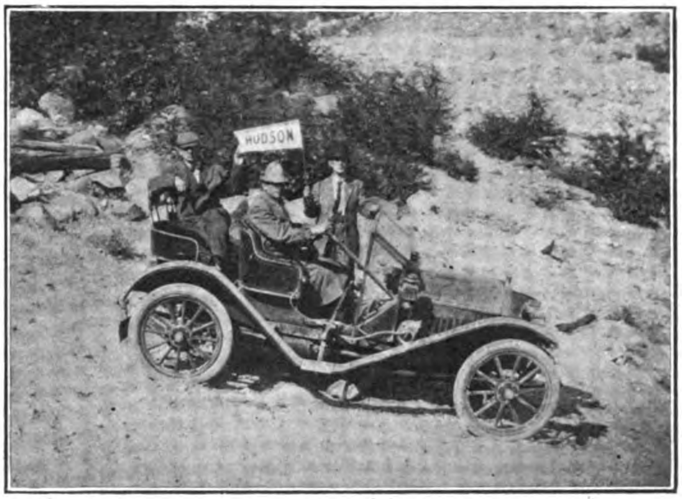
Owing to largely increased business in this territory the Ohio Seamless Tube Company, of Shelby, O., manufacturers of cold-drawn seamless tubing, have opened a selling office in this city at 913 Ford Building, with Lloyd Brown in charge.

General Manager Fred W. Haines and Sales Manager George Wilcox, of the Regal Motor Car Company, have returned from a tour of the Regal branches in the West. They report that they found conditions in that section most satisfactory.

"Bobbie" Davis, manager for the Maxwell-Briscoe-McLeod Company, is taking a well-earned rest. Between selling cars and looking after the details of the recent auto parade, Mr. Davis was just about "all in" at the close of the Elks' reunion. He has gone to Buffalo with his wife and daughter.

J. M. Deuenas, a Chalmers dealer in Havana, is in the city arranging for his allotment of 1911 cars. Automobiles are growing constantly in favor in Cuba, he says. He reports an excellent trade in Chalmers cars for the past season.

"Automobile Day" at the Michigan State Fair, Sept. 24, will be enlivened by some interesting speed contests.



Hudson car which recently made 141-mile non-stop run to Mount Tacoma

That the Elks' reunion is bringing results as far as local car dealers are concerned is already apparent. Dr. C. S. Kramer, past exalted ruler of the Pueblo, Col., lodge of Elks, who was a delegate to the convention, is driving home in a Cole "30," purchased from the local agency.

Stoddard-Dayton Wins Salt Lake Free-for-All

SALT LAKE CITY, UTAH, Aug. 1—The *Evening Telegram's* third annual hill-climbing contest held Saturday afternoon was by far the most successful event of its kind ever held in this section of the country. There were forty-two entries. The course was up what is known as Brigham street and was one mile in length, with a good grade all the way and with a sharp turn at the last quarter. There was one dispute. Samuel Newhouse, who gave the $1,000 trophy in the free-for-all, protested against the award of the cup to the Sharman Automobile Co., which entered both the Apperson and the Stoddard-Dayton. Newhouse contends that Driver Frank Seifert held back the Apperson in order that the Stoddard might win. A Thomas made an exhibition run up the hill in :56 2-5. The summary:

$800 class—Won by Hupmobile in 2:26 4-5.

$1,200 class—Won by Ford; time, 1:48 2-5. Buick 10, second; time, 1:51.

$1,800 class—Won by Stoddard-Dayton; time, 1:45 2-5. E-M-F second; Overland, third; Buick, fourth; Cadillac, fifth.

$3,000 class—Won by Stoddard-Dayton; time, 1:11 2-5. Buick, second; Winton, third; Premier, fourth; Buick, fifth.

$4,000 class—Won by Apperson; time, 1:05. Stoddard-Dayton, second; Thomas 40, third; Palmer-Singer, fourth; Buick, fifth; Premier, sixth.

$2,000 class—Buick and Velie tied for first; time, 1:25. Stoddard-Dayton, third; Buick, fourth; Overland, fifth.

Free-for-all—Won by Stoddard-Dayton; time, 1:08 3-5. Palmer-Singer, second; time, 1:11 2-5. Apperson, third; time, 1:12 2-5. Premier, fourth; Buick, fifth; Thomas Flyer, sixth; Packard, seventh; Velie, eighth; American, ninth; Studebaker, tenth.

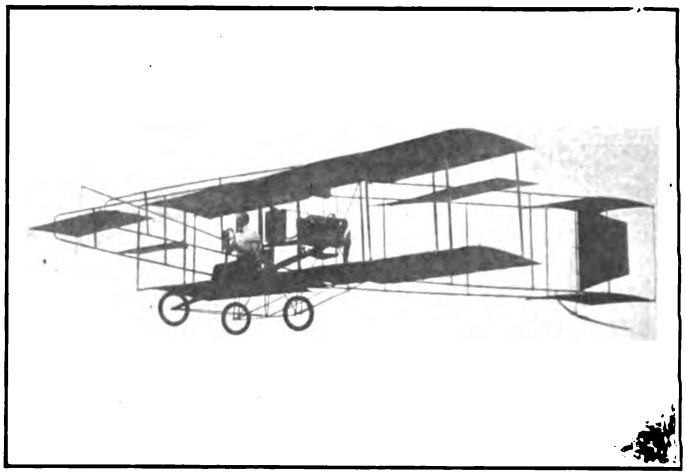
Aeroplane Propulsion Copied on a Land Car

The Overland "Wind Wagon," with Carl Baumhofer and Cleve Jeffries as pilots, which is now touring the Southwest giving a series of exhibitions, is an automobile driven entirely by an eight-foot wooden propeller in the rear. The machine created quite a sensation at the recent Indianapolis Speedway meet, where it negotiated five miles in five minutes and 20 seconds.

The Bergdoll "30" Makes Its Initial Bow

The new Bergdoll "30," product of the Louis J. Bergdoll Motor Company of Philadelphia, is about to make its advent. In fact, a few of the cars have been finished and many are in the final stages of manufacture. The factory was instituted less than a year ago at Thirty-first and Dauphin streets, and more recently the plant has been augmented by the acquisition of a building at Sixteenth and Callowhill streets, thus giving a floor space of 200,000 square feet. The officers of the company are: Louis J. Bergdoll, president; E. C. Johnson, vice-president; P. S. Malickson, secretary, and Charles A. Bergdoll, treasurer.

"Bleacherites" watching the races at Hempstead Plains



Captain Baldwin trying out his bi-plane

Aviation News of the Week

AVIATION from the viewpoint of the Summer visitor is one of the chief attractions of many of the resorts located near the metropolis. In a dozen different places, the air machines are busy every favorable day and the flights attract an immense amount of attention from the public.

Garden City, Narragansett Pier, Asbury Park, Atlantic City and a number of other places are the scenes of daily flights by professionals or amateurs. The newest thing in aircraft shown at these resorts is the French dirigible "Zodiac IV."

This ship, which is the smallest of the French dirigibles built so far, is owned by Stuart Davis of Scarborough, who has been studying aviation in France for the past six years. The vessel will be used as a pleasure craft and its official trial trip is scheduled for August 10. The gas bag is 109 feet long and the ship will carry four passengers.

Charles K. Hamilton, one of the earliest entrants for the $30,000 prize for flight between St. Louis and New York, has outlined his plans for the trial. He says he will start from St. Louis and prefers to make his official attempt for the big prize during the Indian Summer. A special bi-plane is in course of construction for Mr. Hamilton, which will include the most thoroughly tested features of that type of aircraft and will be equipped with wires having a tensile strength of 2300 pounds.

In speaking of the trip, Hamilton said: "I shall try to accomplish the flight as quickly as possible. There is no reason why an aeroplane should not fly ten hours a day and there is really nothing to prevent night flights. While I shall have to have gasoline and oil stations at a number of places. I shall carry an extra propeller and tools on board so as to be able to make repairs if forced to alight in out-of-the-way places, as I was in my return trip from Philadelphia."

The military significance of the recent aeroplane tests in the United States have found a resounding echo in foreign countries. While no public tests have been made, as far as is known, the results of the feat of Curtiss in America have caused an immense amount of conjecture and speculation. A leading official of the French Ministry of Marine in discussing the situation said: "Of course all that has been done in America could be duplicated here and the actual accomplishment in the United States is not in the least surprising to us. We have long accepted that fact as self-evident. The real question involved is as to whether the aeroplane could drop the bombs with the same accuracy under war conditions.

"Doubtless, should war break out to-morrow, the aeroplane would find use in the army and navy in an experimental way. This use would be vastly expanded by the development of reliability under adverse conditions."

Twenty French army officers have obtained licenses to pilot aeroplanes.

In speaking of the American war tests, Santos-Dumont said: "Any one who has flown knows it is very easy to drop an object from an aeroplane so as to hit a selected spot. Absolute accuracy depends only on practice."

Santos-Dumont hopes that the advent of the aeroplane in the field of war will make that practice so horrible that mankind will turn from bloody conflict to universal peace.

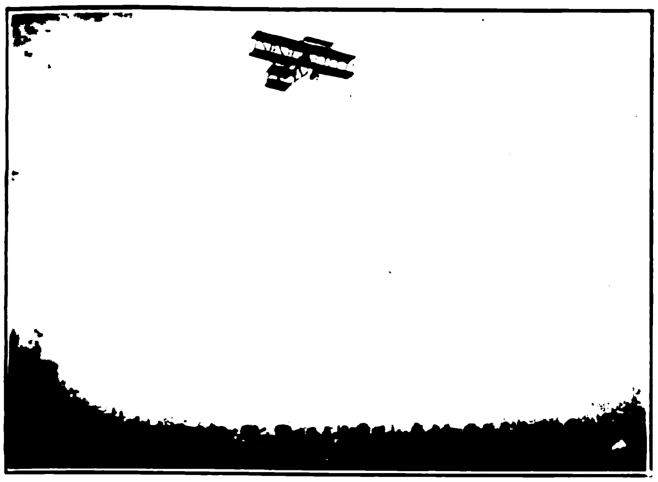
Count Jacques De Lesseps has returned to France. Before sailing he expressed the wish that he might be able to enter the international aviation meet on Long Island in October.

The Harvard Aeronautical Society has purchased a tri-plane from a British manufacturer and the machine will be used in the series of military tests on Soldiers' Field in September. The plans for these tests include a trial of accuracy in dropping bombs within the outline of a battleship. A prize of $5,000 has been offered.

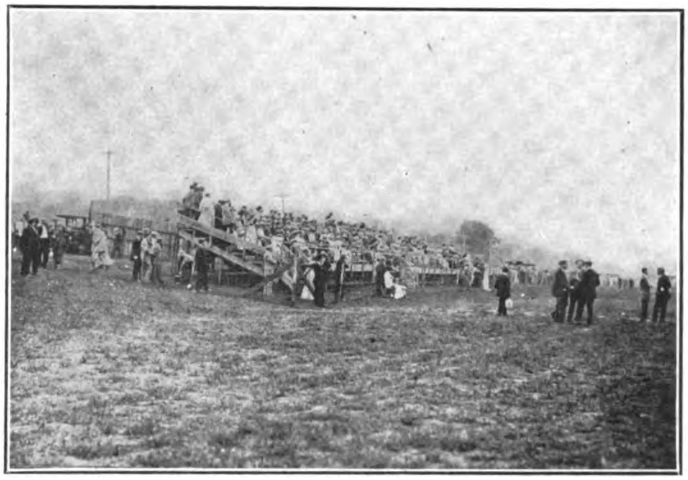
Mrs. Russell Sage, widow of the former Wall street multi-millionaire, witnessed the flights at Garden City, L. I., last week and after seeing a number of exhibitions exclaimed that she had caught the fever and stood ready to back any woman inventor of aircraft to demonstrate the feasibility of her ideas.

Alan R. Hawley, former vice-president of the Aero Club of America, has suggested a new use of the aeroplane. Mr. Hawley says that there is nothing to prevent aircraft from lending ma-

J. A. Drexel, of Philadelphia, ready for a start at Bournemouth



Harmon's bi-plane doing 50 miles an hour



The grand stand at Hempstead Plains is always well filled

terial aid to stranded ships by carrying lines to them from shore. He and several others interested in aeronautics are now arranging for the construction of a number of aero landings along the New England coast.

Clifford B. Harmon, the amateur flyer, has declined to make any further flights at Garden City if admission fees are charged. Big crowds have been attending the trials and Mr. Harmon's action was taken after he said he was certain that the gate receipts had been sufficient to defray the expense of the management in fitting the field for aviation.

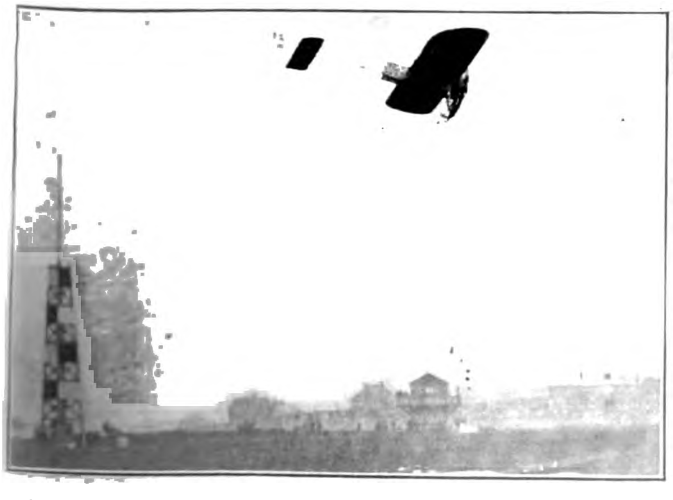
The attempt at crossing the Atlantic ocean in a dirigible is taking something like definite form. The airship, "Amerika" is due to arrive Wednesday on the steamer Oceanic from Paris and will be set up at Atlantic City at once. Melvin Vaniman, aviator and mechanical engineer, is already here and says that on or about August 20 the start will be made. He says he expects to land in England in four or five days. Walter Wellman and five others are slated to man the "Amerika" on the voyage.

In the recent aero tournament at Bournemouth, England, Morane, pilot of a Blériot racer, won the first prize of $4,000 by a flight encircling the Needles. Armstrong Drexel, of Philadelphia, was second, also in a Blériot, and was awarded $2,000 and Grahame White, third, in a Farman bi-plane, receiving $500.

This competition, while in no sense a racing spectacle, proved exciting enough to receive much enthusiastic attention. But the event that was on the program as the star number was never called.

It was a proposed race between motor boat and aeroplane and the leading entrants in both divisions suffered mishaps before the event, that caused the officials of the meeting to call it off.

The arrangements for the race were made as the result of a challenge from the Motor Yacht Club to the Royal Aero Club for a suitable trophy. On the part of the yacht club, the Duke of Westminster entered a specially constructed hydroplane, equipped with a 400-horsepower engine and the Royal Aero Club selected the Hon. Charles Stuart Rolls to represent it.



Morane, the Blériot pilot, making a landing at Bournemouth

About a week before the date set for the race, the Duke of Westminster, while taking a practice spin, put his helm hard over while the hydroplane is said to have been making nearly fifty miles an hour and the boat capsized. The duke escaped drowning by virtue of prompt rescue measures of the life-saving crew stationed nearby.

A few days later, Mr. Rolls suffered his fatal mishap in front of the Bournemouth grandstand and the contest was scratched.

The conditions under which the circle of the Needles was made were picturesque.

From the flying ground competitors had to ascend and make over water toward the Needles, a line of tall sharp rocks standing on the Eastern extremity of the Isle of Wight. Circling the lighthouse there, they had to return and alight before the grandstand. The distance over the water was just over nine miles in a straight line, making the trip just over 18 miles long, and with a turn round the aerodrome and the descent, 21 miles.

Morane rose in the air one evening about six o'clock, and, having encircled the aerodrome, shot out over the sea and within six minutes was lost to sight at an altitude of over 1,000 feet. Armstrong Drexel, also on a Bleriot machine but with a 25-horsepower Anzani instead of the 50-horsepower Gnome engine which Morane employed, followed. He also flew high and vanished into the haze over the sea. Across the belt of water stretched a line of steam yachts and racing motor boats, ready to render assistance if necessary.

Just as Drexel disappeared from sight Morane came into view high in the air. Almost as soon as his mono-plane took distinct form, he shut off the engine and came to earth with a glide from an altitude of nearly 2,000 feet. He had flown very fast, and had taken only just over 25 minutes, his average speed working out at 50 miles an hour. Though Drexel had passed him as he was returning Morane had seen nothing of him. Within a quarter of an hour the American reappeared and landed in front of the stands. His speed had been only 35 1-2 miles an hour, the time he occupied being 35 1-2 minutes. Grahame White made the circle in 46 minutes.

Twenty-five Enter Munsey Historic Tour

WASHINGTON, D. C., July 31—Five more cars were entered this week in the Munsey Historic Tour, bringing the entry list up to twenty-five. The additions were two Maxwells, entered by the United States Motor Company, a Staver-Chicago, by the Staver Carriage Company, a Stoddard-Dayton, by Leo H. Shaab, the Baltimore agent, and a Crawford by Walter Scott, of Baltimore. The entries will close at midnight, August 5, at which time it is expected more than 30 cars will be enrolled.

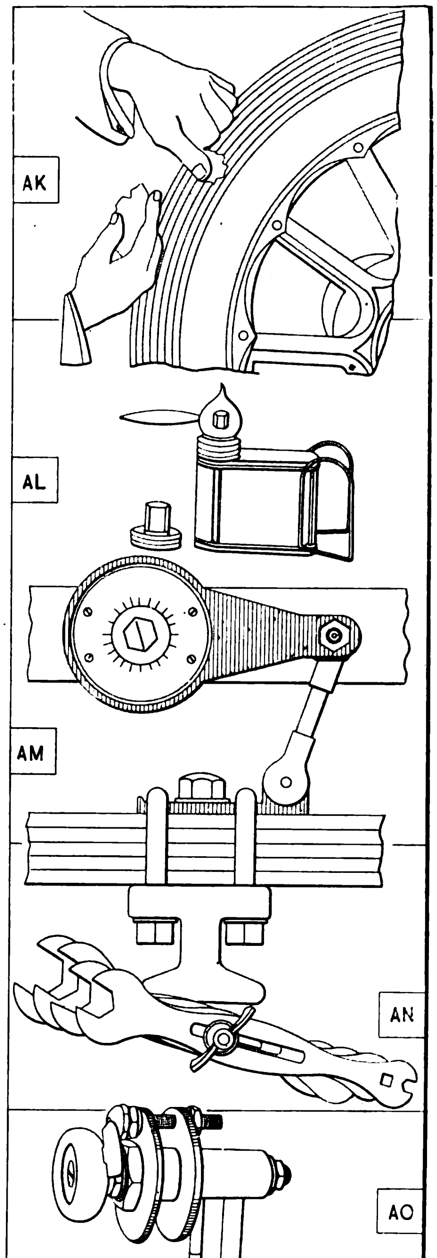
Seen in the Show Window

ON the principle that "a stitch in time saves nine," every autoist should see to it that his repair kit contains a can of Knead-it (AK), which is made by the M. & M. Manufacturing Company of Akron, O. The main merit claimed for this article is that by applying a little to a slight cut or sand blister as soon as it is discovered, the autoist prevents its growth to the point where a blow-out results. The material in kneaded between the fingers and stuffed into the cut, where it sets quickly, and seals so securely and permanently that it becomes really a part of the tire.

THE terrors of a leaky pipe or joint on the road would seem to have been minimized by the recent appearance on the market of a handy little soldering outfit, the Tinol Torch (AL), which is handled by Hess & Son, 1215 Filbert Street, Philadelphia. This is an extremely neat and compact self-acting blow-torch, burning methylated spirit and giving a hot, well-defined flame about four inches in length and sufficient for all soft soldering purposes. The solder itself, a finely granulated alloy of tin and lead, mixed with an oily flux, is in paste form. It is spread thinly on the surface of the metal to be soldered and then heated. The compound melts, the flux evaporates and the solder hardens and adheres closely to the metal.

THE principal point of merit in the Martin Shock Absorber (AM), manufactured by the company of the same name at 926 Central Avenue, Los Angeles, Cal., is that it acts only on the rebound of the springs. The spider is bolted to the car frame and carries with it all parts of the absorber except the ring and the arm which is integral therewith. This arm is linked to the axle by a connecting rod provided with ball-and-socket joint. The downward movement of the car body revolves the ring to the right. Revolution of the ring in the opposite direction through the rising of the car body causes the toggle bars to straighten, thus expanding the brake shoes against the ring. The absorber is packed in hard oil and needs no additional lubrication.

UTILIZATION of space in the tool kit, under the conditions of body designing which are fast taking shape, is a factor well worth considering. A means to this end is the Ronson Wrench (AN), made by the Ronson Specialty Company, 7-15 Mulberry Street, Newark, N. J. Weighing but half a pound, and but six inches long when closed, and half an inch thick, this handy combination tool—it gives nine wrenches in one—can be carried in a side pocket if need be. Once set, the turning of an individual wrench is impossible. It can be also taken apart, and each wrench used separately.



(AK)—"Knead-it" Tire Seal
(AL)—Tinol Soldering Torch
(AM)—Martin Shock Absorber
(AN)—Ronson Combination Wrench
(AO)—Presto Auto Lighter
(AP)—Skinner Automatic Pump

PHYSICIANS and car owners whose business necessitates much night driving will appreciate the advantages of such a handy little dashboard accessory as the Presto Auto Lighter (AO), marketed by the Motor Car Sales Company, Motor Mart, Boston, Mass. Without leaving his seat the driver, by one turn of a switch, creates the spark and at the same time turns on the acetylene gas. In the matter of economy the lighter is especially noteworthy. The average driver at night allows his headlights to remain burning, no matter how long the stop, rather than bother about turning off the gas and relighting his lamps when ready to go on his way. With his car equipped with this lighter he will turn off his lights at each stop, no matter how short, the saving effected being considerable in the aggregate.

LET the engine do the work—that is the slogan of the ease-loving autoist. And in the matter of inflating tires this is an easy proposition with the aid of the Skinner Automatic Tire Pump (AP), made by Skinner & Skinner Company, 1716 Michigan Avenue, Chicago, Ill. All that it is necessary to do is to remove one spark plug, screw the connection into the spark plug hole, run the engine two or three minutes on low throttle, and the tire is hard and round. The pump can be attached to any size of motor, and it is not necessary to race the engine to obtain a high pressure.

THE Racine Auto Tire Company, of Racine, are putting out what they call the Racine "Horseshoe" Tires, and claim to be the only manufacturers making a leather tire with a perfectly intact all-leather exterior. These tires are composed of four thicknesses of chrome-tanned leather vulcanized together and to a specially constructed carcass having a rubber bead of standard size. The manufacturers maintain that tests have proven that it requires about 1,000 pounds pressure to puncture one thickness of chrome-tanned leather. In the making of these tires four thicknesses of leather are used, each inseparably joined to another and the four layers vulcanized to the inner carcass.

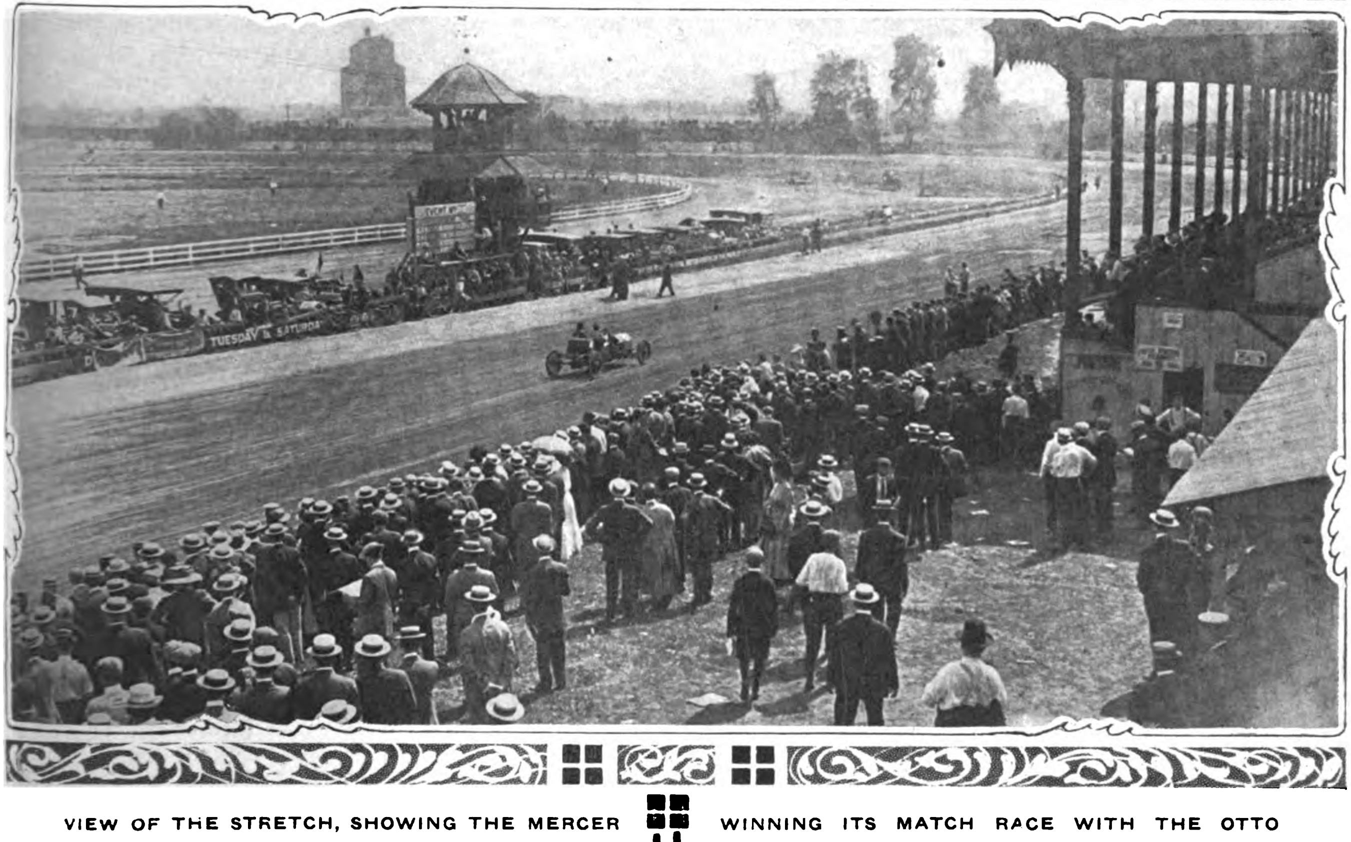
VOL. XXIII NEW YORK—THURSDAY, AUGUST 11, 1910—CHICAGO No. 6

THE AUTOMOBILE

Q. C. M. C. Midsummer Meet

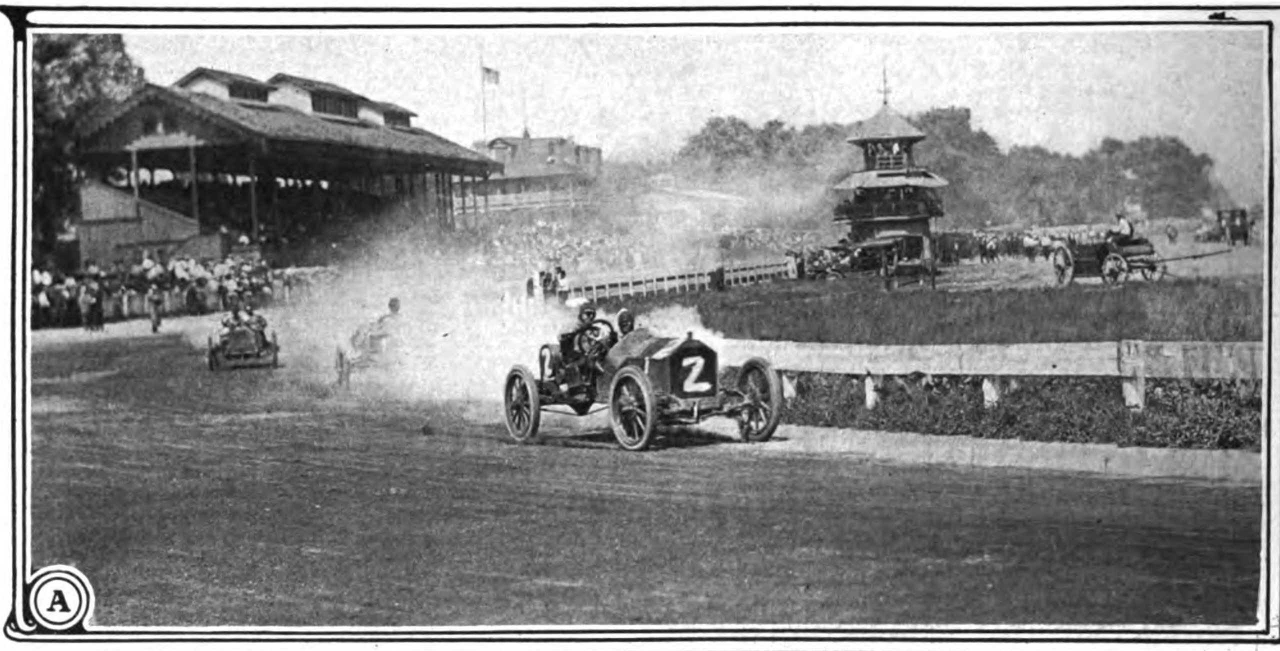
CRACK PHILADELPHIA ORGANIZATION PROMOTES THE MOST SUCCESSFUL AFFAIR IN ITS HISTORY BEFORE A RECORD-BREAKING CROWD.

PHILADELPHIA, Aug. 8—That this city is not yet prepared to abandon automobile track racing was demonstrated on Saturday afternoon, when, at the midsummer meet of the Quaker City Motor Club, the crowd of upwards of 10,000 not only packed the stands, hotel porches and paddock at Point Breeze track, but a contingent of thousands more broke down the fence along the back-stretch and swarmed into the inclosure despite the efforts of a large force of policemen.

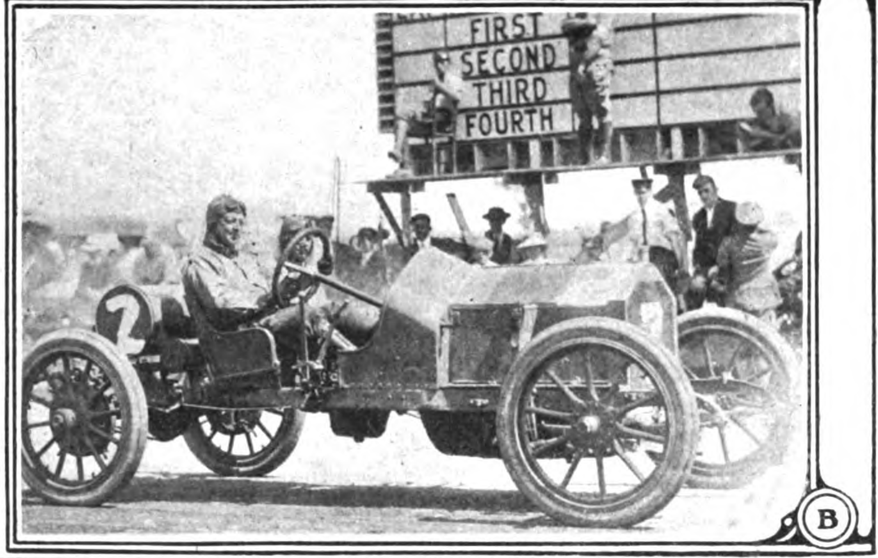


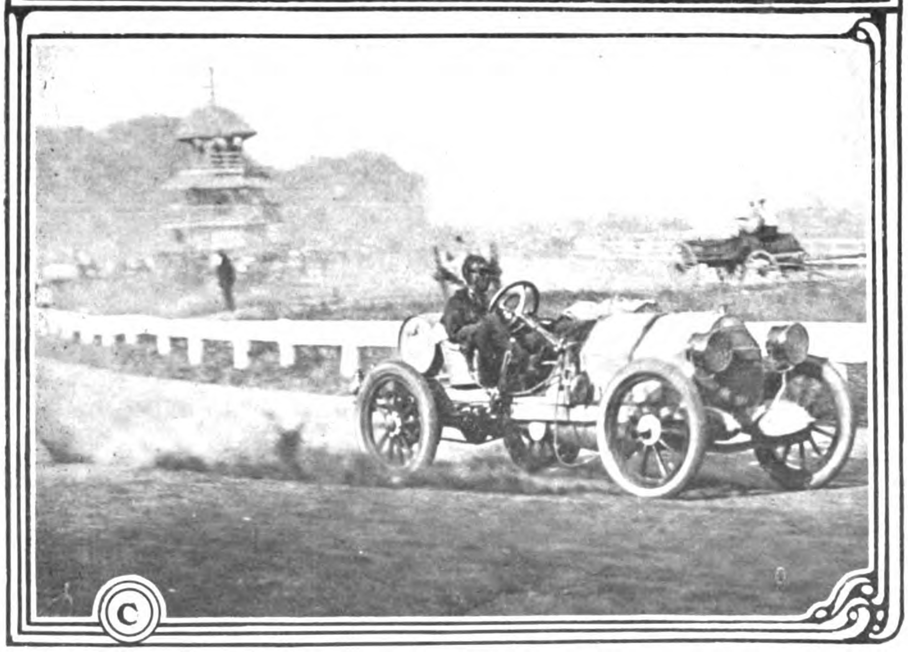
VIEW OF THE STRETCH, SHOWING THE MERCER WINNING ITS MATCH RACE WITH THE OTTO

The six-hour race was the big event of the day. Seven cars started: Knox, B. Oldfield; Kline-Kar, W. D. Morton; Darracq, B. Kerscher; Ford, F. Kulick; Pullman, H. Ringler; Selden, C. Young, and Chalmers "40," C. Howard. Getting off to a good start the drivers settled down for the long grind. Kerscher, in the Darracq, jumped to the front, but was forced to relinquish the lead shortly to the Knox, which forged ahead and at the end of the first hour had twice lapped the Darracq. the runner-up. The Pullman had hard luck throughout the contest, having to leave the track several times, starting with the very first lap, when it threw a rear tire. At the end of the second hour the Knox was seven miles ahead of the Kline-Kar, which had usurped the Darracq's place as contender, engine trouble shortly after causing the latter to withdraw. At the end of the fourth hour the Knox had a lead of 12 miles and it was only a question as to how many miles the car would make. In the fifth hour a very pretty race developed between the Kline-Kar and the Ford for second place. So fiercely was it fought out that at the end of the hour each car had covered 209 miles. Minor troubles developing, however, caused the Ford to lose ground in the last hour. At the end of the race the Knox had completed 261 miles, Kline-Kar, second, 245; Ford, third, 226; the Chalmers "40", fourth, 218, and the Selden, fifth, 167.



A—Ringler's Pullman leading in the 450-and-under event





B—Pullman-Ringler combination—two-time winner

C—The Kline-Kar which finished second in six-hour race

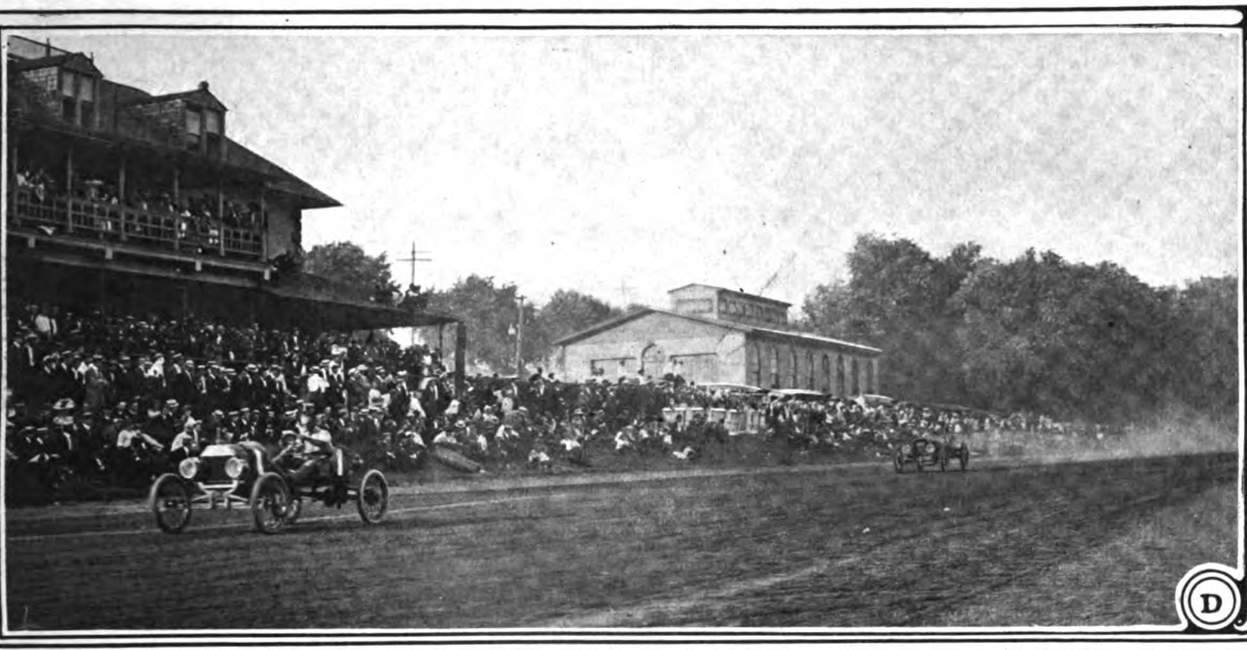
The real feature of the meet was the performance of Harvey Ringler, an amateur driving a Pullman. He not only won the 161-300 cubic inch and the 450-and-under event for Class C cars, but his time in the latter was the best for the distance made during the meet—11:30 flat. The Pullman also started in the 750-and-under event, in which it came in third, and in the six-hour race, from which it was withdrawn owing to cylinder trouble.

The time trials were only partially successful, for while the Knox clipped 1 2-5 seconds off the previous best mile track record after two trials, the Darracq's attempt to lower the five-mile figures—5:13—was unsuccessful by a margin of 8 1-5 seconds.

The first race run off was a match race for blood between a Mercer driven by J. Sherwood and G. H. Jones' Otto. The latter had the misfortune to throw a tire on the very first lap and before he could get going again his opponent had opened up a seven-lap lead, finally crossing the tape by that margin in 12:28 2-5.

Everybody picked the Ford-Kulick combination to win the 161-300 cubic inch 10-mile event, but the Pullman, driven by Harvey Ringler, the clever amateur, assumed the lead about the third mile, adding to its advantage with every lap to the finish, flashing under the wire in 11:33 2-5, with the Ford 300 yards behind the Otto, which captured the place.

In the 450-and-under Class C event at ten miles, C. C. Fairman's Kline-Kar being an added starter, the Pullman repeated, this time beating the Ford by a full half mile in the best ten-mile time of the day—11:30. The Kline-Kar and



D—Crowd encroaching on track in six-hour race—Ford leading Pullman

the Otto were lapped by the leaders on the seventh mile and dropped out.

In the 750-and-under race, in which the Pullman, Kline-Kar, Darracq and Knox were the starters, the latter went to the front at the gun and was never headed, winning by the small margin of one-fourth of a second from the Darracq, which led the Pullman by nearly a mile, the Kline-Kar dropping out at the sixth mile with tire trouble.

The timing and scoring arrangements were the best ever seen here, Paul B. Huyette, official timer, having inaugurated a new system which worked perfectly. In the six-hour race the laps were scored with the aid of a battery of seven odometers—one for each entrant—and at each mile the time was set forth on a score-board in black figures on white cards. The summaries:

MATCH RACE, 10 MILES

No. Car	Driver	Time
1—Mercer	J. Sherwood	12:28 2-5
2—Otto	G. H. Jones	Did not fin.

10 MILES, 161 TO 300 CU. IN.

1—Pullman	Harvey Ringler	11:33 2-5
2—Otto	G. H. Jones	12:12
3—Ford	Frank Kulick	12:14 4-5

10 MILES, 451 CU. IN. AND UNDER

1—Pullman	Harvey Ringler	11:30
2—Ford	Frank Kulick	12:10
3—Kline-Kar	C. C. Fairman	Did not fin.
4—Otto	G. H. Jones	Did not fin.

10 MILES, 750 CU. IN AND UNDER

1—Knox	Oldfield ..	11:34 4-5
2—Darracq	Ben Kerscher	11:35
3—Pullman	Harvey Ringler	13:30 3-5
4—Kline-Kar	C. C. Fairman	Did not fin.

MILE FOR TRACK RECORD (1:01)

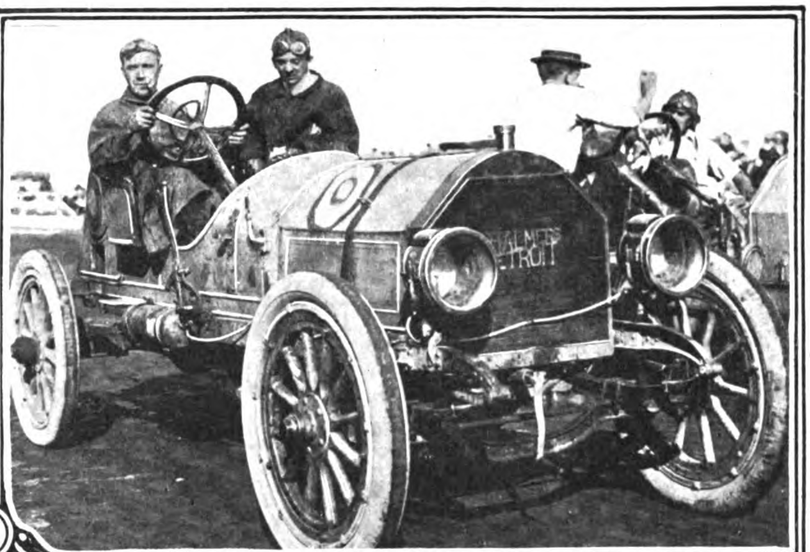
1—Benz	Oldfield	1:00
Benz	Oldfield	:59 3-5

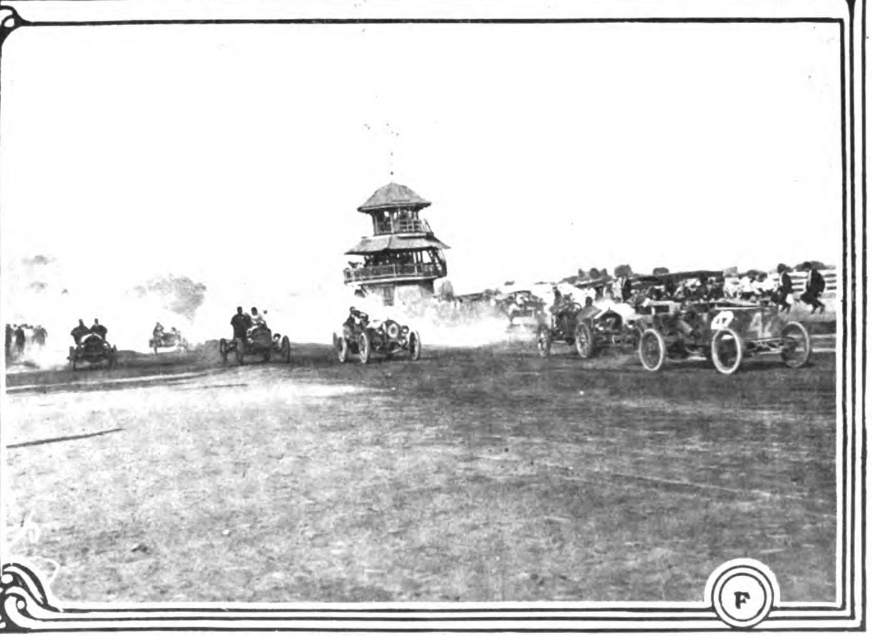
FIVE-MILE FOR TRACK RECORD (5:13)

1—Darracq	Ben Kerscher	5:21 1-5

SIX-HOUR ENDURANCE RACE

No. Car	Driver	Distance Miles
1—Knox	Oldfield	261
2—Kline-Kar	W. D. Morton	245
3—Ford	Frank Kulick	226
4—Chalmers	Chas. Howard	218
5—Selden	Chas. Youngs	167
6—Darracq	Ben Kerscher	Retired
7—Pullman	Harvey Ringler	Retired

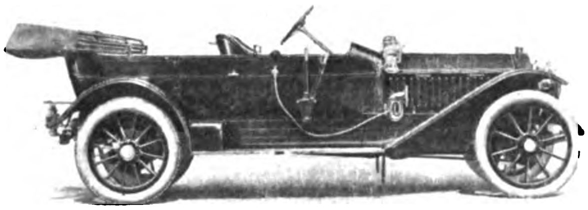




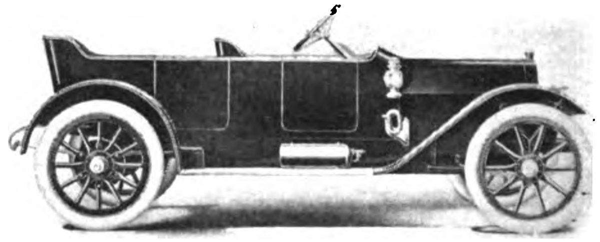
E—Chalmers-Detroit "40" driven by Charlie Howard, fourth in the six-hour race

F—Seven cars started in the six-hour event, five of them finishing

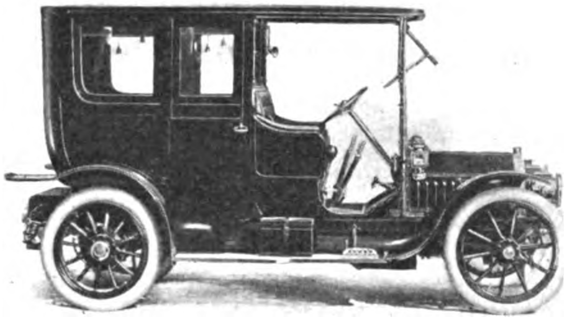
Advanced Types



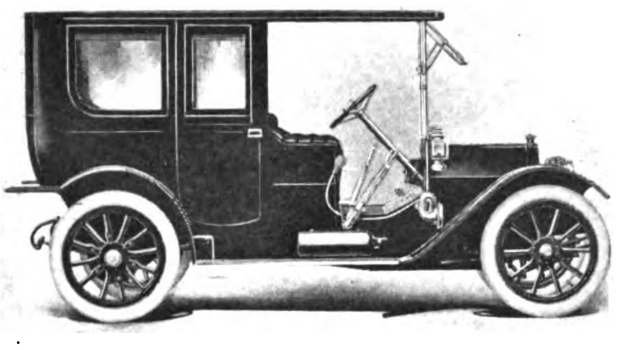
Peerless Torpedo



Chalmers "40" Torpedo



Peerless Limousine

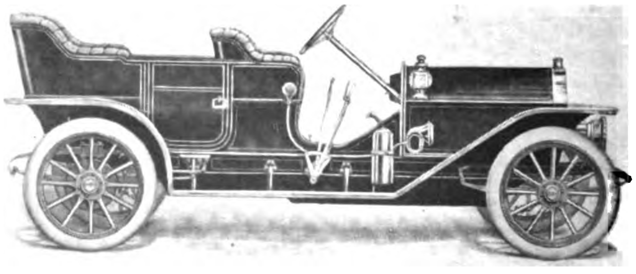


Chalmers "30" Limousine

Some 1911 Automobiles

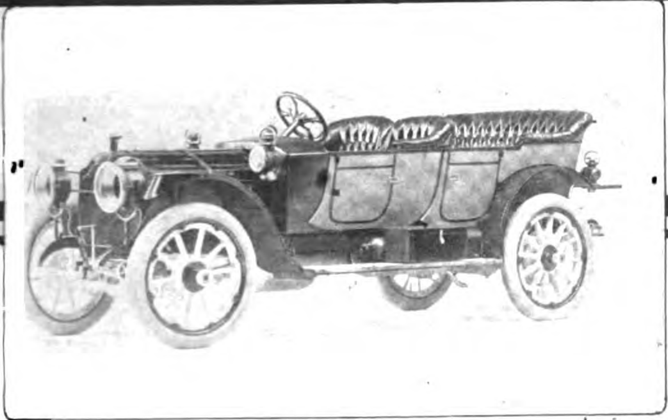
VETERAN autoists, especially those who make it a practice to have a new automobile every year, find themselves somewhat at a loss this season, due to the fact that they are not offered a wide opportunity to ascertain with any degree of certainty just what the 1911 cars will be like. This is as it should be, and the probabilities are that it is only a matter of two or three years at the most when the "annuals" will disappear so that when a good automobile is selected by a purchaser it will remain good until it is worn out in the regular way. The idea that an automobile, like a costume from Worth, should cease to be of value because the season changes, is perfectly absurd, and it is believed that the new designs of bodies, some of which are presented here for the first time, are sufficiently standardized and so well along stable lines that an autoist will scarcely have to buy a new car next year simply because it may be next year, or because a change in body work was found to be necessary on the ground of imperfections in the earlier effort. Past practice, with its rapid-fire variations, frequently hid serious defects under a

Chalmers "30" Roadster

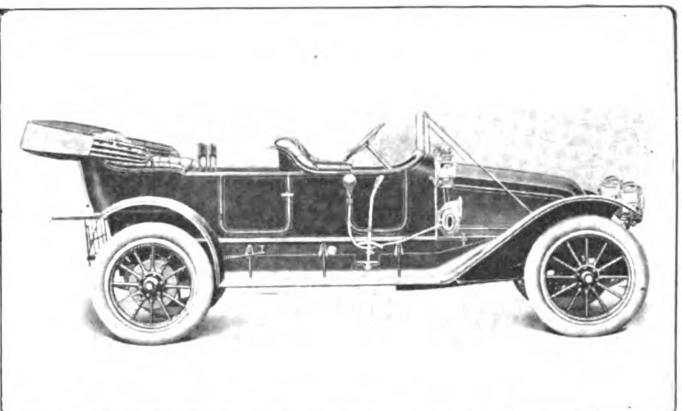


Inter-State Touring Body

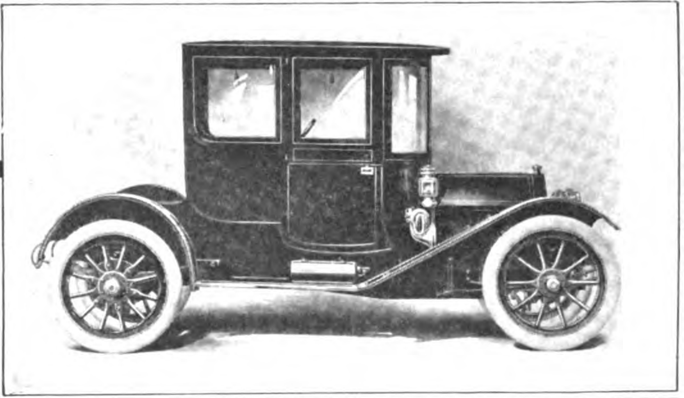
of 1911 Bodies



Packard "30" Fore-Door Phaeton



Franklin Model H Open Body Touring Car

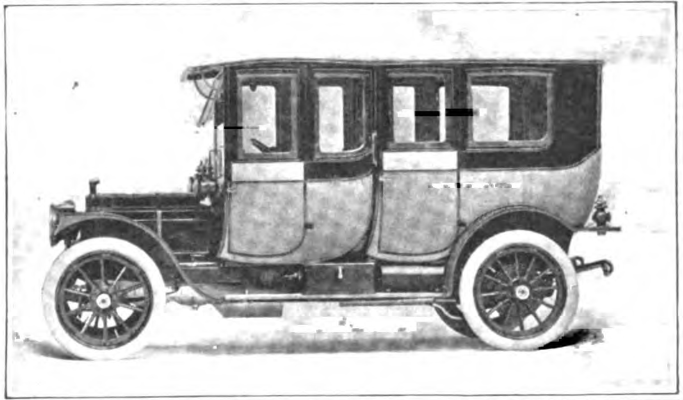


Chalmers "30" Coupe with Inside Control

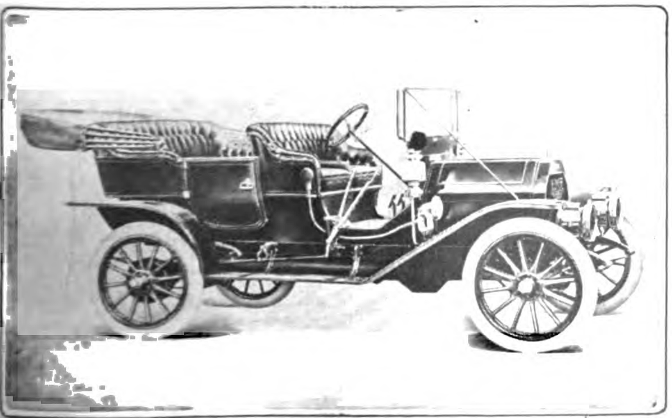
DISCUSSING SUCH MAKES AS PEERLESS, PACKARD, CHALMERS, INTER-STATE, AND FRANKLIN, FROM THE BODY AND POWER PLANT POINT OF VIEW, DEPICTING THE TREND

guise of a change in style, for the sake of style, conveniently forgetting that there was a grave necessity at the bottom of it all.

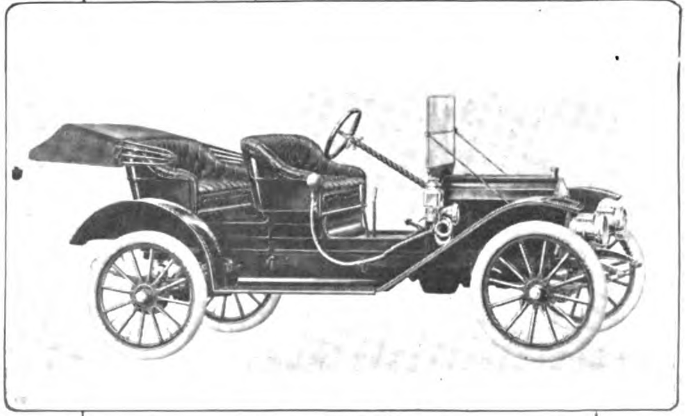
It is believed that the supporters of the industry have always laid too much stress upon questions of appearance, and failed in many cases to grasp the significance of quality from the point of view of the mechanism. As an illustration of what not to do when it comes to buying automobiles, a $3,000 body is scarcely a fitting crown for a $1,300 chassis. This may be an apparently far-fetched presentation of an absurd situation, but such things have happened in the past. In looking over the bodies of the several makes as here presented, it will be observed that they are in better taste than formerly. The cost of the body work is commensurate with the chassis, and a better adjustment of the relating costs will be found. This may not seem to be a sufficiently important point to draw out a protracted discussion, but as the history of the automobile is written, it represents far more than surface indications would seem to show. The evolution of the automobile represents a long struggle with the mechanical phase of the situa-



Packard "30" Fore-Door Limousine

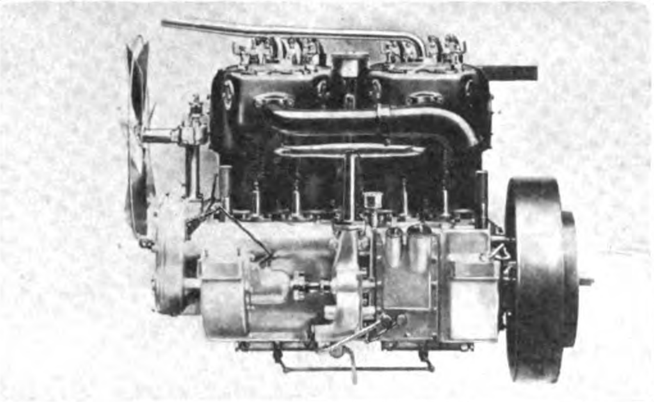


E.M.F. "30" Touring Body with Top and Windshield

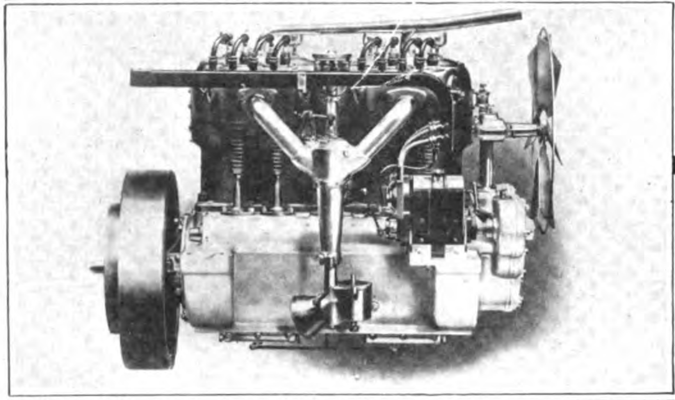


Flanders "20" Suburban

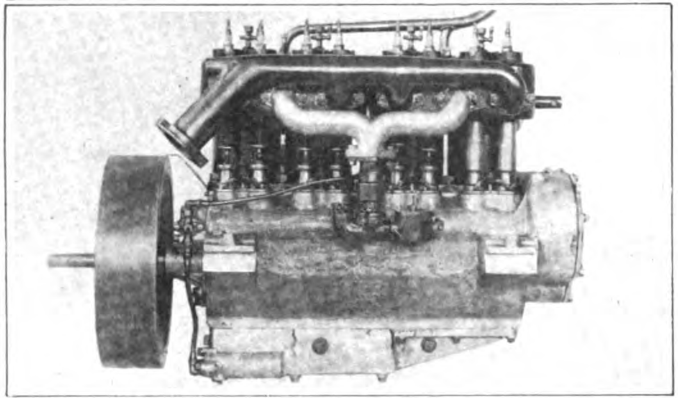
Depicting 1911 F



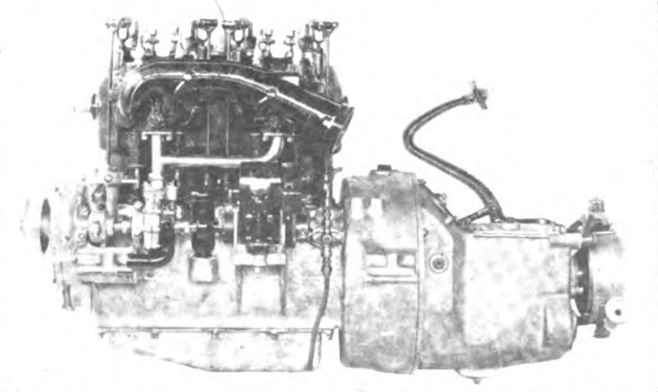
Left side of the Peerless Motor, showing the Water Pump and Method of Driving



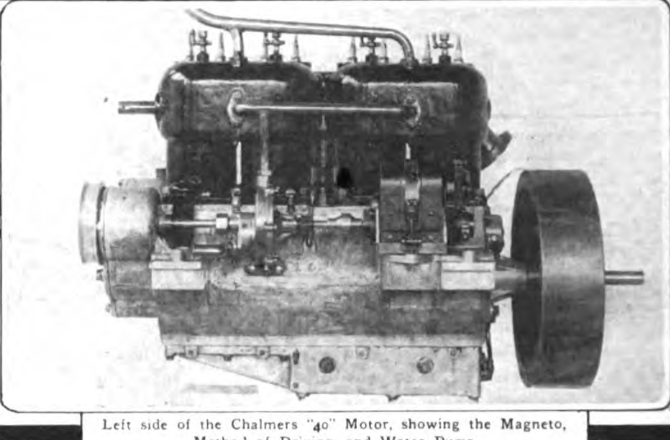
Right side of the Peerless Motor, showing Carbureter Installation and Magneto in Place



Right side of the Chalmers "40" Motor, showing the Carbureter and Encased Valve Springs



Left side of the Chalmers "30" Motor, showing the Magneto, Oil Connections and Water Pump



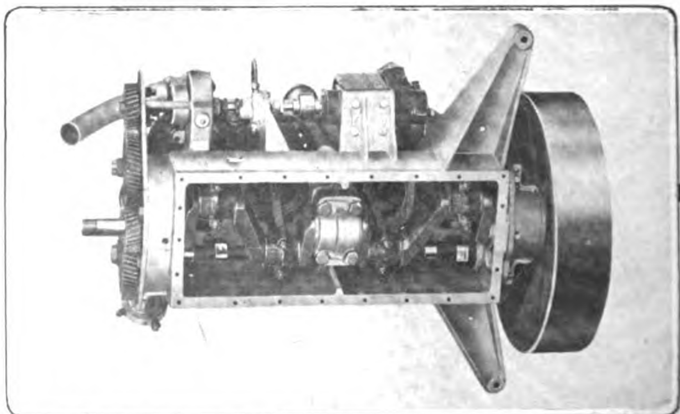
Left side of the Chalmers "40" Motor, showing the Magneto, Method of Driving, and Water Pump

tion, and a slow but sure series of modifications of body work, they being the result of mechanical changes. Originally, bodies were mere adaptations of those in common use on horse-drawn vehicles, employed, perhaps, because of the designers' lack of experience. In time the body situation modified, and for 1911 we have the enclosed types of bodies, some along torpedo lines, others conforming to gunboat styles, but all suggesting the presence of a machine, rather than a relation to the old "rig."

If it may be taken for granted that the enclosed form of body simplifying the torpedo or the gunboat idea is taking root, and indicating that it is a permanent institution, the fact remains that limousine types are being perfected and amplified. The illustrations given with this article of enclosed types of bodies represent the best interpretation of the creative genius of the pure artist, coupled with the strength which comes by taking advantage of the designing ability of a trained engineer, advanced a step through the handiwork of the artisan, and brought to finality by depth and scope of finish, calling into play appropriateness in the selection of groundwork and color, beyond the dream of the carriage maker at his best, and in the fullest conformity with the exigencies of automobile service.

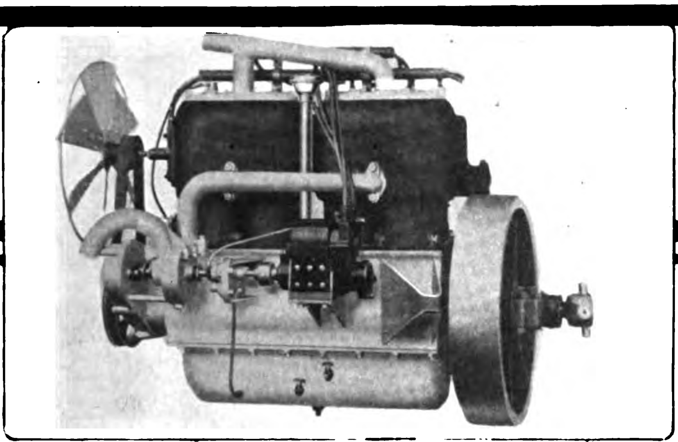
Mechanical Refinements in the Finer Sense Only

Taking the Peerless 1911 power plant with a view to comparing 1910 with 1911, the new line as announced includes three dis-



Looking Into the Inter-State Motor at the Crankshaft, Main Bearings, and Camshaft

ms of Motors

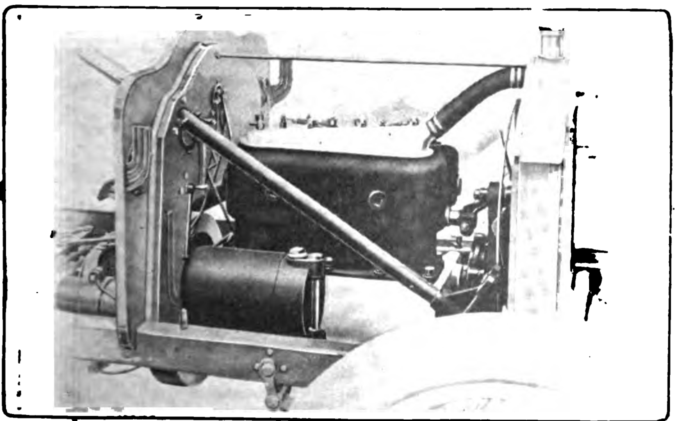


Left Side of Inter-State "30" Motor, showing Magneto, Oil, and Water Pump

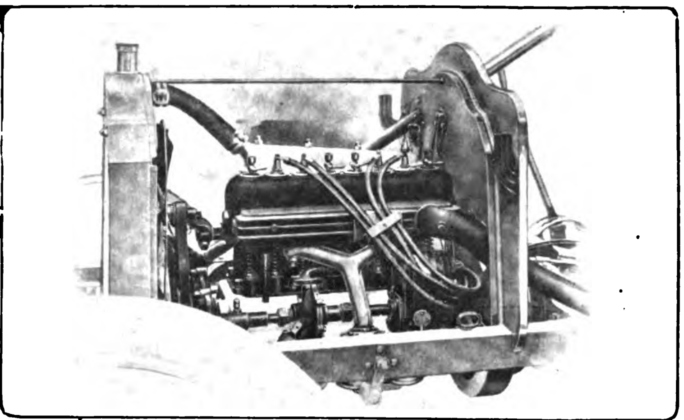
tinct models as follows: Model 31 with a 30-horsepower, four-cylinder motor, having a 5-inch bore and 5-inch stroke; Model 32 with a 50-horsepower, six-cylinder motor, with a bore of 5 inches and stroke of 5 1-2 inches, and Model 29 with a 20-horsepower, four-cylinder motor, with a bore of 4 inches and stroke of 4 5-8 inches. As an indication of the flexibility of the plan considered by the Peerless Motor Car Company, of Cleveland, Ohio, ten distinct types of bodies are regularly available for the three types of chassis. It has been the claim of this company all along that it aimed at standardization and avoided to the greatest possible extent the introduction of glaring innovations, so that it will come as no surprise when it is said that beyond making such refinements as a year's experience might properly suggest, the 1911 product is substantially the same as for 1910.

Taking up the refinements of the year, the most important one, perhaps, comes in the form of an air compressor pump for inflating tires. This pump is a prototype of a four-cylinder automobile motor, and is secured to the front end of the gearset under the front deck-boards. It is driven by an extension of the lay shaft of the gearset. In order that the pump may be thrown into gear at will, a suitable clutch is interposed. Air is conducted from the pump through brass tubing, terminating in a coil of hose of sufficient length to facilitate the work, and the clutch for the air pump is operated by means of a rod and lever which extends through the side member of the frame at a convenient

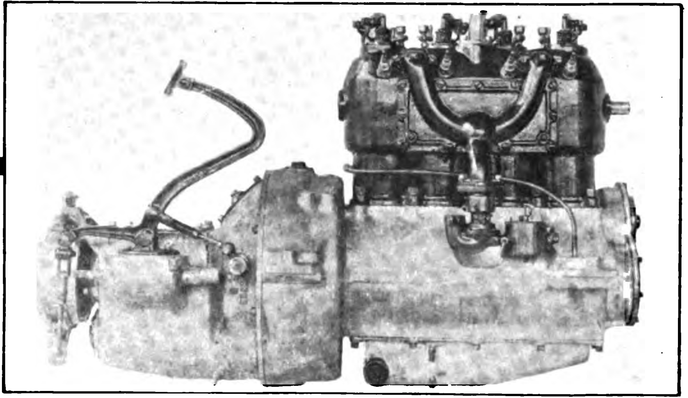
(*Continued on page 247.*)



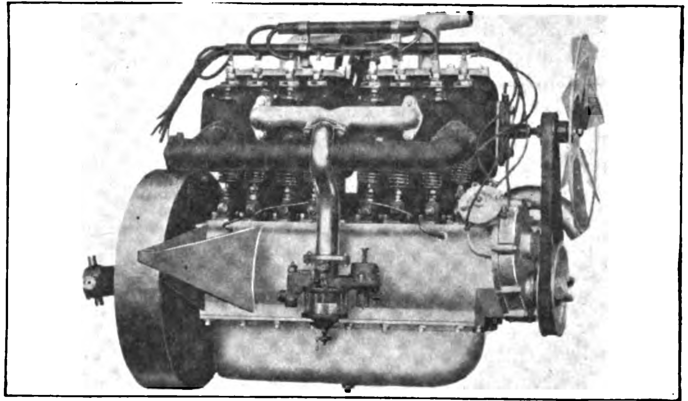
Right Side of Flanders "20" Motor Depicting the Water Connections and Other Nice Features of Design



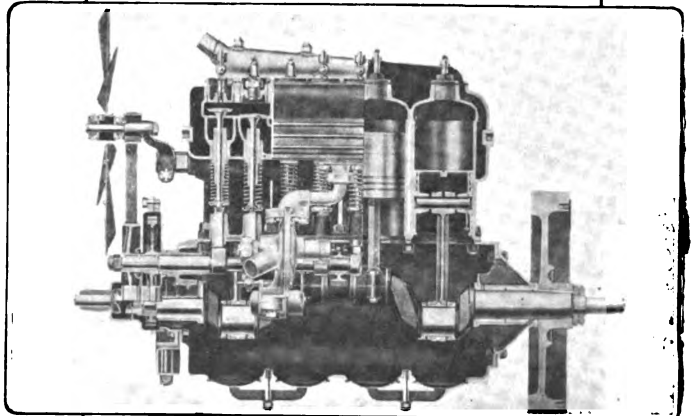
Left side of the Flanders "20" Motor Nested in the Chassis, Looking at the Magneto, Carbureter, and Centrifugal Pump



Right side of the Chalmers "30" Motor, showing the Carbureter, "Bloc" Cylinders, Transmission Gear, and Pedal



Right side of Inter State "30" Motor, presenting the Stromberg Carbureter



Section of the Flanders "20" Motor with a 2-Bearing Crankshaft and Other Details besides the Centrifugal Pump

The Clark Power Wagon

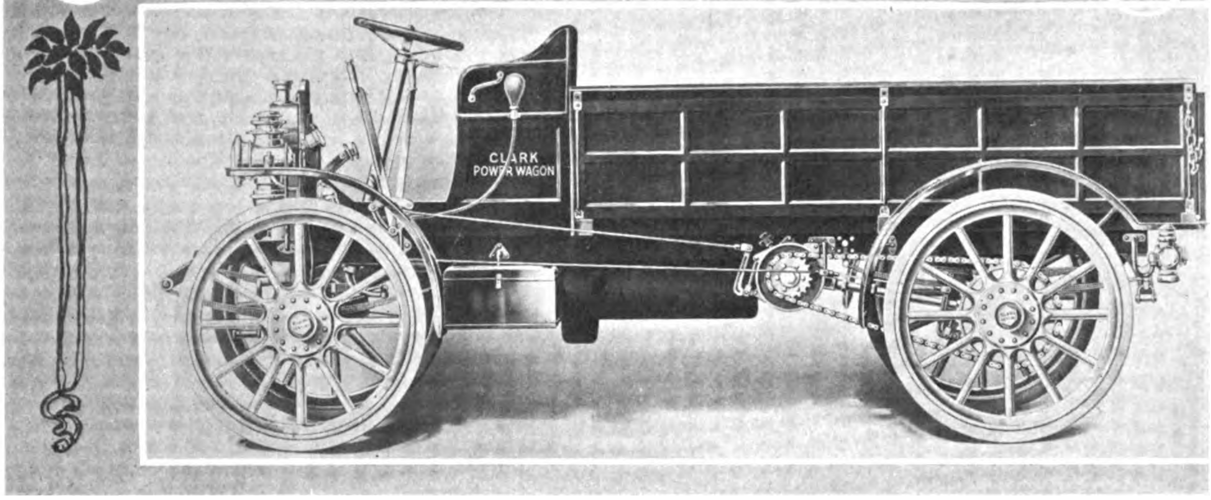


Fig. 1—The Clark Power Wagon, fully equipped and ready for service

LEADERS in the automobile field are rapidly reaching the conclusion that power wagons will ultimately become the mainstay of the industry, it being the case that "long hauls" are now made advantageously in this way and heavy inroads are being made in the "short haul" work. During the pioneer days of the commercial car the plan was more or less hampered by considerations which had nothing to do with the enterprise. The plants devoted to the manufacture of automobiles were so thoroughly engaged in the production of pleasure vehicles that there were no facilities left to be utilized in other work. In addition to lack of facilities the industry was confronted by a famine of technically trained men, and even the artisans were in numbers insufficient to supply the demand. Many attempts under the conditions in the direction of commercial car production were rendered futile, and the public at large reached the false conclusion that however good the automobile proved to be in pleasure pursuits, it was lacking in stamina.

It is no longer necessary to put any effort into persuading merchants that they must use the automobile for long hauls, and all that remains is to afford them the time in which to readjust conditions (one of which is to get rid of a circuit of horses), when short haul work will be taken care of through the medium of power wagons especially designed to successfully cope with the problems involved. It is recognized that the light delivery wagon, as it will have to meet competition, must be thoroughly good in every way, and its flexibility must be greater than that possible under ordinary conditions; moreover, the cost of maintenance will have to be kept down below that which seems to be true with improvised delivery wagons.

Encouragement is not hard to find if it is sought after in the quarters where it seems to reside in plenty; it is not in the path of wisdom to overlook the fact that with animal transportation the service is well organized and conditions of economy obtain at every point. Considering the service to be expected from power wagons, the conditions are not so fortunate. As a rule, the men who are devoted to the care and maintenance of animal-drawn vehicles are impressed into the other service when it is instituted, and in addition to a certain antipathy, due to their love for horses, there is the other side of the question involving not only lack of mechanical skill, but the probability of incapacity for acquiring a reasonable measure of the same.

The Clark Power Wagon Company, with a well-equipped manufacturing plant at Lansing, Mich., having spent many years in the manufacture of wagons in general, made it a point not to transfer its allegiance to power wagons until the time was ripe. It is a well-established fact, if not a principle, that an invention ahead of its time, however good it may be, sinks to the level of a common nuisance, and it was foreseen by the company that it could better afford to continue its regular line of work, supplying its clientèle as dictation required, studying the automobile situation in the meantime, hoping thereby to arrive at a wise and fitting conclusion, and after going over the mätter at the greatest possible length two harmonious ideas took form: one was that the company had conducted a sufficient investigation to permit it to build a good power wagon, and the other takes into account the positive demand for wagons of this character.

It will be understood that the body work in the majority of cases must be contrived in view of the service to be rendered. Under the circumstances, the company devotes a part of its energies to the building of special bodies and is equipped to turn them out with great promptness after a fitting conclusion is reached in which the customer is consulted and is advised in the various ways. Fig. 1 depicts a standard form of the power wagon, a body which is much in vogue and may be had with or without a top. With the understanding that there is no limit to the types of bodies to be had for the asking, this phase of the situation will be subordinated to the mechanical side of the subject, which is of far more importance. Fig. 2 is a plan of the chassis showing a 2-cylinder motor of the opposed type located athwartships at a point on the chassis which brings the motor directly under the driver's seat. The radiator is located in front on the center line of the front axle, and independent water connections are made to the respective cylinders of the motor. The flywheel F1 is at the back of the motor, houses a cone clutch, and power is transmitted from the same through universal joints U1 to the transmission gear G1, thence to the jackshaft J1 with a bevel drive and differential gear enclosed. The jackshaft unit is self-contained, and is bolted up to the chassis frame, bringing the sprocket pinions S1 and S2 at a point well in front of the rear axle, but in line with the sprocket drums D1 and D2, which are bolted to the rear wheels, details being given elsewhere. The exhaust from the two cylinders of the motor passes back to the cross connections E1 and E2 to the muffler M1, bringing the same to the rear of the chassis frame and assuring that the exhaust will be cool, smokeless and noiseless, and affording the advantage of straight pipe connections without interfering with the play of the rear axle. The steering linkage L1 comes to the rear of the front axle, is protected thereby, and the link to the steering post is straight and long enough to avoid cranky steering action.

Main Points in the Power Plant Construction

The plan of the motor as shown in Fig. 3 presents the cylinder S1 with the water connection removed, showing the valve springs S2 and S3 and the tappet adjustments T1 and T2 with long guides G1 and G2 for the valve lifts V1 and V2, engaging the cams C1 and C2, which are integral with the camshaft which floats in bearings B1 and B2, taking power from a pinion on the crankshaft to the gear G3. The other cylinder S4 is shown in section, including the piston P1. There are four packing rings to maintain tight compression, one of them being below the gudgeon pin G4. The connecting rod C3 is of the I-section and has a long bearing on the gudgeon pin, which, together with other nice features of design, represents the foundation for the sanguine hopes of the designer. The flywheel F1 is relatively massive, this being an important matter in commercial work, and the magneto M1 is located at the other end, being driven by an extension from the camshaft through a universal joint U1.

Substantial Crankshaft Relied Upon for Service

Referring to Fig. 4, which is a side view of the motor in part section, the valve V1 is clearly brought out and the guide G1 is shown. All valves are of the bevel seat type, of the same size, and in diameter equal to half the diameter of the cylinders, thus assuring a full charge on each suction stroke, and exhaust free from back pressure, resulting in a well-established torquing moment and a full measure of power. The connecting rod C1 is shown completely in this view, and the halftime pinion P1 is shown in part indicating its relation to the halftime gear G2. The crankshaft C2 is a well-designed drop forging of special steel and the crank pin C3 is shown in section, indicating that the bearings are large, this being an extremely important detail in commercial service. Oiling is done positively by a pump P1 located in a well which is bolted up to the crankcase and the pump is driven by a vertical shaft S1, which takes power from the crankshaft. Among the other points worthy of mention are the symmetry of design, large water-jackets, uniform sections of metal at every point, castellated nuts with cotter pin locking, and just the refinements that are now standard with engineers of competence.

In order to fully appreciate the extent to which this motor has had the attention of the designer, it will be necessary to make a critical examination of Fig. 5, which is a longitudinal section in the plane of the crankshaft, presenting a substantial front main bearing M1 which may be removed by taking out the bolts B1, B2, etc., around the periphery, and if it is desired to remove the crankshaft, the same operation may be performed for the main bearing M2. The rear main bearing carries the weight of the flywheel F1, and is made relatively long and of greater diameter than the bearing M1. With the idea of inducing additional service security the method of oiling is looked after with the utmost care. The oil enters at O1, and after flooding the bearing, passes out under pressure to the slinger on the shaft S1, where it is thrown by centrifugal force to the cavity C1, whence it flows back through the channel C2 to the crankcase C3, thence to the oil-well O2. The method of driving the oil pump is clearly brought out in this section, showing a worm W1 driving the pump gear G1. The timer T1 is driven by a bevel set B3 taking power from the camshaft, and the magneto M3 is maintained in proper alignment, due to the accuracy with which the support S2 is machined. The clutch C4 is of large diameter, made of aluminum and dished, has a leather facing L1 with cork inserts C5. The clutch spring S3 is of large diameter, and housed in. An adjusting nut N1 permits of varying the pressure of the spring, and the thrust is taken by a suitable thrust ball bearing.

Transmission Includes Universal Joints

Referring to Fig. 6 of the transmission gearset, power is taken by the universal joint U1, the same being pressed up on a taper T1, by a nut N1. The universal joint is of large capacity, and being fastened onto the shaft in this secure manner, it is permitted to serve for a long time in a proper and satisfactory manner. This shaft is supported by two annular type ball bearings B1 and B2; they are spaced at a considerable distance apart and are large for the work. At the point of engagement for high gear the jaws J1 are of substantial design, and instead of the two shafts telescoping at this point, an annular type ball bearing B3 is used. The other end of the shaft is supported by the ball bearing B4, and a thrust ball bearing B5 is also placed just back of the bevel pinion. The lay shaft, which is back of the main shaft shown, also rolls on annular type ball bearings. Power is transmitted to the bevel pinion B6 to the bevel gear G1 and is translated by the bevel differential D1 to the jackshafts J1 and Y2, thence to the sprocket pinions. Annular type ball bearings B7, B8, B9, with a mate to B7 on the opposite end, are placed to handle the jackshaft load and a ball thrust bearing B10 is placed back of the bearing B8 to resist the thrust of the bevel gear G1. At every point in this system, the proportions of the parts are in accord with the latest and most approved practice, and in addition to using annular type ball bearings of authenticated ability, the materials employed in the shafts, gears, and other parts are selected for their kinetic characteristics.

In order to show the location of the lay shaft with respect to the main shaft in the transmission gear system, it is necessary to present the section Fig. 7, which is at right angles to the section

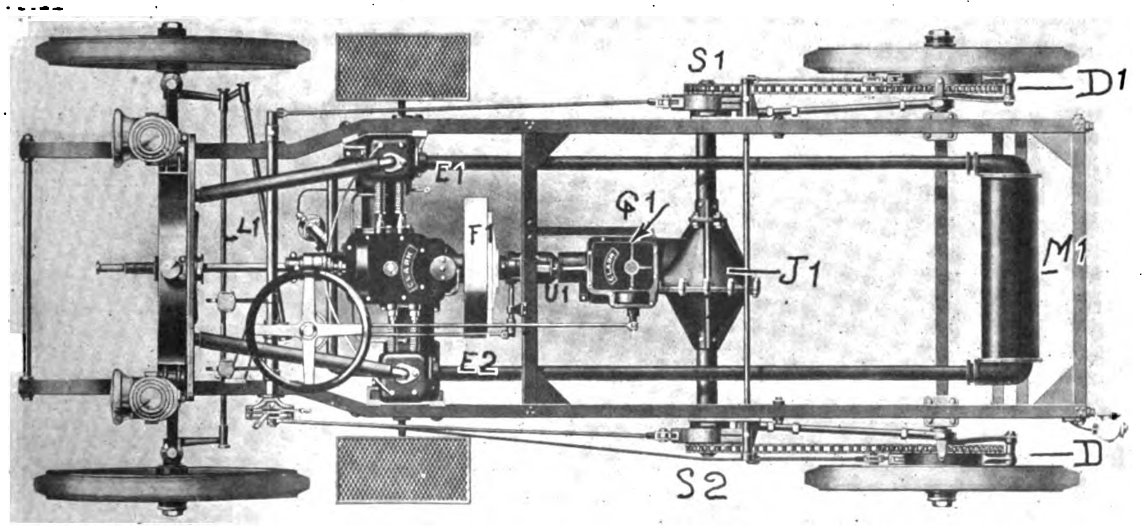


Fig. 2—Plan of the chassis, showing the nesting of the power plant

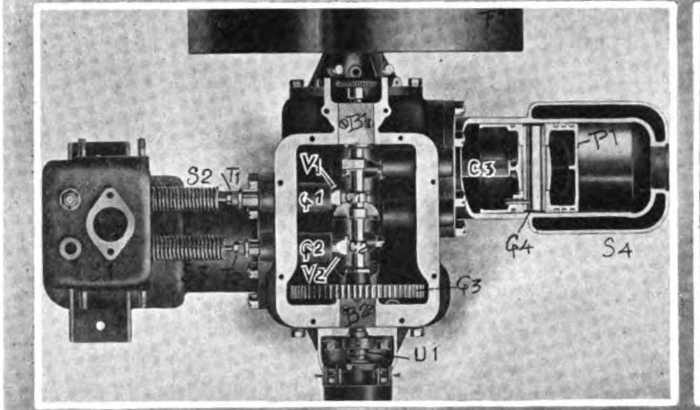


Fig. 3—Plan view of motor and sectional view of cylinders

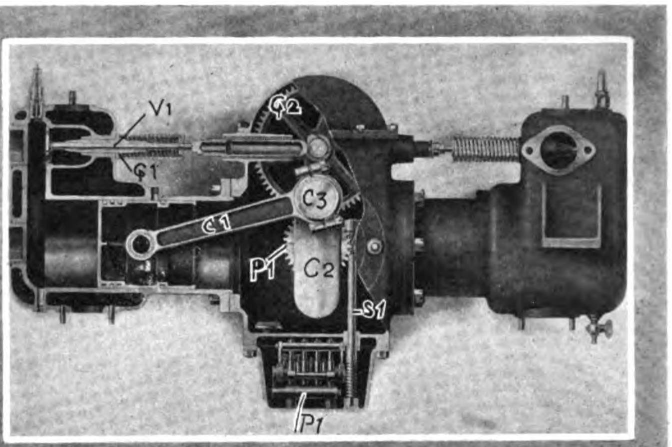


Fig. 4—Front view of motor; sectional view of cylinders and oiler

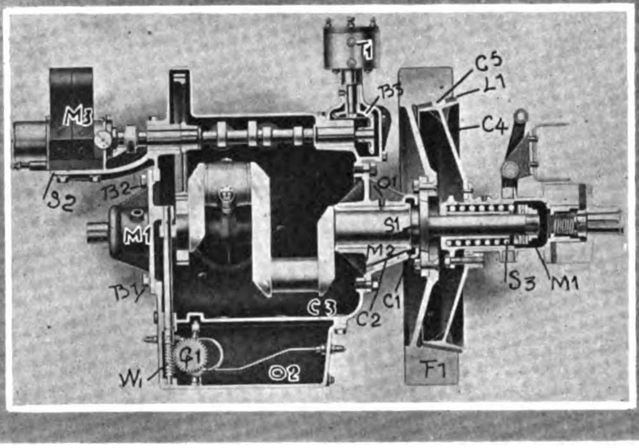


Fig 5—Sectional view of motor, oiler and clutch

Fig. 6. In this section the lay shaft L1 is in the plane of the main shaft M1 directly below. The relations of the gears are clearly indicated, and the annular type ball bearings before mentioned as belonging to the lay shaft are shown. This section also presents details of design that are not so clearly brought out elsewhere, as, for illustration, the ball bearing housings are presented, and the method of locking the ball bearings on to their spindles is shown with great clearness.

Fig. 8 shows the L-section front axle, details of the steering knuckles, taper roller bearings, methods for lubrication, and an indication of a sufficiently liberal use of metal to sustain in commercial service.

Harmony of Relations Aimed At

The two-cylinder motor is expected to furnish all the power that can be advantageously used in the service of this character, and the opposed type is selected in view of its favorable history in commercial pursuits, but in order to assure a sufficiency of motor performance the cylinder bore is made 5 inches with a stroke of 5 1-2 inches. Next in line on the road to smooth action is the large and suitably fashioned clutch, it being the case that cork inserts have the facility of permitting of slipping, if it is found to be advantageous, without burning the clutch. From the clutch to the sliding gear there is a further bid for harmony through the use of the universal joints as previously shown, and the well-designed transmission gear of the sliding type with two speeds forward and reverse, being progressive in action, eliminates the necessity of using a great measure of intuition in the management. The power being translated from the sliding gear system to the rear wheels by means of an efficient and stable side chain drive leaves little else to be desired, and it is worth pointing out, while the opportunity affords, that this school of design is quite free from harassing detail from the point of view of maintenance. The brakes are of suitable design and efficient for the purpose, and the tire equipment is either solid or pneumatic, depending upon the service to be rendered. The wheel base is 102 inches, and 36 x 2 1-2-inch solid tires are used. The regular price of $1,450 includes the express body as shown in Fig. 1. If the purchaser selects pneumatic tires they will be 36 x 3 1-2-inch and cost $50 extra. If the express body is to be supplanted by a special body, the chassis will be figured in at $1,375. The tool, tire, and regular lamp equipment are included in the chassis price. The company has a well-equipped plant and is making rapid strides in the direction of the production of the cars, of which it proposes to turn out enough to satisfy every investigated demand; but care will be taken not to put cars into service for which they are not intended.

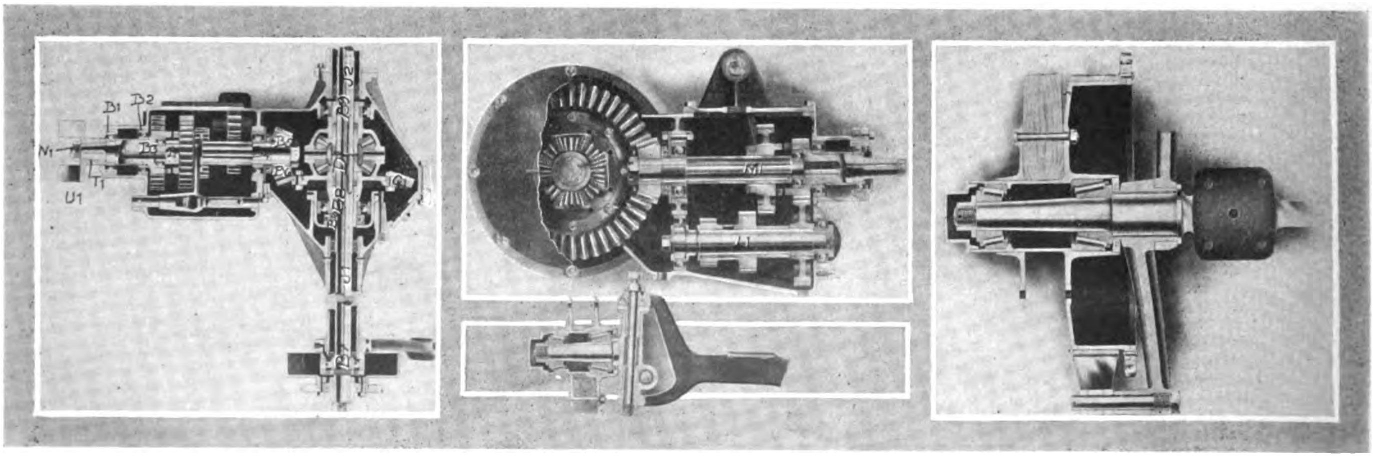


Fig. 6—Sectional plan view of transmission, differential and jackshaft. Fig. 7—Sectional view, side elevation of transmission and differential. Fig. 8—Front axle, presenting sectional view of steering knuckle pin, bearings, and hub. Fig. 9—Sectional view of rear brake drum and wheel bearings

Body Rejuvenation

DESCRIPTIVE OF REJUVENATED E-M-F "THIRTY" BODY AFTER IT IS CHANGED OVER FROM THE REGULAR TOURING TYPE TO CONFORM TO THE CRUISER IDEA, INCLUDING WORKING DRAWINGS.

LAST of a series of working drawings which were offered for the purpose of showing autoists how old touring bodies might be reconstructed at small cost, bringing them up to the latest idea along cruiser lines, using the old body in the new work, without having to alter the same in any way, excepting to provide a new dashboard and utilize a pillar of bent wood in securing the new fore-door in place. Fig. 25 is a side elevation of the E-M-F "Thirty" car as it would appear were it converted in accordance with the working drawings as presented in Figs. 26, 27 and 28. Fig. 26 shows the shape of the new fore-door, and glancing at Fig. 25 it will be observed that it is in the style of the door of the side entrance of the tonneau, with hinges and hasps to match. Referring back to Fig. 26 the dotted lines show the framing, allowing for a door 17 inches wide in the clear, hinged in front, and in harmonious relation with the old body. There is of course no door provided for the right side of the car, and as Fig. 27 shows, the emergency brake lever falls to the outside of the body line, but the sliding-gear lever passes through the body, a slit being provided for the purpose, thus bringing the sliding gear lever to the inside. The overhang of the dash is 4 1-2 inches amidships, is 34 inches across, and 24 inches high at the low point. The flare of the overhang would come in the natural course of construction and would be made to suit the eye. The plan, Fig. 28, will give an excellent idea of the finished result, and as before stated, for other efforts along this line, it is important to refinish the old body in such a way that it would not be possible to distinguish as between the newer and the older portions after the body is painted. This demands a little care on the part of the finisher, who should show some competence.

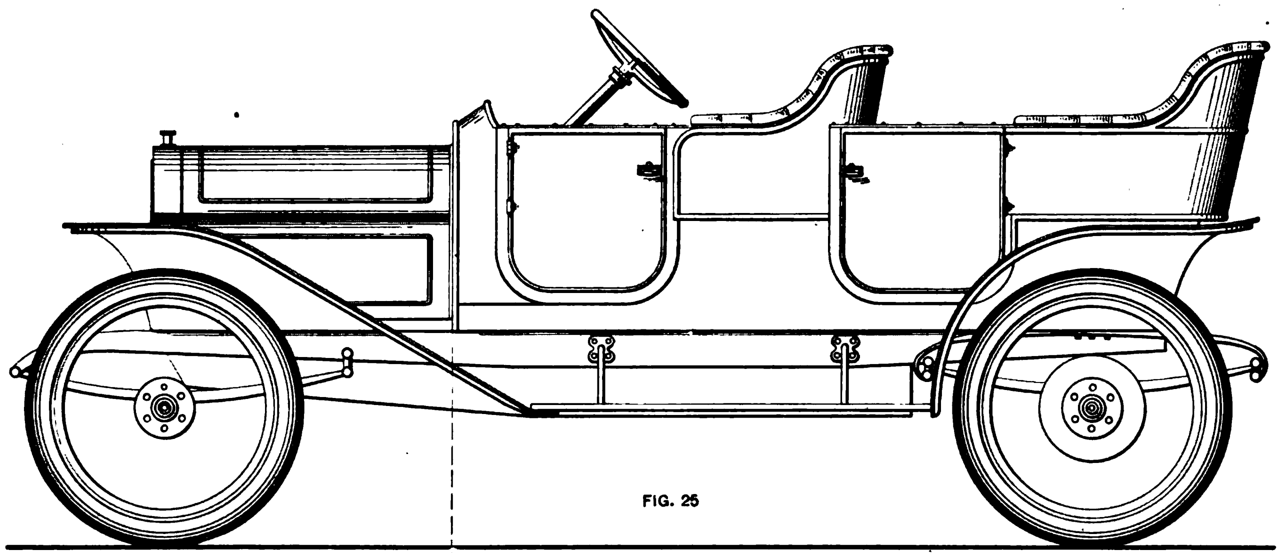


FIG. 25

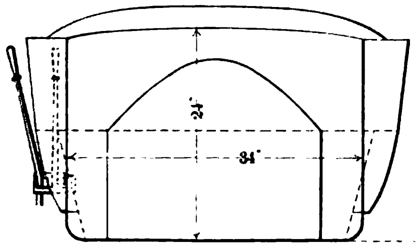


FIG. 27

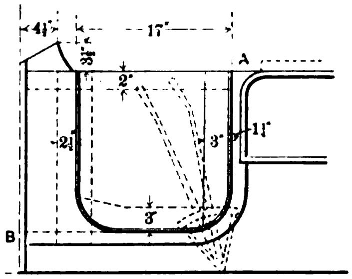


FIG. 26

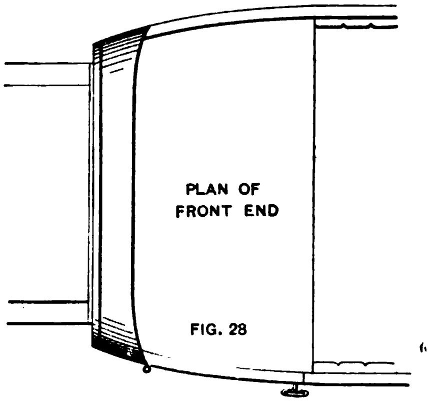


FIG. 28

Fig. 25—E-M-F "Thirty" model, with new fore-door type body replacing old touring style. Fig. 26—Detail of new fore-door. Fig. 27—Front elevation. Fig. 28—Plan of front end

Vaporization of Gasoline Discussed

Investigation seems to have shown that the gasoline out of the nozzle is more likely to be in stream formation than as a spray, and the stream is made up of a solid portion surrounded by torn-off globules, some of which are relatively large and the rest grading down to vapor size. Observers have been deceived by the outer wall of vapor which tends to hide the solid central stream and the larger chunks of gasoline which form between the solid stream and the vapor-like outer wall. The claim is almost invariably made that perfect vaporization is brought about by carbureters—such results are not always realized.

Questions

CONSIDERING WIND RESISTANCE; SPEED ON CURVES; EFFECT OF BANKING; CALCIUM CARBIDE; PRESSURE, VOLUME AND TEMPERATURE OF GASES; AUTOMATIC VALVES AND FORMULAE FOR SPRINGS; ADVANTAGE OF STUB TOOTH GEAR.

[193]—Is it necessary to consider wind resistance in connection with the power required to drive the average runabout type of automobile?

No. The wind resistance is scarcely a measurable quantity at 20 miles per hour, is not more than 3 pounds per square foot at 30 miles per hour, nor does it reach 10 pounds per square foot until the speed is equal to 52 1-2 miles per hour in round numbers.

[194]—How is wind resistance determined?

A formula for use in approximating the power required to overcome wind resistance is given as follows:

$$HP = \frac{PA\ (M\ 5{,}280 \mid 60)}{33{,}000} = 0.96\ PAM$$

In which

HP. = horsepower required to overcome wind resistance.
P = pressure of wind in pounds per square foot.
A = front area of body in square feet.
M = speed of car in miles per hour.

Numerical example:

Assuming a car with a front area of 10 square feet and a speed of 60 miles per hour, the power required to overcome this wind resistance will be:

$$H.P. = \frac{13 \times 10\ (60 \times 5{,}280 \mid 60)}{33{,}000} = 20.8$$

It is not believed that this formula will hold out for all ranges in speed, nor can it be said with certainty that the front area total will be correctly stated if the areas of all the parts without respect to shape or location are figured in on the same basis. In all probability, the most certain way to ascertain the amount of power required to overcome wind resistance is to take a certain car and with suitable instrument under road conditions measure the power required.

[195]—In dealing with the questions of car performance on a curve, it would be interesting to know not only the maximum speed at which it is safe to drive, but also the effect of banking, and of declination. Can you state in a comparative way the effect on car under the three conditions?

On a level hard road with a curve of 100 feet radius, the turning over speed is about 38 miles per hour. On an embanked curve, considering the same radius, if the inclination is 10 degrees, it will be safe to travel at a speed of 47 miles per hour, but if there is a declination instead, and the same amounts to only 5 degrees, the safe speed will be about 23 miles per hour. These figures are sufficient to indicate to a driver of prudence that it is extremely dangerous to round a curve if there is a declination, whereas an inclination (banking) renders driving quite safe, at the same time, it must be remembered that increasing the radius of the curve adds materially to the measure of safety.

[196]—During the warm days I noticed that my tires become harder and the tire pressure actually increases, probably on account of temperature. Is there any danger of blowing up the tires?

The real danger lies in not maintaining a sufficiently high tire pressure. None of the hand pumps to be had upon the market as used in automobile work are capable of affording a pressure higher than that which may be safely sustained by tires. A 34 x 4 tire, for illustration, should have a pressure of 80 pounds per square inch as a minimum, and if a tire such as this is inflated to 80 pounds per square inch during the cool of the morning, when the temperature increases, as it will following service and the heat of mid-day, the pressure in the tire will increase considerably, but there is scarcely any danger of obtaining a pressure from these causes greater than the tire is capable of sustaining. If a tire is inflated to 80 pounds per square inch cold, the pressure will increase to about 98 pounds per square inch under the worst conditions likely to be encountered in the summer time. The tire may ride a little hard with this higher pressure, but it will last longer than would be true were the pressure to fall below 80 pounds per square inch. Tires on front wheels may be permitted to run at a somewhat softer pressure, but it is a dangerous experiment.

[197]—At my country house, where I keep five automobiles, I have solved the gasoline problem by purchasing a commodious steel tank, and properly installing the same so that I buy a wagon-load of barrels of gasoline at one time, getting the lowest price per gallon and on the delivery as well, but I have not succeeded in solving the carbide problem. I am purchasing it in cans at too high a cost. Is there not some better way?

After manufacture, the fused carbide is run through crushers just as coal is crushed, and the result is several sizes of carbide which are named in the same way as coal. Lump carbide is the largest size, ranging between 3 1-2 and 2 inches. Egg carbide is the next size, and ranges between 2 and 1 1-2 inches. Nut carbide follows in turn, ranging between 1 1-4 and 1-2-inch, and the size that you would probably want is called "quarter" carbide, ranging in size between 1-2 and 1-4-inch. Those who make a a practice of canning carbide, procure it in tight drums of various sizes, and at a lower price than that ruling for small lots.

[198]—What is calcium carbide composed of and how is it made?

The base of acetylene (calcium carbide) is made in the electric furnace from lime and coke, fused at a temperature ranging between 5,000 and 7,000 degrees Fahrenheit.

[199]—Will you please state the chemical composition of a grade of nickel steel that you would recommend for cementing purposes?

Nickel	Carbon	Silicon	Sulphur	Phosphorus	Manganese
4.5	.10-.15	.15-.20	.03-.04	.03-.04	.30-.40

[200]—What is the variation of volume and temperature with compression?

Assuming that no heat is added or subtracted, the tabulation as follows will hold:

VARIATION OF VOLUME AND TEMPERATURE WITH COMPRESSION

Gauge Pressure	Volume	Temperature
0	1.000	60
2	.910	80.4
5	.810	106
10	.690	145
20	.543	207
30	.454	252
40	.393	302
50	.350	339
75	.276	420
100	.232	485
115	.213	518
130	.197	550
145	.184	580
160	.172	607
175	.163	632
200	.149	672

[201]—In a carbureter, what is the measure of the force of the float in the bowl?

The vertical upward force, in other words the buoyancy, will be equal in weight to the weight of the liquid displaced.

[202]—The opinion obtains in some quarters to the effect that the automatic inlet valve idea in motor designing is less complicated than when a positive method is employed, such as that involving the use of a cam shaft, valve lifts, springs, etc., but practice seems to will to the contrary. What is the matter with the automatic inlet valve?

Force is required to open the valve. This force is only available through suction, and it is at the expense of a more completely filled cylinder. The power of the motor is due to the weight of the mixture taken into the cylinder, and any obstruction in the intake is bound to reduce that power. An automatic valve may be looked upon as one of the most efficacious obstructions that can be devised for the purpose, and while it permits mixture to enter the cylinder after the valve is opened by the difference in pressure between that which resides in the cylinder and that in the atmosphere without, it is, nevertheless, at a great cost in power.

[203]—What are the proportions of the Brown & Sharpe involute form of teeth as used in transmission work?

PROPORTIONS OF INVOLUTE FORMS OF TEETH

Whole depth of tooth $= \frac{2.157}{P}$

Depth of tooth above pitch line $= \frac{1}{P}$

Working depth of tooth $= \frac{2}{P}$

Depth of tooth below pitch line $= \frac{1.157}{P}$

Clearance at root of tooth $= \frac{0.157}{P}$

Thickness of tooth at pitch line $= \frac{1.57}{P}$

Width of space $= \frac{1.63}{P}$

Back lash $= \frac{0.6}{P}$

P = Diametral pitch of gear.

[204]—Is there a formula of any kind that will permit of scientifically designing half-elliptic flat plate springs so that they may be depended upon under the most severe conditions of service?

There are complex methods of arriving at fairly safe conclusions, provided the material used is up to some known and recognized standard. The usual method, however, is faulty in that it fails to take into account the fact that a given amount of material should not be worked beyond a certain limit if it is to last for a long time. One formula recommended for what is known as the safe loading, is: Let,

B = Width of plate in inches.
T = Thickness of plates in 1-16 inches.
N = Number of plates used.
S = Span of spring in inches.
C = A constant = 11.3.

When,

$$\text{Safe Load in tons} = \frac{B\,T^2\,N}{C\,S}$$

To determine the amount of the deflection in inches, per ton of load, the formulæ as follows has been recommended: Let,

D = Deflection in inches per ton of load.
L = Span of spring in inches.
C = Constant — 40,000.
B = Width of plates in inches.

When,

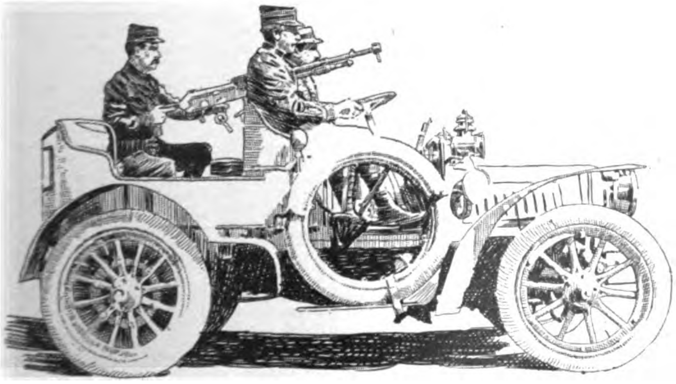
$$D = \frac{L^3}{C\,B\,T^3\,N}$$

Unarmored War Car

DR. ROBERT GRIMSHAW TELLS HOW THE FRENCH GOVERNMENT DURING THE MOROCCAN TROUBLES EXPERIMENTED WITH THIS OUTFIT WITH A VIEW TO ITS USE IN THAT CONFLICT

In Europe the military automobile has been undergoing many developments and alterations as applied in the service of the various branches of the army—from carrying the general staff conveniently along the best roads, to hill-climbing, for transportation of men and ammunition; from automobiles with heavy armor-plating and mounted with comparatively heavy machine guns, to others which constitute the more humble, "mute and inglorious," but none the less necessary, field kitchen. The latest form is the unarmored machine-gun auto.

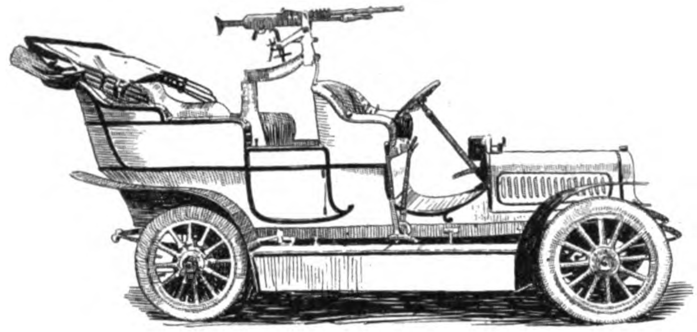
The first advantage derived from the automobile for war purposes was considered to be its emancipation from the track necessary for the locomotive—this giving it necessarily in great part the carrying and towing capacity of the latter, without the limitations of direction which are necessarily inseparable from the "iron horse" of the last century. As a means of offence, however, the railless self-propelled vehicle had its defects—being, of course, somewhat restricted as regards two things: the amount of armored protection which it could carry and the caliber of gun with which it could be equipped; that is, it was either offensively or defensively weak, or both. So the armored auto has not done all that the manufacturers hoped, or the military authorities wished.



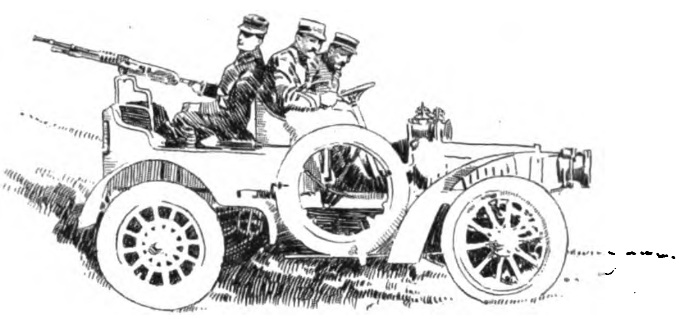
French unarmored automobile war outfit—a Hotchkiss gun mounted on Panhard truck; Capt. Gentil driving

In October, 1905, the German War Department had an armored auto submitted to it by a private firm, on the latter's own initiative. The tests, made before the representatives of the Ministry of War and the troops, did not receive the encouragement that the builders hoped. This vehicle was steel-plated even to the wheels—for, of course, like Achilles, who (if mythology belie him not and do not deceive us) was vulnerable in his running gear—the auto with "pneumatics" would be an easy prey to the enemy if its tires should happen to be burst by sharpshooters or from other causes. The Austrian Ministry of War also made tests in the same field of investigation—in this case with a Wiener-Neustadt Daimler driven on all four wheels. This armor-auto—if I may be allowed the expression, and really I should not—could quite conveniently, thanks to its four-wheel drive, cross plowed land and take hills, on which the ordinary auto, even of lesser weight, would stall. Here, instead of protecting the tires by steel armor-plate reaching nearly to the ground, solid rubber tires were used.

The heaviest caliber of machine gun which it has been considered practical to use is five centimeters, or a trifle short of two inches. The great disadvantage of the armored auto, however, is that it offers to the enemy a much better target than the average horse-drawn field-piece of equal or greater destructiveness. This led to the demand for an armor plating much more resistant, and consequently much heavier, than the shield protecting the horse-drawn machine gun. But this armor materially reduces the offensive power of the wagon. For this reason the idea has gradually been adopted to dispense entirely



Ready to sweep the country ahead with the automobile gun



The gun swung to the rear to keep off pursuers

with the armor and let the occupants simply "take their medicine." Those manning torpedo boats have practically to do this; the officers of the British Army stand when under fire, although their men lie down; why not the auto-gunners? At any rate the result of the idea or the return to the old one, in warfare, is the auto shown herewith, and which is intended to serve in cases where mounted infantry would accompany the cavalry. Should either the running gear or the driving mechanism be put *hors de combat*—which does *not* mean "war horse," as the schoolboy translated it—the only resource would naturally be to spike the gun, or perform the equivalent operation which would render it useless, and abandon the entire rig. The military authorities have not yet decided whether it would not be better to use, instead of the type here shown, motor-bicycles with one man each, suitably armed.

The intermediate step between the entirely unprotected auto here illustrated (the cuts are taken from the *Leipziger Illustrierte Zeitung* for January 16) was the Opel-Darracq machine shown at the last Berlin Automobile Exhibition, and which had only a belt of armor, so that it was entirely unprotected against projectiles falling from above, as where downward fire is directed against it from a hilltop, or shot fired at great elevation makes the corresponding curve in descending, or where a shell bursts in the immediate neighborhood. In order to enable the occupants better to view their surroundings, this vehicle had in the armor belt hinged portions which could be let down to give unobstructed view.

At the recent, most unsuccessful, German Military, Marine and Colonial Exhibition in Berlin there were exhibited alongside of the fully armored auto of the Eckhardt firm, of Zella St. Blasii, the vehicle as shown herewith, and in which, figuratively speaking, not merely the Achillean heel, but the whole Achillean body, is entirely unprotected. The drive is by means of a friction coupling to the change gear, and thence to the rear wheels. There are seats for four persons, and the machine gun is swivelled on a special "lafette"—carriage it could not be named—between the front and the rear wheels in such a manner as to command the entire circle without turning the auto. It is easy to see that such a vehicle would have special value for colonial warfare—meaning, in this sense, war against unmounted savages, insufficiently equipped with weapons and relying on their numbers. This would point especially to its value for certain African conditions; and also, if we leave out the reservation about cavalry, for settling the Moroccan question by force of arms. Whether or not the French Government will do in this respect what it did before with regard to the captive military balloon—namely, postpone its adoption until too late—remains to be seen.

In the meanwhile there went to Oran in December on the steamer *Russie* a Panhard "auto-mitrailleuse," which was at once sent by train to Tlemcen, and for the service of which a detachment of ten men under command of Captain Gentil was detailed. Eastern Morocco would seem to be very well suited for operations with such an auto—perhaps better than the Casablanca district, to which we hear that a similar auto will be sent. These vehicles resemble considerably the light military auto shown at the before-mentioned triple-named exposition by the Rheinische Metallwaren und Maschinen Fabrik.

Fig. 2 shows the French machine gun ready to sweep the field in front; in Fig. 3 the attack is to the rear.

Testing Steel

FOR IMPACT, BENDING, ETC. FINAL INSTALLMENT OF A PAPER PRESENTED BY BERTRAM BLOUNT, W. G. KIRKALDY AND CAPT. H. RIALL SANKEY BEFORE INSTITUTION OF MECHANICAL ENGINEERS (GREAT BRITAIN).

IN the issue of THE AUTOMOBILE of June 23 was printed the first installment of the article of which these tables form a fitting conclusion. The authors presented in a telling way the methods employed and the conclusions reached in the exhaustive tests of various types of steel furnished by British makers. To insure accuracy in the impact tests a falling-weight apparatus was designed. A series of tensile tests were carried out in the usual way on test-pieces made in accordance with the provisions of the British Standard specifications. The methods of analysis employed were those usually accepted by steel chemists. Tensile-impact and repeated-bending tests, as carried out by the experimenters, are fully described in the course of the paper, and the conclusions arrived at are given in the accompanying tables in the form of a comparison of the results obtained. These tables show, among other things, the elastic limit, yield stress, breaking stress, percentage of elongation and character of fracture in the tensile tests, and the energy absorbed in the impact and bending tests.

TABLE 1—CHEMICAL ANALYSIS

1	2	3	4	5	6	7	8
Item No.	Type of Steel	Carbon	Silicon	Sulphur	h phorus	Manganese	Iron by Difference
		per cent	per cent	per cent	per cent	per cent	per cent
1	Marine boiler-plate (shell)	0.255	0.110	0.038	0.028	0.742	98.827
2	Marine boiler-plate (combustion chamber)	0.152	0.019	0.035	0.039	0.601	99.154
3	Locomotive boiler-plate (not exposed to flame)	0.190	0.008	0.044	0.042	0.529	99.187
4	Locomotive boiler-plate (exposed to flame)	0.148	0.024	0.039	0.022	0.562	99.205
5	Forging (Class B)	0.286	0.123	0.019	0.035	0.662	98.875
6	Forging (Class C)	0.411	0.127	0.014	0.032	0.727	98.689
7	Locomotive axle	0.364	0.121	0.023	0.020	0.774	98.698
8	Wagon axle	0.428	0.112	0.031	0.018	0.558	98.853
9	Bull-head rail (Basic Bessemer)	0.449	0.044	0.032	0.031	0.814	98.630
10	Bull-head rail (Acid open hearth)	0.643	0.039	0.030	0.031	0.648	98.609
11	Tram rail	0.520	0.038	0.060	0.046	0.817	98.519
12	Tire (Class C)	0.739	0.347	0.030	0.028	0.720	98.136
13	Nickel-chrome for automobile parts	0.335	0.245	0.031	0.027	Nickel = 2.630 0.666 Chromium = 0.483	95.583

TABLE 2—PRINCIPAL FIGURES OF THE TENSILE, IMPACT AND HAND-BENDING TESTS

			TENSILE											IMPACT (average of 3 test-pieces)					HAND BENDING (average of 4 test-pieces					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Item Number	Type of Steel	Carbon Content	Size of Test-piece	Elastic Limit	Yield Stress	Breaking Stress	Elongation Percentage in					Contraction of Area	Fracture	Cross-section of Test-piece	Energy Absorbed	Elongation in 2 Inches	Contraction of Area	Fracture	Cross-section of Test-piere	Number of Bends	Bending Effort		Energy Absorbed	Fracture
							2 ins.	3 ins	5 ins.	8 ins.	10 ins.										Initial	Maximum		
		per cent	ins.	tons per sq. in.	tons per sq. in.	tons per sq. in.						per cent		ins. diam.	ft.-lb.	per cent	per cent		ins.		lb.-ft.	lb.-ft.	ft.-lb.	
1	Marine boiler-plate (shell)	0.255	0.358	16.0	16.8	32.1	30.5	....	....	....	....	56.4	Silky	0.357	513	34.4	57.0	Silky	0.375	31.1	44.8	51.2	2380	silky trace granular
			1.50 × 1.28	16.6	17.7	31.1	57 0	46.0	37.2	30.9	28.0	54.9	Silky											
2	Marine boiler-plate (combustion chamber)	0.152	0.358	16.4	17.2	26.7	34.2	....	....	....	....	58.4	Silky	0.356	460	39.2	61.1	Silky	0.375	34.2	33.3	44.7	2210	silky and granular
			2.00 × 0.875	17.3	18.7	26.9	54.0	44.0	34.4	27.7	24.9	54.1	Silky											
3	Locomotive boiler-plate (not exposed to flame)	0.190	0.358	15.2	15.6	28.6	32.0	....	....	....	....	54.5	Silky	0.357	440	35.0	56.7	Silky	0.375	29.5	32.0	45.0	1960	silky and granular
			2.00 × 0.500	14.2	14.9	28.0	49.0	40.7	33.4	28.5	26.3	47.5	Silky											
4	Locomotive boiler-plate (exposed to flame)	0.148	0.358	13.9	14.5	25.3	36.7	....	....	....	....	62.4	Silky	0.357	467	39.7	61.7	Silky	0.375	42.9	28.2	40.7	2500	silky and granular showing fibre
			1.50 × 0.57	13.0	13.9	26.0	52.0	45.0	37.8	31.8	29.2	55.8	Silky											
5	Forging (Class B)	0.286	0.357	17.7	18.3	33.2	32.0	....	....	....	....	59.0	Silky	0.358	524	35.1	59.6	Silky	0.375	41.3	39.8	51.0	3020	silky and slightly granular
			0.798	17.9	18.5	32.9	42.0	34.0	26.7	....	....	56.6	Silky											
6	Forging (Class D)	0.411	0.357	21.6	21.9	40.9	23 5	....	....	....	....	49.0	Silky	0.357	424	24.2	50.3	Silky	0.375	24.5	49.1	58.0	2140	silky and fine granular
			0.798	19.6	20.0	39.6	31.5	26.7	21.2	....	....	42.6	Silky											
7	Locomotive axle	0.364	0.358	18.4	18.4	37.6	27.2	....	....	....	....	51.5	Silky	0.357	503	30.2	52.7	Silky	0.375	28.2	43.0	54.8	2380	granular and silky
			0.798	16.1	16.3	36.8	34.5	28.5	....	....	....	43.6	Silky											
8	Wagon axle	0.428	0.358	20.2	20.9	39.3	21.5	....	....	....	....	34.6	85% silky 15% gran.	0.358	408	23.7	38.0	70% silky 30% granular	0.375	12.2	50.0	58.0	1120	granular, two specimens, 30% and 15% crystalline in centre
			0.798	15.9	17.0	37.4	24.0	20.7	....	....	....	27.4	35% silky 65% gran.											
9	Bull-head rail (Basic Bessemer)	0.449	0.358	18.3	18.4	39.1	26.5	....	....	....	....	40.6	Silky	0.357	535	28.9	40.7	Silky	0.375	19.5	48.0	59.0	1660	silky and granular
			0.798	19.3	19.6	42.1	29.0	24.7	19.2	....	....	39.2	75% silky 25% gran.											
10	Bull-head rail (Acid open hearth)	0.643	0.357	25.0	31.2	50.8	16.5	....	....	....	....	26.0	35% silky 65% gran.	0.357	460	19.2	27.3	50% silky 50% granular	0.375	8.9	63.0	72.5	1010	granular and 40% crystalline
			0.798	21.3	22.2	48.5	19.0	16.5	13.4	....	....	22.2	25% silky 75% gran.											
11	Tram rail	0.520	0.357	25.7	26.0	48.9	19.5	....	....	....	....	36.0	70% silky 30% gran.	0.358	492	24.1	38.9	Silky	0.375	14.0	62.5	72.0	1540	fine granular
			0.798	22.2	23.0	47.5	26.2	22.7	18.2	....	....	33.6	40% silky 60% gran.											
12	Tire (Class C)	0.739	0.358	24.6	25.9	56.6	14.7	....	....	....	....	20.8	12% silky 88% gran.	0.357	399	15.9	16.7	granular trace silky	0.375	5.1	74.0	81.7	670	fine crystalline
			0.564	25.0	25.6	53.7	16.5	....	....	....	....	22.0	5% silky 95% gran.											
			0.798	25.9	26.8	54.7	16.2	15.0	12.6	....	....	17.0	2% silky 98% gran.											
13	Nickel-chrome for automobile parts	0.335	0.358	38.6	39.8	50.6	21.5	....	....	....	....	65.3	Silky											
			0.798	41.2	42.0	51.6	31.0	23.7	17.2	....	....	63.8	silky nickel flake	0.357	486	22.9	63.0	Silky	0.375	30.2	72.2	78.9	3240	fine silky with velvety look, bird's-mouth shape

TABLE 3—COMPARISONS OF THE VARIOUS TESTS

		COMPARISON OF STRENGTH. REPEATED BENDING AND STATIC TENSILE				COMPARISON OF DUCTILITY				COMPARISON OF ENERGY ABSORBED PER CUBIC INCH—FOOT-LBS. PER CUBIC FOOT						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
							Ratio of No. of Bends, Col. 21, Table 2, to:			Static Tensile						
Item Nos.	Types of Steel	Breaking Stress Calculated from Impact Test	Ratio of Col. 3 to Tensile Breaking Stress	Initial Bending Effort to Yield Stress, Col. 22 Divided by Col. 6, Table 2	Maximum Bending effort to Breaking Stress, Col. 23 Divided by Col. 7, Table 2	Extension Standard Tensile in Gauge Length 4 √A Inch Per Cent	Extension Col. 12, Table 2	Contraction of Area, Col. 13, Table 2	Product of Extension by Contraction Area, Col. 7, T. 3 × Col. 13, T. 2	Small Test-Piece	Standard Test-Piece	Impact Tensile	Ratio of Col. 13 to Col. 11	Repeated Bending Test	Static Tensile in Region of Maximum Disturbance	Ratio of Col. 15 to Col. 16
		tons per sq. in.														
1	Marine boiler-plate (shell)	39.9	1.24	2.53	1.65	34.5	0.89	0.57	1.64	1510	1490	2560	1.70	16500	8300	1.99
2	Marine boiler-plate (combustion chamber)	31.4	1.18	1.78	1.66	34.0	1.01	0.63	1.85	1470	1280	2300	1.56	15300	6920	2.22
3	Locomotive boiler-plate (not exposed to flame)	33.7	1.18	2.15	1.61	35.5	0.83	0.62	1.75	1430	1350	2200	1.54	13600	5810	2.34
4	Locomotive boiler-plate (exposed to flame)	31.5	1.25	2.03	1.56	40.5	1.06	0.77	1.90	1460	1420	2335	1.60	17400	7400	2.35
5	Forging (Class B)	40.0	1.21	2.15	1.55	34.5	1.20	0.73	2.11	1660	1480	2620	1.58	21000	9000	2.33
6	Forging (Class C)	46.9	1.15	2.45	1.46	26.5	0.92	0.58	2.17	1500	1350	2120	1.41	14900	6480	2.30
7	Locomotive axle	44.6	1.19	2.56	1.49	30.0	0.94	0.65	2.15	1570	1480	2515	1.60	16500 Small tensile test piece	6230 (8340)	2.64 (1.98)
8	Wagon axle	46.1	1.18	2.84	1.55	21.6	0.56	0.45	2.06	1310	1130	2040	1.56	7760	3400	2.28
9	Bull-head rail (Basic Bessemer)	49.6	1.27	2.45	1.40	25.0	0.78	0.50	1.99	1580	1320	2675	1.69	11600	6090	1.90
10	Bull-head rail (acid open hearth)	64.2	1.26	2.84	1.50	16.5	0.54	0.40	2.43	1290	1050	2300	1.75	7000	3430	2.04
11	Tram rail	54.6	1.12	2.70	1.52	22.5	0.62	0.42	1.85	1490	1330	2460	1.67	10700	5600	1.91
12	Tire (Class C)	67.2	1.19	2.76	1.49	15.0	0.34	0.30	2.00	1250	1140	1995	1.60	4600	3170	1.45
13	Nickel-chrome for automobile parts	56.9	1.12	1.72	1.53	24.5	1.23	0.47	1.93	1850	1660	2430	1.31	22500	17810	1.26

Letters

QUERIES OF TIMELY INTEREST FROM READERS OF "THE AUTOMOBILE," INCLUDING COMPLEX RELATIONS OF FUEL AND TIMING; SOME FACTS IN RELATION TO A DANGEROUS PROPOSAL; LOOKING FOR TROUBLE IN THE MOST DIRECT WAY; RATHER POINTED QUESTIONS ABOUT IMPORTANT MATTERS; RADIATOR MAY BE OF INSUFFICIENT CAPACITY.

Will Some Expert on Leather Furnish a Recipe?

Editor THE AUTOMOBILE:

[2,342]—Will you kindly tell me in your column "Letters Interesting" what I can do to the leather of a new automobile to prevent the black from ruining one's clothing. Have tried washing with ivory soap and rubbing dry with cloths. There seems to be an unlimited supply of this black stain in the leather. I have had my car eight weeks, and by chauffeur's coat, although washed every week, is still blackened as at first. Is there not some kind of a varnish that could be put on the leather to prevent this? The men in the leather business around here cannot help me.

Bethlehem, Pa. SUBSCRIBER.

Many Fallacies in the Automobile Business

Editor THE AUTOMOBILE:

[2,343]—Is it possible for a 4-cylinder, 4-cycle engine to overheat, with water in the radiator up to the cap? Will ground flax-seed harm the radiator or engine? If so, what is the best way to clean both? Is a low-tension magneto considered as good ignition as a high tension? How can I remedy a magneto (low tension) if it does not spark on slow speed? I notice it will not run the engine as slow as batteries.

Brooklyn, N. Y. J. W. REEVE, JR.

1. An engine will overheat whether the water is up to the filler cap in the radiator or not, provided the conditions in the cylinder are such as to induce overheating, as incrustation within the combustion chamber, or if the exterior surfaces of the dome are crusted up, then, a poorly designed cylinder may heat up independent of the above situations.

2. Ground flax-seed or any other foreign matter in the circulating water should give you all the trouble you can possibly handle gracefully. If you want to keep out of trouble use pure water circulated vigorously, and run the motor so that it will deliver the least possible amount of heat to the cooling system.

3. The best way to keep a radiator system clean is to have one that will not steam, so that the water will not have to be replaced, but if it must be replenished use pure water.

4. Either form of ignition system works perfectly well if it is properly designed, well built, suitably installed and cared for.

5. Time the magneto so that it will deliver a spark more nearly retarded than you now have it. We should think it ought to spark at about 18 degrees advance for the condition you name.

Stenographers Seldom Break Into Racing

Editor THE AUTOMOBILE:

[2,344]—Please inform me through the columns of your estimable paper the best way in your estimation to become connected with the racing team of some automobile factory. I am an experienced stenographer with a good knowledge of automobiles, and am anxious to get in the racing game. Would you think it advisable for me to endeavor to secure a position as stenographer with some factory which enters cars in races and maintains a force of drivers, and from that position try to become connected with the racing end? I noticed in an issue of your paper some time ago the statement that several prominent drivers now before the public were not over 18 years old. Could you kindly give me the names of some of them, and the make of cars they are driving? R. V. L.

Washington, D. C.

The way to become a racing driver is clear to the man who has qualities as follows:

(A) An eye for judging distance.
(B) The digestion of an ostrich (steady nerves and indigestion do not go together).
(C) A bland smile in the face of acute danger.
(D) The machinist trade at the ends of the fingers.
(E) Perfect familiarity with racing automobiles.
(F) A disinclination to do other kinds of work.
(G) Lack of acquaintance with John Barleycorn.
(H) No very great use for tobacco.
(I) Regular hours.

The qualifications which do not seem to be essential to the successful racing driver may be set down after a fashion as follows:

(A) Stenography and shorthand offers no great attraction.
(B) Youthfulness so accentuated as to be classed in the 'teens is all right for a juvenile hopeful, but some racing backers have a penchant for the veteran's experience.

Ideas Drift Along Parallel Lines

Editor THE AUTOMOBILE:

[2,345]—I have been reading your articles on "Automatic Stability in Aeroplanes" with very great interest. It seems to me that an end portion of the wing of an aeroplane could be so hinged that it would remain on the same level as the rest of the wing unless raised or lowered by a greater or lesser wind pressure. This movement would be arranged to tip the ailerons in such a way as to lower or raise the side struck by the wind, just according to whether the wind created a vacuum or the opposite, and thus maintain the stability of the machine.

A WOULD-BE INVENTOR.

New York City.

This is substantially the same arrangement as was proposed by the German engineer, Robert Conrad, in the article rendered in the June 2 issue of this journal, and illustrated in Fig. 1G, except that Mr. Conrad desires to employ the differential movement of two feeler-planes, on opposite sides of the machine, and considers it most practical to make these feeler planes highly sensitive and to have them operate ailerons or other control planes indirectly instead of directly; that is, he suggests to have them indicate to the aviator how *he* should control, because the feeler-planes could not be very sensitive and do work also. But they could operate an indicator by electric contact and thus release other forces, whether the aviator's or those of an auxiliary power device. With regard to the practicability of any arrangement of this order, we would reserve judgment until the apparatus was fully designed, and then once more until it was fully tried.

Wants Particulars of S. A. E.

Editor THE AUTOMOBILE:

[2,346]—I would be very much obliged if you could tell me the character of the Society of Automobile Engineers. I would like to know the qualifications for membership, and whether they maintain a junior membership as all of the great engineering societies do. I am a young man just entering the automobile business and would like very much to take out an associate membership in the society, and at least get their proceedings regularly as they appear.

St. Louis, Mo. B. O.

The Society of Automobile Engineers has a membership of well over three hundred, consisting of the leading engineers, designers and superintendents in the manufacture of automobiles, parts thereof, accessories thereto, and raw materials therefor.

It is the policy of the society to take into its membership all men interested in any field of automobile engineering, and qualified for S. A. E. affiliation.

The qualifications for the various grades of membership are as follows:

A *member* must be 26 years of age, or over, and have been so connected with engineering as to be competent as a designer or as a constructor to take responsible charge of work in his branch of engineering, or he must have served as a teacher of engineering for more than five years.

An *associate* must be 26 years of age or over, and have either the other qualifications of a *member*, or be so connected with engineering as to be competent to take charge of engineering work, or to co-operate with engineers.

A *junior* must be twenty-one years of age or over, and have had such engineering experience as will enable him to fill a responsible subordinate position in engineering work, or he must be a graduate of an engineering school.

Application blanks and literature explaining the present activities of the society may be secured from Coker F. Clarkson, General Manager of the Society of Automobile Engineers, 1451 Broadway, New York City.

Timing of the Franklin Air-Cooled Motor

Editor The Automobile:

[2,347]—In view of the practice of the Franklin Company which takes expression in the form of an auxiliary exhaust valve at the bottom of the stroke, I am bothered with the notion that the timing of the valves will necessarily be different from timing of valves in conventional types of water-cooled, four-cycle motors. Can you state just what the Franklin practice is?

Trenton, N. J. A. R. B.

It is the claim of the Franklin Company that about 70 per cent. of the total weight of exhaust product passes out through the auxiliary valves, so that the main exhaust valve is free to do the balance of the work; but this would not be ground for making any very considerable change in the timing of the exhaust valves and it was reported in the tests made at Sibley College, Cornell University, under the direction of Professor Rola C. Carpenter, that the timing as follows was used by Messrs. Evans and Lay in making these tests:

TIMING OF FRANKLIN AIR-COOLED MOTOR

(A) Inlet valve opened 5 degrees past center.
(B) Exhaust valve closed 12 degrees past center.
(C) Exhaust valve opened on center.
(D) Inlet valve closed 30 degrees past center.

Timing Exhaust Valve with Automatic Intake

Editor The Automobile:

[2,348]—What should the position of the crank be on a four-cylinder engine with automatic intake, when the exhaust valve commences to open and when it is closed? F. W. H.

Sidney, N. Y.

The exhaust valve opening should lead about 40 degrees with the piston on the down-stroke, and it should close with a lag of 10 degrees with the piston making the suction stroke.

Efficiency Depends on Many Considerations

Editor The Automobile:

[2,349]—Will you kindly advise me through the columns of The Automobile whether or not the efficiency of a gasoline engine decreases as the number of cylinders increase. That is, will a six-cylinder engine, of the same rated horsepower as a four-cylinder, consume more gasoline per minute while turning over at the same rate of speed and developing the same horsepower, all conditions being equal? C. M. Cole.

Berkeley, Cal.

Referring to the thermal efficiency, it has been found that the 6-cylinder motor, when well designed, is capable of delivering nearly 20 per cent. of the fuel value in useful work. This high thermal efficiency has never been exceeded by a motor with a lesser number of cylinders, but there are quite a number of tests available which show a close approximation to this with 4 cylinders. This statement is limited, of course, to automobile motors of the 4-cycle type. The gasoline consumption is reflected by the thermal efficiency. It is true that poor carbureters perform badly, particularly if the number of cylinders is increased, and to some extent this situation has given the 6-cylinder motor a reputation for "drinking" gasoline.

Wants to Become Driver of a Racing Car

Editor The Automobile:

[2,350]—Will you kindly answer the following question in your "Letters Interesting." For nearly four years I have tried to become a driver of a racing car, in either a track or road race. I have had five years' experience and have driven a car on a mile track for 1 mile in 4 seconds slower than the records. Can you advise me how to secure a position as a racing driver?

New York City. C. B. M.

Grow a reputation sufficient to attract owners of racing cars. One way is to get permission to become attached to a racing team and "fag" for it without compensation until you attract notice. Another way is to buy a big racing car and enter it on the provincial circuits. This formula is a little bit high-priced.

Radiator May Be of Insufficient Capacity

Editor The Automobile:

[2,351]—I am a subscriber to The Automobile and wish you would answer the following question: I have a 1910 car and every time I use same I have to fill the radiator with water. The motor gets very warm and forces the water up and out of the overflow pipe. It makes no difference how much water I put in the radiator it will invariably empty itself down to below the top of the tubes within three miles running. Is this doing any harm to the motor, or is it natural for some cars to act in this manner? Air must get into the bottom of the radiator and lift the water up to the overflow pipe. Is there any remedy for it? I have heard that it is only a natural condition with the car, but I would like to satisfy myself thoroughly about it.

Harrisburg, Pa. R. H. Senseman.

If the motor is in good working order, that is to say, clean and is operated on an advanced spark, your trouble may be traced to an insufficient cooling system, unless perchance the circulating pump is in a leaky condition. If the motor is quite old, it is possible that incrustation is responsible for the boiling away of the water. It will be understood that the water, after it absorbs heat from the cylinder walls, must have this heat absorbed from it in turn, or the temperature of the water will increase to the boiling point. If incrustation is responsible for the trouble noted, it will be an extremely difficult trouble to overcome. It is quite impossible to be able to get at the incrusted surfaces in the radiator for the purpose of scraping the crust off, and unfortunately it will not come off by a dissolving process through the use of any chemical that will be safe to employ for the purpose. It is just possible that you have the habit of running on a retarded spark. If so, no radiator will suffice for the purpose, and the remedy lies in learning how to operate your motor properly. There is just one other point that may be responsible for your difficulty. Hot water occupies more space than when the water is cold, and you may fill the radiator to the brim, in which case after the water is heated the excess will spill out.

The Pyrometer

ITS DEVELOPMENT AND USE. BEING THE SECOND INSTALLMENT OF AN ARTICLE BY WM. H. BRISTOL READ BEFORE THE SOCIETY OF AUTOMOBILE ENGINEERS AT ITS SUMMER MEETING.

THE platinum-rhodium couple instrument which has been described may be classed as a high-resistance pyrometer in comparison with the pyrometer using a base metal thermo-electric couple.

Base metal alloys have been found as the result of many experiments which produce high electromotive forces with practically uniform increase of the same in proportion to the increase of the temperature, and which have high fusing points, and produce a uniform electromotive force after continuous use, thus meeting the commercial requirements very satisfactorily.

In practice in the treatment of steels the ranges of temperature required are mostly below eleven hundred degrees Centigrade. For this maximum range special thermo-electric couples have been selected, the thermo-electric force obtained from this couple being several times greater than that of the platinum-rhodium couple, making it possible to use an indicating instrument with jewel bearings in place of the delicate suspension galvanometer.

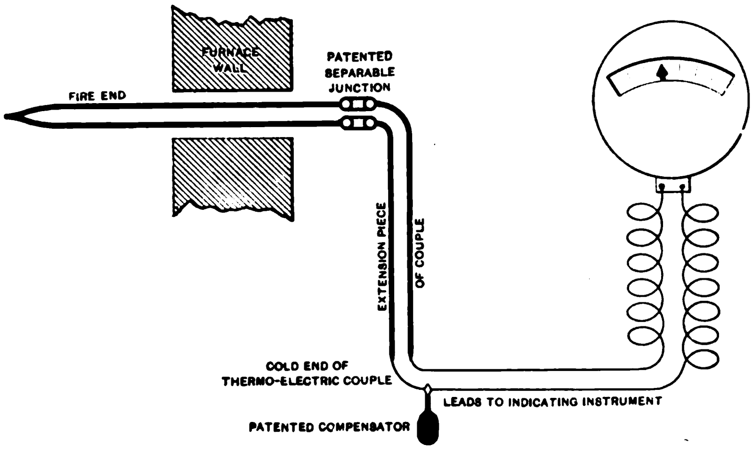


Fig. 2—Fire end of thermocouple applied horizontally through side of furnace

Couples formed of base metal alloys have also been developed for ranges above two thousand degrees Fahrenheit, but they are not capable of withstanding continuously these temperatures.

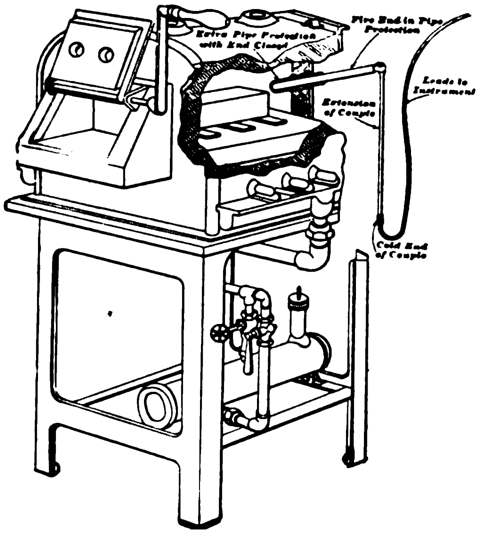


Fig. 3—Showing manner of applying fire end, with extension piece, to furnace

For convenience in comparing the extra power developed by the base metal couple with that of the platinum-rhodium couple, the table No. 2 gives the electromotive forces for the different temperatures up to 1100 deg. Cent., the figures in this table being obtained from a standard Bristol's pyrometer couple taking an average test. The upper line in the diagram No. 1 shows the curve obtained from plotting the temperatures and millivolts. It will be seen that the line is nearly straight. If the indicating arm of the pyrometer is set at 75 deg. Fahr., the average room temperature, no corrections will need to be made for the cold end, provided it is placed where the temperature is maintained at the average room temperature.

Room Temperature.—As no rare metals are used in the low resistance type of couples it is possible to employ elements of large cross-section which will not be affected in their resistance to any appreciable amount by the variation in temperature along the lengths of the elements forming the couple. It is, therefore, also practicable, in commercial service, to have the thermo-electric couple made of sufficient length to carry the cold end beyond the influence of the radiation of heat from the furnace and conduction along the thermo couple and its protecting tubes.

In practice where the thermo couple is thus extended a novel feature is that of separating the thermocouple into two parts, one which is called the fire end, and the other the extension piece, these parts being joined together as near as practicable to the point where the thermocouple passes through the wall of the furnace in which the temperature is to be measured.

The diagram No. 2 illustrates the fire end applied horizontally through the side of a furnace with the separable junction and the extension piece extending vertically toward the floor with the leads connecting to the indicating instrument.

The advantages of the separable junction will be obvious, as it makes it possible to renew the fire end of the couple whenever it is necessary, with the minimum amount of expense, and secondly it permits carrying the cold end to a point toward the floor where the atmospheric temperature will be practically uniform, and away from the influence of the temperature which is being measured.

Fig. No. 3 shows the manner of applying the fire end with the extension piece to an "American" gas furnace.

Diagram No. 4 shows a bent fire end applied to a metal bath with the separable junction and extension piece located vertically with the cold end near the floor away from the influence of the furnace.

Fig. No. 5 shows a method of applying the fire ends of thermocouples to Brown & Sharpe hardening and annealing furnaces and illustrates the separable junction and extension piece made extra long reaching over the side of the furnace and extending to the floor level away from the influence of the heat of the furnace. In the diagrams above referred to showing the application of the fire end it will be observed that a double pipe protection is represented.

The low resistance type of pyrometers are manufactured in

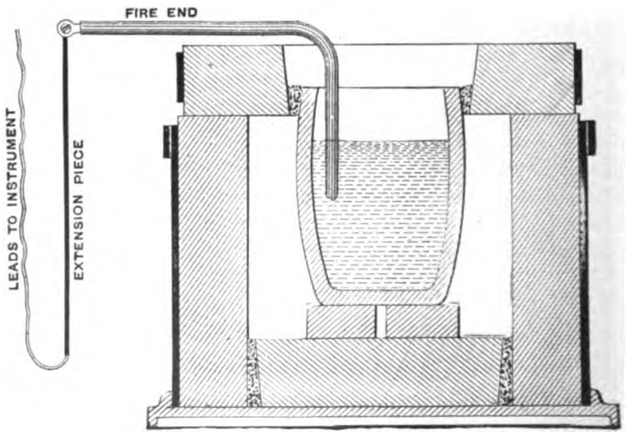


Fig. 4—Bent fire end applied to metal bath, with cold end removed from influence of furnace

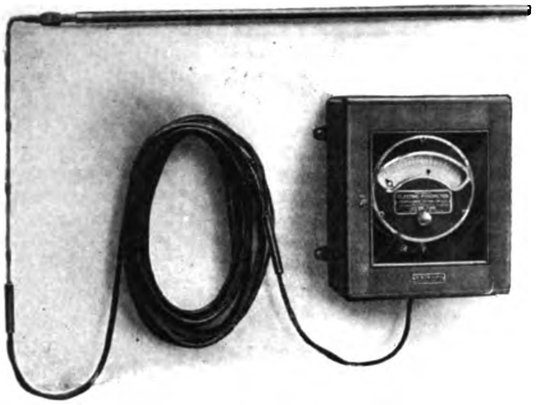


Fig. 6—Low resistance type of pyrometer with separable junction and extension piece vertical

both the indicating and the recording forms, the movements in both instances being of the pivoted type with jewel bearings, as manufactured by the Weston Electrical Instrument Company.

The leads can be made of almost any desired length so that the indicating instrument can be placed at the most convenient point for the observation of the operating attendant.

The low resistance type of instrument is illustrated in Fig. 6, which shows the fire end in a horizontal position with the separable junction and the extension piece vertical.

The details of the construction of the separable joint are shown in Figs. 7 and 8. The separable junctions joining the fire ends and the extension pieces in these illustrations are made with large bearing surfaces with double screw connections to prevent any possibility of variation of resistance at the junction, and, as will be seen by the illustrations, they are so constructed that it is impossible to incorrectly make the connection between the fire end and the extension piece.

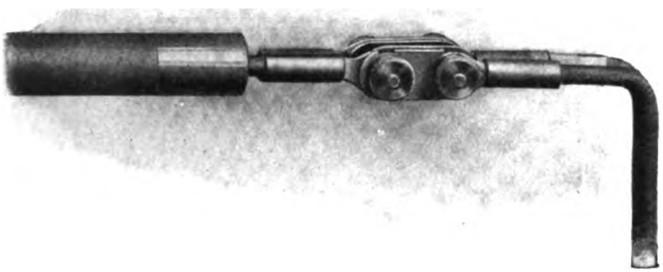


Fig. 7—The separable joint connected up, ready for use

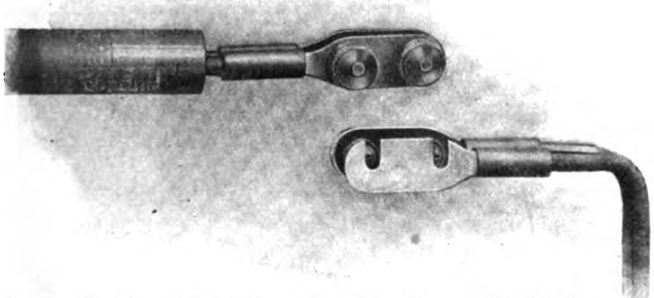


Fig. 8—Showing details of construction of separable joint

The elements forming the couple and the extension piece are independently insulated in an effective manner by winding each with asbestos cord and coating the surfaces with carborundum paint, using a solution of silicate of soda as a binder. This manner of insulation has proven very effective, especially where the fire ends are placed in iron protecting pipes with closed ends and are not moved about when they are in a heated condition.

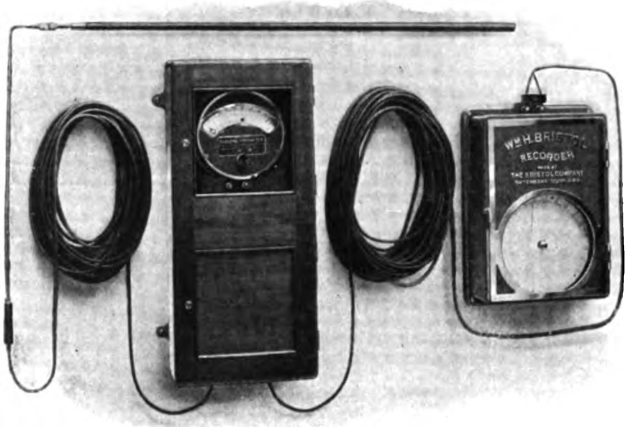


Fig. 9—Complete thermocouple outfit, with indicating instrument connected to single fire end and extension piece

Where the fire ends are applied to furnaces for continuous service a double pipe protection is generally used which can be readily renewed, thus increasing the life of the fire end.

These base metal thermocouples are comparatively inexpensive, making it practicable for a user to keep extra fire ends in reserve for checking and renewing fire ends which have been in long service.

A complete outfit showing the combination of an indicating and a recording instrument connecting to a single fire end and extension piece is illustrated in Fig. 9. This illustration shows the combination unit outfit with the fire end, extension piece and leads to indicating instrument which can be located for the observation of the operator, and also shows the leads connecting to the recording instrument, which can be placed in the superintendent's office, making it possible for the manager of a plant to have before him a continuous record of the temperatures that are being carried at any point in the works. This is a matter of far greater importance than is ordinarily supposed, and the engineer of experience will fully appreciate the innovation and the saving it makes.

(To be continued)

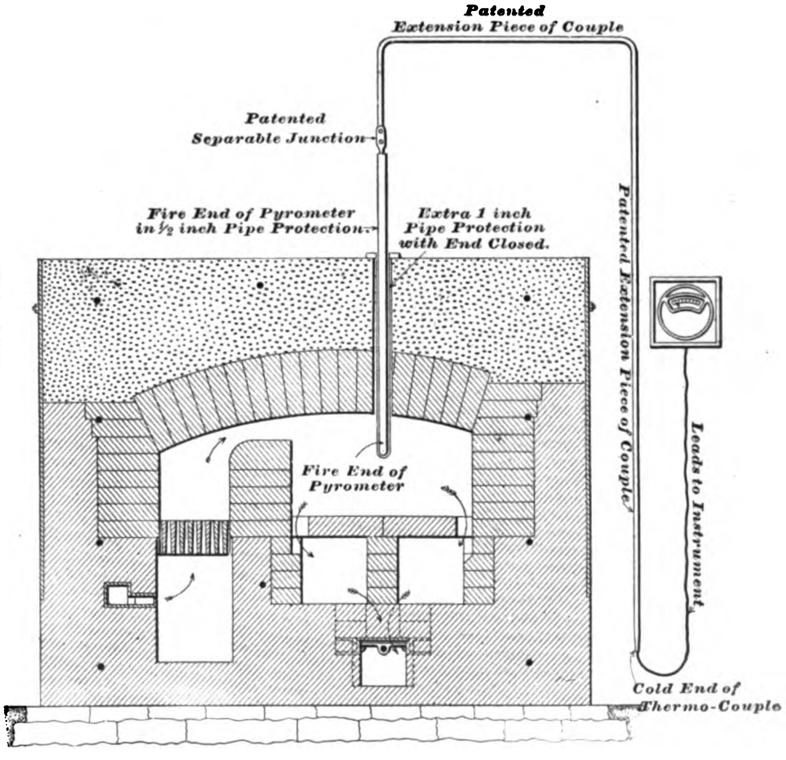


Fig. 5—Method of applying fire end of thermocouple to hardening and annealing furnace

Motor Valves

ABSTRACTS FROM A SECOND INSTALLMENT OF PAPER BY EUGENE P. BATZELL READ AT SUMMER MEETING OF SOCIETY OF AUTOMOBILE ENGINEERS DEALING WITH SLIDE, ROTARY, AND PISTON VS. POPPET VALVES

By assuming that the gas velocity remains 50 feet per second during the whole period, the inlet valve remains open after the crank has passed the lower dead center, and by further assuming a mean figure of valve opening area for this time, we can determine the maximum quantity of fresh charge which can be forced into the cylinder by gas inertia if no losses take place.

Mean valve port area for cams 1 and 2 = 0.45 square inch.

Mean valve port area for cam 3 = 0.62 square inch.

Duration of 45 degrees crank movement at 1000 revolutions per minute = 0.0075 second.

(1) Quantity of gases $50 \times 12 \times 0.45 \times 0.0075 = 2$ cubic inches.

(2) Quantity of gases $50 \times 12 \times 0.62 \times 0.0075 = 2.8$ cubic inches.

"The piston displacement being 117.8 cubic inches, these quantities constitute 1.7 per cent. and 2.38 per cent. of the piston displacement volume. These figures are the maximum possible, and they show that a late closing of the inlet valve cannot have any direct influence on the motor power. Only if the motor were choked strongly at high speed with partly closed throttle or by smaller valves so that there would be considerable vacuum in the cylinder, would the supplementary cylinder filling through late inlet closing be of direct value. The main reason for a late inlet closing is that the cam becomes of fuller shape, affecting the valve port area in such a way that the intake gas velocity is kept lower during the piston suction stroke and the quantity of fresh charge then drawn in is increased. This influence of late inlet closing on the motor power is thus indirect.

"To obtain an air velocity of 170 feet per second, without considering losses, a difference in pressure of approximately 0.25 pound per square inch is required. The difference in pressure required for an air flow (if this difference is not very great) may be found from the equation:

$$P = \frac{V^2 \times Q}{2g \times 144} \text{ pounds per square inch.}$$

where V = air velocity in feet per second, Q = weight of 1 cubic foot of air (about 0.081 pound), and g = gravity acceleration = 32.16 feet. A flow of 50 feet per second requires only about one-twelfth the pressure difference from a flow of 170 feet per second. From this it is seen that without extra resistance the vacuum inside the cylinder necessary or the gas flow is very small, but owing to the existing resistance it may amount to some pounds per square inch in motors only slightly throttled. Therefore, the curve of actual gas velocities through the valve ports differs greatly from the theoretical one, especially at the beginning of the valve opening. This actual velocity will follow approximately curve v, Fig. 2, the shape of which is merely a rational guess. At the 170 degrees crank position this curve v shows no marked difference from curves v_1, v_2 and v_3, and there may be seen also the little direct influence of late inlet closing.

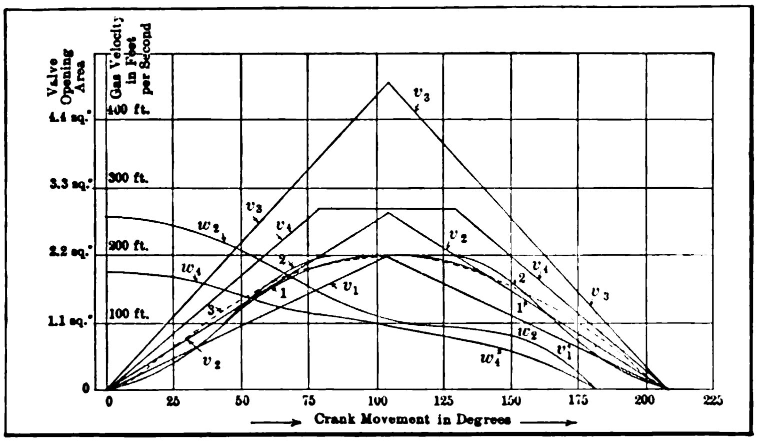


Fig. 4—Valve-opening diagrams

"From the gas velocity curves it may also be deduced that it is more important, from the standpoint of motor power, to have a quick opening inlet of small size than a slower opening inlet of large size. And it is also better to obtain a certain valve port area through large valve diameter and small lift, than small diameter and high lift. The cams for high and small lift being made of the same type, say for instance both after Fig. 1, No. 1, will have coinciding valve opening curves on the length of their straight flanks. The valve with smaller lift, but with a larger diameter, will also have a larger port area during this time and this will help to reduce the high intake gas velocity at the inlet beginning. The influence of a change in the time of valve opening is noticeable by comparing curves v_3 and v_4 of Fig. 2. Curve v_4 corresponds to cam 3 with the valve opening starting at "0" degree crank position. It represents a much lower and also much more constant gas velocity at the beginning than curve v_3; and, besides, these curves practically coincide further along. It follows that, theoretically, an early inlet opening is advantageous, and this statement is true for high speed. In practice, however, better results are sometimes obtained with somewhat later inlet openings, but if a certain long duration of inlet opening is desired, it is better to start and close early, because a too late inlet closing will result in motor power loss. The inlet valves should close before the moment when the piston in its backward stroke compresses the charge inside the cylinder to the pressure in the intake pipe. With a fairly opened throttle, and at normal speed, the cylinder at the end of the suction stroke will hardly contain more than 80-85 per cent. of a full charge. Also the amount of supplementary cylinder filling is very small under the conditions cited, and, therefore, there is no likelihood of a return flow until after about 10 per cent. of the return stroke, or nearly 45 degrees of crank movement. A lag of 30-40 degrees in the closing of the inlet valve is, therefore, not harmful in this respect. However, when the throttle is nearly closed, the pressure inside of the intake pipe will not differ much from that inside the cylinder, and then the piston in making 10 per cent. of its return stroke while the inlet valve is open will cause a part of the cylinder charge to be expelled into the inlet pipe. This results in loss of power and efficiency.

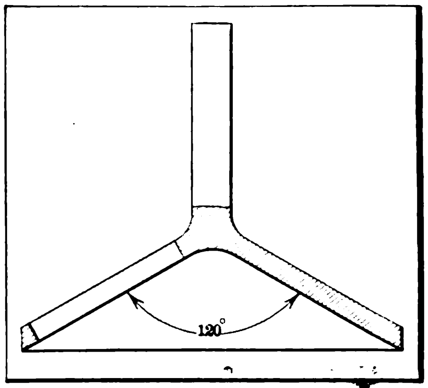


Fig. 3—Conical rotary valve

"If the compression space is 25 per cent. of the total cylinder volume, and the compression starts at 10 per cent. of the return stroke, the effect will be the same as if the compression space were 27 per cent.; but with a compression beginning at 2-3 per cent. of the return stroke, corresponding to a lag in inlet closing of 20-25 degrees, the rated compression of 25 per cent. may be figured on. Other conditions being equal, these compression ratios will result in the following compression and explosion pressures, and theoretical efficiencies:

		Explosion Pressure	Thermal Efficiency Per Cent.
Compression pressure $P_{25} = \frac{v^1}{v}^{1.35} \times 13 = 84.5$ pounds square in absolute		300	39
Compression pressure $P_{27} =$ pounds square inch absolute	76.	270	37.5
Difference	= 8.5	30	1.5

"Having thus discussed the phenomena of the inlet with poppet valves, we could now take up the exhaust in the same way. However, the determination of exhaust gas velocity is a very complicated problem. As long as the pressure inside the cylinder is higher than the pressure in the exhaust pipe we have a flow of gases through an orifice under a pressure difference. This flow depends on the physical properties of the gases, their temperatures, etc. Moreover, the flow occurs under variable pressure differences. It would, of course, be possible to construct a theoretical curve of gas velocity, but it is such a complicated matter that the results would hardly justify the attempt. Being already familiar with inlet valve opening diagrams, and assuming that exhaust valve diagrams closely resemble them, some interesting conclusions can be drawn. The exhaust velocity curve and also the curve of the pressure inside the exhaust pipe is most likely undulatory, with waves of great amplitude at the beginning, quickly decreasing. A sudden escape of gases is followed by a heavy drop in pressure inside the cylinder, which may become lower than atmospheric. This vacuum is then filled in by the outside pressure, with a certain excess pressure due to gas inertia; again the gases expand, and so forth.

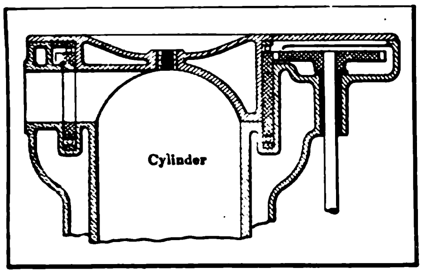


Fig. 5—Revolving sleeve valves outside cylinder

"In the case of gradually opening valves the exhaust has to begin at some point before the piston reaches its lower dead center, otherwise there would be considerable back pressure on the piston during the early part of the exhaust stroke, and consequently loss of power, the latter greater than that due to a reasonably early exhaust opening. If the exhaust begins to open early it may be more lingering. The pressure inside the cylinder at the lower dead center should be practically equal to that in the exhaust pipe.

"The exhaust gas velocity can be depicted approximately by noting the character of the inlet valve opening and supposing it to be shifted over to the right 20 or 30 degrees. An exhaust cam for 40 degrees lead and 5 degrees lag gives the maximum opening at 72 1-2 degrees after the lower dead center, or about 25 degrees before the maximum piston speed is attained. The gas velocity curve will, therefore, slowly rise from 0 degree to 72 1-2 degrees; then rise at a quicker rate to a point of maximum piston speed and gradually drop from this point to zero at the upper dead center. The smaller the gas velocity during this period the less resistance there will be on the piston. An exhaust valve giving a large, quick opening will be favorable not only in this respect but will allow also of a later exhaust beginning. The motor power can be increased by using large exhaust valves as well as large inlet valves.

"It is advisable in many cases to close the exhaust valve after the piston reaches its upper dead center, and particularly so if the exhaust valve closes gradually. At high speed there is considerable back pressure at the end of the piston stroke, and if the exhaust were closed exactly at 0 degree, the pressure line would follow an expanding curve during the piston travel and the admission of fresh charge would begin only at the end of the travel." The author went on to say: "From what has been said it can be seen that quick closing of the exhaust is preferable, with respect to the back pressure."

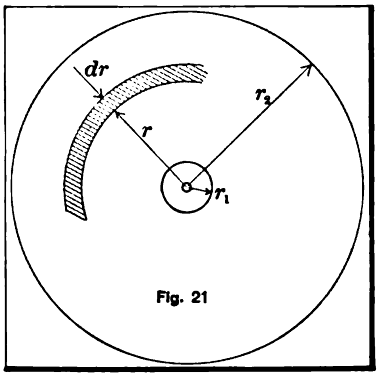


Fig. 6—Diagram indicating power required for rotary valves

As an illustration of a type of rotary valve that might be a possibility in automobile work, the old "Raymond" valve motion was referred to, and some of its qualifications from a theoretical point of view were discussed. The author failed, however, to take cognizance of the fact that the better part of a million dollars was dissipated upwards of twenty years ago to make this type of valve popular, but the project failed. As a matter of record, a 4-cylinder, 4-cycle automobile type of motor, with a bore of 12 inches and square delivered barely 50 horsepower. There were some hundreds of these motors built and the testing facilities available at the time were adequate, so that failure was largely due to the poor results obtained by this plan. It will be remembered that the smaller sizes of motors performed fairly well, but there were times when the flat rotary valve rubbing against the flat dome of the cylinder gave lubricating trouble which could only be cured in a percentage of the cases. This type of valve was modified and reproduced in THE AUTOMOBILE possibly a year and a half ago, and as was suggested at the time, the conical shape afforded larger port areas, and should perform somewhat better, as Mr. Batzell states: "A conical angle of 120 degrees (combined) affords a port area of 15 per cent. over that of the flat valve in the case taken." The conical valve of the rotary type referred to is shown in Fig. 3.

In relation to constant gas flow through rotary valves, the author plotted curves as shown in Fig. 4, stating: "The maximum valve opening is not important by itself, as the time factor also enters into the problem. In rotary valves driven at a constant speed, and with ports shaped to give the maximum possible opening area, the area of opening at any moment is proportional to the angle through which the valve has turned. The area of opening increases uniformly from the beginning of the opening until the maximum is obtained and then decreases in the same manner. The curve representing the change of this area with reference to the crank movement will be an equilateral triangle. The curve for the Raymond type of valve is given as v_1 in Fig. 4, and for the sake of comparison the curves of the

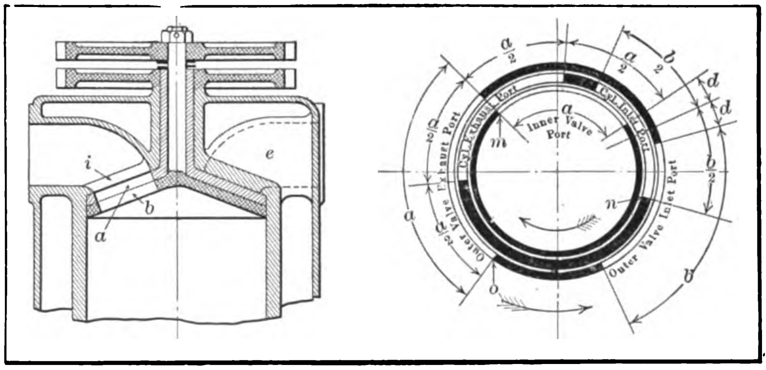


Fig. 7—Double rotary valve. Fig 8—Position at time of exhaust closing of Fig. 7 valve. Motion transferred to cylindrical for clearer understanding

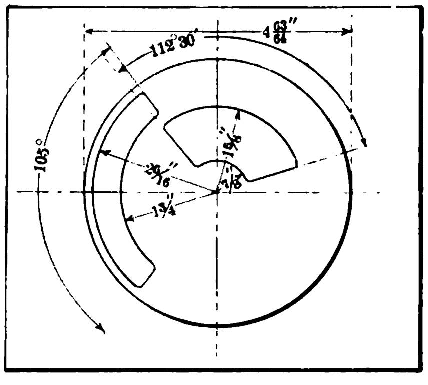


Fig. 9—Another double rotary valve construction

cams as depicted in Fig. 1 (first installment) are reproduced in Fig. 4, but all openings start at 0 degrees of crank position. (In this article the cylinders are supposed to be in the same plane as the crankshaft—not offset). It will be seen that the curve v_1 has a much smaller enclosed area than curves 1, 2, and 3. Moreover, the valve opens and closes but a trifle quicker than with cams 1, and 2; Fig. 1, and less quickly than with cam 3. The theoretical curve of gas velocity will not be as good with this type of rotary valve as with poppet valves, but the actual condition of the gas flow may be better. In poppet valves, the gas flow into the cylinder through a comparatively narrow opening offers considerable resistance. Besides, a part of this annular opening is close to the walls of the explosion chamber unless the valve is located in the center of the cylinder head, and that tends to change the flow through the valve. The paths of unequal length which the gas particles passing through the different section of the valve opening must travel further diminish the value of the poppet valve port effective area. The rotary valve, on the contrary, will allow a practically constant flow through its total area, and with small loss.

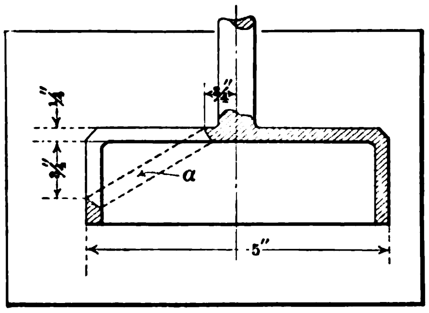


Fig. 10—Cap form of rotary valve

"The flat disc valve can be improved in respect to cylinder filling, if it can be made larger." The author points out that by having separable cylinder heads, the flat valve can be made of larger diameter than the bore of the cylinder.

Referring to the question of the power required to drive rotary valves, the author states: "The rotary sleeve, if properly made and lubricated, may consume very little power, particularly systems like Fig. 5 in which the valves are not exposed to the explosion force or to the side pressure of the piston on the other side. Systems with disc or cap valves are subjected to friction, caused by the full force of the explosion which might aid one to believe that a great amount of power is required for their driving.

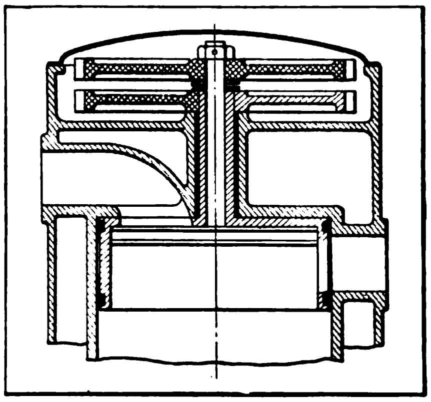


Fig. 11—Modification of cap valve shown in Fig. 10

Assuming pressure of valve against seat has a mean value of t, Fig. 6, the power necessary to overcome the frictional resistance of an elementary band of radius r and of width dr is:

$$p \times f \times 2\pi \times r \times dr \times \frac{\text{R. P. M.}}{2} \times 2\pi \times r,$$

Where f is the coefficient of friction R. P. M. are expressions in motor revolutions for a halftime valve." The author continues with the arithmetical expressions integrating between limits, r_1 and r_2, simplifying and substituting, finally arriving at the conclusion that the motor taken when developing 10 horsepower on the brake at 1,000 revolutions per minute with a mechanical efficiency of 83 per cent. with a valve friction of 0.1 consumes 0.525 horsepower in operating the valve.

Fig. 7 shows a double rotary valve. Fig. 8 is a diagram of the same, and Fig. 9 is another double rotary valve construction. In considering the power required to drive these types of valves, Fig. 7 works out on a 1.15 horsepower basis.

Fig. 10 shows a cap form of rotary valve, and Fig. 11 is a modification of this cap form of valve.

(To be continued.)

Digest

BRIEF RÉSUMÉ FROM 50 FOREIGN PAPERS; HANDLING 2-CYCLE LION-PEUGEOT MOTOR; LOUIS RENAULT MOTOR; PRODUCTION OF VALVELESS 4-CYCLE MOTORS; HIGH-VOLTAGE STORAGE BATTERIES, AND ADVANCES IN AVIATION

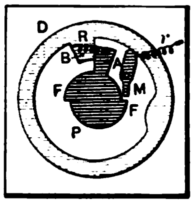


Fig. 3—Diagram of device for starting ignition with magneto in Lion-Peugeot two-cylinder V-motor

A partial description is offered of the two-cylinder Lion-Peugeot automobile motor, which is a close kin to the motorcycle of the same make, though with enlarged dimensions, and of the single cylinder, long stroke motor which was favorably noted at the recent racing meet and hill climb at Boulogne. The two cylinders are placed at a V of only 20°, and are cast in one block integral with their water jackets and with a valve-enclosing chamber. The latter is accessible through a gate at the top which may be removed by loosening a single screw. Particularly in the motocycle type of motor this arrangement serves to obviate spattering of oil from the valves and to reduce noise. A bevel gear *J* on the motor shaft *Y* drives the shaft *N* which in turn drives the camshaft *F* by spur wheels, and the cams *SS* for the exhaust and *TT* for the admission actuate the bell cranks *A* on the shaft *U*, the latter being adjustable longitudinally, as indicated in one of the accompanying illustrations, so as to reduce the compression for starting in the well-known manner by keeping the intake valve open longer than normally. The magneto and the pump are mounted on a shaft parallel with the camshaft and are rotated from the latter by means of straight spurwheels of equal size, so as to turn at the same speed. One of the connecting rods embraces the whole width of the crankpin *H* between the two internal flywheels WW, and the other connecting-rod knuckle is a simple steel ring bearing on the outside of the first one as at *hhh* in the second illustration, the relative motion of one rod to the other being so slight that only small bearing surface is required. *G* represents the inlet for lubricating oil. *L* is an end thrust ball bearing. A locking arrangement for securing and adjusting the valve springs is indicated at *d*. In order to produce ignition by the magneto *M*, without resorting to variable advance of the spark, there is mounted upon the shaft of the magneto a disk *P* which carries a lug *A* which is normally pressed strongly against another lug *B* forming part of the actuating pinion *D* (driven from the camshaft). But the disk *P* may be stopped in its rotation by a pawl *M*, controlled by the driver. In that case the pinion *D* continues to turn and lugs *A* and *B* separate, but the spring *R* tends to draw them violently together. At the moment chosen for ignition a cam fixed upon pinion *D* releases the pawl *M* and the disk *P* is then very much accelerated, until the two lugs are again in contact, but meanwhile the rupture has been produced in the magneto with great force, because the moment when the pawl released the tooth *F*, the lug *B* had already passed the position corresponding to that set for normal ignition. This device is only used for starting and when it is desired to get the advantage of fully advanced ignition. For normal travel, the magneto is permitted to cause ignition for one of the cylinders 10° ahead of the position which would be chosen for a motor with vertical cylinders, and for the other cylinder 10° behind time. But the explosions in this motor must of course take place at intervals of alternately 380° and 340°. It is made with either 75 mm. bore and 150 mm. stroke or with 85 mm. bore and 150 mm. stroke, giving respectively 12 and 16 hp. according to the rating, but in reality much more.—*La Vie Automobile*, July 2.

Drawings reproduced from a patent recently secured by Louis Renault show a cylinder *a* flared conically at the top and a valve sleeve *b* concentric with the cylinder and similarly shaped. The conical part of the sleeve is provided with four ports adapted to cover and uncover successively the induction and exhaust openings *A* and *E* in the cylinder. The sleeve in whose cylindrical portion the piston *c* travels is rotated around its axis by means of a spiral gear *e* near its bottom driven by a worm *d*, and its speed of rotation is one-eighth of that of the crankshaft. The ports 1, 2, 3 and 4 of the sleeve are spaced 90° apart (measuring on the plan projection instead of on the cone), while the induction and exhaust ports in the cylinder are offset suitably to admit of advancing the exhaust and retarding the closure of the induction. Suppose the intake opens 10° past the upper dead center and closes 25° past the lower dead center and that the exhaust opens 40° past the lower dead center and closes 5° past the upper dead center. The manner in which the mechanism will function may now be realized. The intake is open for the space of 195° and the exhaust for 225°. The compression and the explosion or expansion, during which phases of the cycle all openings must be closed, comprise 295°, and between the closing of the exhaust and the opening of the intake everything is closed for 5°. These four divisions of the full cycle of 720° must be represented on the sleeve in the space of 90°, since the sleeve turns once for eight revolutions of the crankshaft and consequently one-fourth of a revolution for the two revolutions representing a full cycle. The angle *A* representing the intake on the sleeve must then be one-eighth of 195° or 24° 22′ 30″. The angle of compression and explosion, *C* + *D*, must similarly be 295° divided by 8, or 36° 52′ 30″ and the angle of the exhaust *E* must be 28° 7′ 30″, and finally the small angle of closure between exhaust and induction must be 37′ 30″. If the ports are limited by two *radii vectores* of the cone which in plan projection are 12° apart, for example, it will be necessary to give to the opening *A* in the cylinder a width of 24° 22′ 30″ minus 12° = 12° 22′ 30″ and to the opening *E* similarly 16° 7′ 30″, and the size of the openings may be made as great as necessary by enlarging them as well as the sleeve ports radially. The exact positions of the cylinder ports are readily determined. Under the suppositions of timing assumed above, the motor functions for 715° between the moment when induction begins and the exact moment when the exhaust closes. If port 1 has uncovered the admission it is port 2 which must uncover the exhaust in the same cycle, since no other port of the sleeve can pass the exhaust opening meanwhile. The opening edges of cylinder ports *A* and *E* must therefore be a certain distance apart corresponding to the sum of 90°, which is the distance from port 1 to port 2, and 61° 15′, being one-eighth of 490°, which under the suppositions given is the distance between the beginning of the induction and the beginning of the exhaust. This places the two opening edges 151° 15′ apart, and under different assumptions with regard to the proper moments for opening and closing of the ports this would be varied accordingly, of course.

The upper part of the sleeve, it is noticed in the illustration, is provided with three grooves in which are lodged tightening rings *f* to prevent the escape of gas from or to the cylinder. In his patent Renault also secures a sleeve in which there are only two ports, in which case the sleeve will be required to rotate at one-fourth the speed of the motor. The author comments upon the advantages of the construction in securing an unimpeded path for the gases, its robustness and simplicity, and he holds that, if the ports seem small, they may be easily enlarged by lengthening the cone and reducing its angle.—F. Carlés in *La Vie Automobile*, July 23.

Only large manufacturers can see their way to go into the production of valveless four-cycle motors and this fact is becoming an additional reason for large manufacturers to go into it, apart from the merits of the type, everything being welcome which promises distinction from the small producer and doubly welcome if it is plainly in the line of mechanical progress. The difficulties of adequate production, involving high accuracy, superior materials and the possession of an elaborate equipment of intricate machine tools, become a recommendation when the eventual results are assured. Something of this view, tempered with consideration for the large majority of the members of the industry who are not prepared to make all the changes and submit to all the expenses involved in the discarding of the poppet valve, is leaking out in the European press in many devious ways and expressions scattered throughout many paragraphs and articles. The success accomplished with the Knight motor by the British Daimler company and by the Minerva company of Antwerp, Belgium, their invasion of the French market, the readiness of the Panhard-et-Levassor firm to turn out their first chassis with valveless Knight motor, this fall, and trials which show 42 hp. for a valveless motor of dimensions which could not be made to yield more than 35 hp. with the older system and the same fuel consumption, constitute facts which divide the automobile industry of Europe in two camps, one consisting mainly of the large manufacturers, who look forward to the valveless motor in some form, as a savior of distinction and price, and another comprising a much larger number in all classes who work feverishly to perfect the motor with extraordinary length of stroke or the two-cycle motor or one of the types of motor which have sprung into existence through

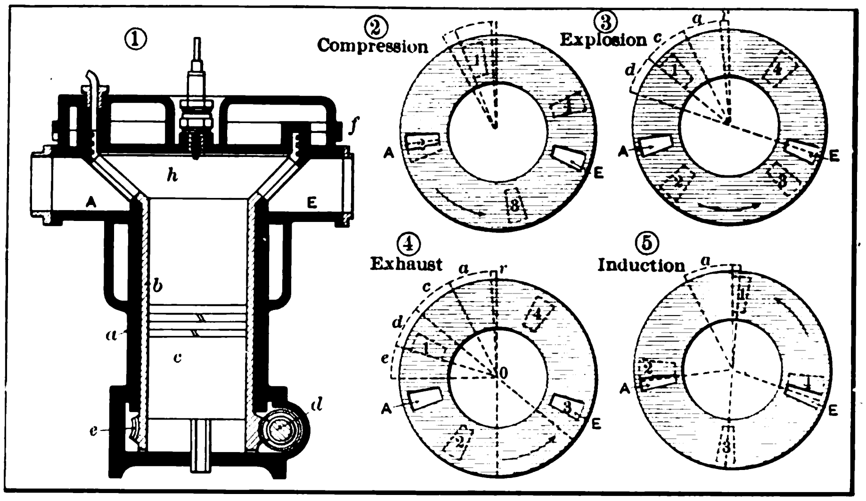


Fig. 4—Reproduction of patent drawing for Renault valveless motor. (1) Sectional view of cylinder. (2) Plan view showing position of ports at end of suction stroke. (3) When port 1 has passed the angle c, representing the compression period, the explosion will take place. (4) Exhaust to begin. (5) Suction to begin.

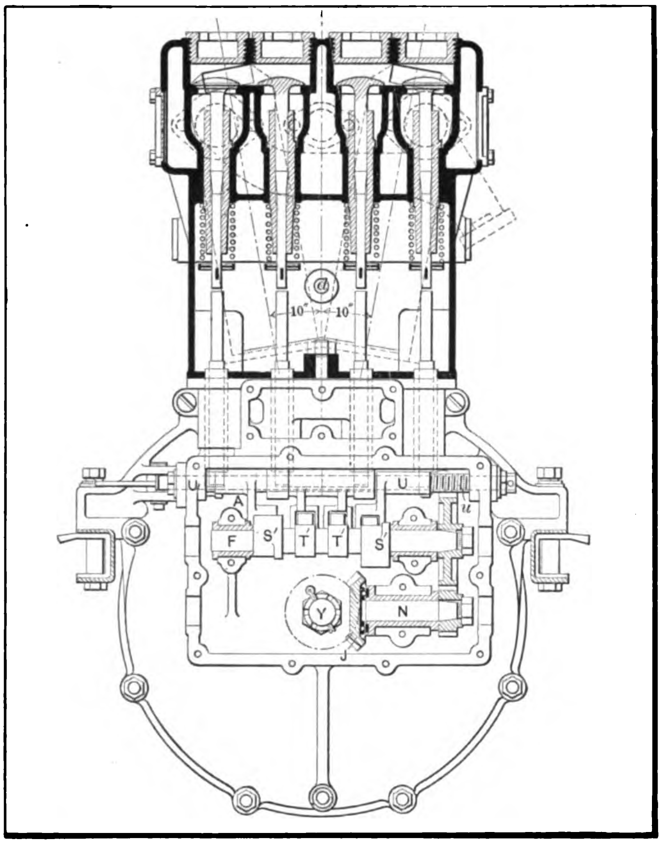


Fig. 1—Section through the valves of the 12-h.p. Lion-Peugeot two-cylinder automobile motor

the demands of aviators and promise suitability for automobiles. Among the large number of articles whose gist is given in the foregoing remarks one deals with the patents secured by Louis Renault for a valveless motor of a special type, but it is notable that the Renault firm does not yet authorize any statement to the effect that this type will be manufactured or has been found satisfactory. The fact remains that the trend is in the direction of lighter motors and the chances are that the activities of the present will lead to certain improvement before the end of the chapter.

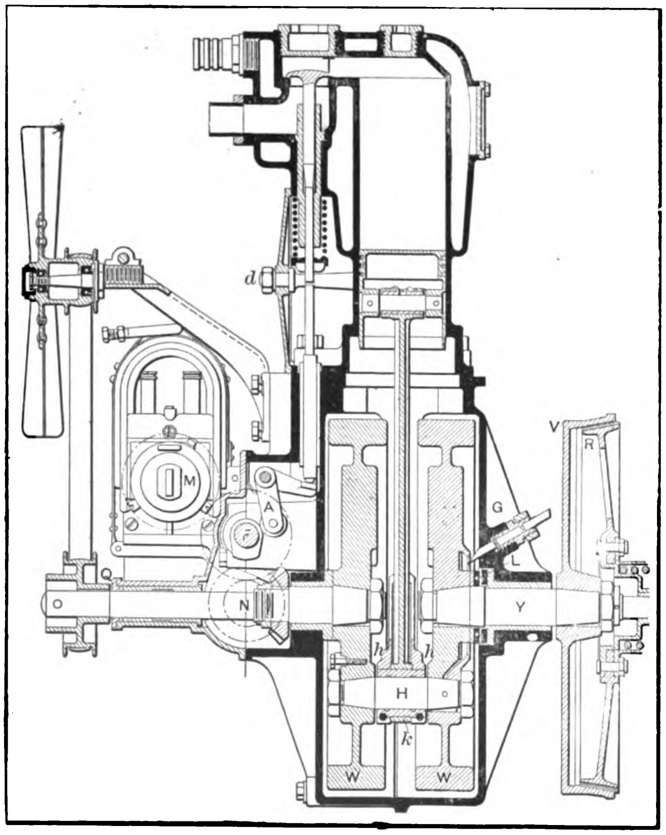


Fig. 2—Section through one of the cylinders of the 12-h.p. Lion-Peugeot motor

Ordinary electric storage batteries give but small voltage, ranging from 1.8 to 2.4 volts, and the iron-nickel batteries even less, so that it is necessary to place a large number of elements in series in order to obtain high tension. But now a high-tension element has been invented by Mr. Gross, a teacher of music at Christiania, Norway. *Elektrophysikalischer Rundschau* publishes curves representing the discharge of the first Gross element and of a subsequent improved type. The first element weighed 1-2 kilo, and was discharged at the rate of one ampere. The initial tension was 55 volts, but at the end of ten minutes this had fallen to 24 volts, after 20 minutes to 16 volts, after 30 minutes to 12 volts, after 40 minutes to 10 volts, and finally, after one hour, to 8 volts. The construction was therefore not practical. But the improved type gave better results. It weighed 2 kg., and was in the form of a cube 140 mm. (7 1-3 inches) high. The initial tension was reduced to 26 volts, but at the end of two hours of discharge the voltage was still 23. This element yielded 20 watt-hours per kilogram, being in this respect inferior to lead-lead batteries, as used in public cabs, which yield 35 watt-hours. Later information indicates that further improvements of the Gross battery have been effected, especially that the output is now superior to that of older types, while the voltage remains considerably higher. A rapid discharge battery, convenient for experimental work, may thus soon be available.—*L'Automobile,* June 25.

A remarkable flight with a monoplane which has not been recorded in the aeronautic journals took place on Saturday, June 25, last. The Belgian aviator, Gaston Goffaux, rose with the "Belgica," a monoplane of his own design, at St. Job, near Brussels, while the wind blew at the rate of from 15 to 22 meters per second (which equals a mile in 80 seconds, maximum). Terrible gusts swept the field. During the first trial, which lasted 25 minutes, the monoplane maneuvered peaceably at a height of 100 meters, without apparently being in the least disturbed by the unceasing onslaughts of the angry atmosphere. Accordingly as the aviator headed the wind or went with it, his speed diminished till it seemed the machine hung motionless in the air or, on the contrary, burst into a dizzy velocity. But its stability asserted itself so remarkably that two spectators did not hesitate to join the pilot in a second experience. One of these new passengers weighed 85, the other 100 kilos. Mr. Gaston Goffaux promenaded them around in the tempest for ten minutes at a height of 50 meters, cut out his ignition several times and took them back to the ground in gliding flight. The monoplane in question has flexible wings, and here lies, it seems, the whole secret of its tranquil resistance to the violent air currents. Its inventor has decided to fly from Ostende to London, in the first days of August. "I don't believe," adds the writer, "that I have ever written you anything which equals in importance this dry and astounding report of one flight among a thousand."—Henry Kistenmaeckers, in *La Vie Automobile,* July 16.

The thrust of an atmospheric screw propeller, whether constructed with true helical pressure surface or with the preferable curvature of 1-14 or any other curvature, is always the same for the same torque of the shaft, and tests made with a propeller *in loco* are therefore sufficient to establish its qualities. It is not necessary to undertake costly arrangements for trying it at varying forward speeds, but it is desirable to test motor and propeller together. While the rotary speed of the screw increases with forward speed, the angle of incidence against the air is at the same time reduced, and the thrust remains unchanged.—From calculations by C. Eberhardt in *"Theorie und Berechnung der Luftschrauben."*

Don't

WHEN A PATIENT IS AILING THE DOCTOR DOES NOT APPLY ALL THE REMEDIES KNOWN TO "MATERIA MEDICA" IN ORDER TO MAKE SURE OF HAVING APPLIED THE RIGHT ONE. A PROPER DIAGNOSIS IS OF THE FIRST IMPORTANCE—SO WITH AN AUTOMOBILE.

Don't be selfish; if you have had trouble with your car and the remedy you applied proved to be efficacious, be generous; take the time to tell your brother autoist how it was accomplished. THE AUTOMOBILE will furnish the means of transmission. Write to the Editor—on one side of the paper only—setting forth the facts.

Don't imagine that literature is what is wanted in a matter of this sort; facts are most in need; literature can be purchased at a book store for a small sum; facts are as scarce as chicken teeth.

Don't imagine the character of trouble that you experienced is too trivial to tell about; if it gave you a bad half-hour, then, by telling the other fellow, he will be favored.

Don't become superstitious when your motor fails to work. The patent medicine man takes advantage of just this fault in man. It is easy to imagine that one is ailing from every disease under the sun after reading a patent medicine advertisement—it may only be a hankering for a dish of ice cream.

Don't purchase an automobile without considering what it is to be used for; a banker would scarcely want to be taken to his place of business in the morning on a five-ton truck. The trouble that some autoists have is due to having selected the character of automobile that fails to accord with their needs.

Don't part with your money until you find what you want—just the right kind of a car is available somewhere—get it.

Don't forget solid gold hunting cases do not always house good watches. While it is wise to let your wife select the body, it will be a good stroke on your part to examine the works.

Don't purchase real estate without having the property and its title examined. Why go at it blindly when you put an equal amount of money in an automobile?

Don't purchase a pocketbook with your last cent. If you cannot afford a road locomotive, and the cost of maintaining it, buy the kind of automobile that will take you where you want to go every time you have to make the journey, at a cost well within your income—just such automobiles are to be had.

Don't imagine you were skinned if you find that the car you selected is not what you wanted—the salesman is not a fortune-teller.

Don't expect the salesman to drive you away from his door; he is there to sell you his make of car; not the make of his competitors.

Don't expect a runabout to go as fast as a touring car. It is prejudicial to the life of the runabout to force it to trail a touring car. Be content to drive leisurely. The scenery along the roadside is superior to the dust thrown up by the car ahead—fall back.

Don't forget to "sniff" if a salesman paints a cabbage to look like a rose. If he deceives the eyes, rely upon the nose.

Don't drug your good judgment by a "plethora" of extras on a car; what you need is a good automobile; make sure that you have the foundation even if you have to do without the extras. Lamps are used to illuminate the space ahead, not to provide the means for going ahead; the lamps will be of no use if the car is faulty.

Don't make the mistake of stopping at a saloon for gasoline; the kind they keep in such places would burn the lining out of the tank.

Don't keep a chauffeur twenty minutes after you find that you can dance a jig upon his breath. A befogged brain makes a bad steering wheel.

Don't try to overcome the ills of poor springs by running on partially deflated tires. Slow down to the speed where the springs will do the work. The tires will give out too soon if they are not kept inflated.

Don't race with other autoists on the road; you become a criminal by subjecting your automobile to criminal abuse even if you do not maim or kill a citizen.

Don't contest the right-of-way with a locomotive; when you come to a railroad crossing stop (if necessary), look, and listen.

Don't use your muffler cut-out as a means of telling the public that you own an automobile. A better way is to stand on the corner and politely inform the passers-by of the fact; be sure and clearly state the make, model, horsepower, from whom it was purchased, and the cost.

Don't look with disdain upon the fellow who elects to walk; he may be just as able to buy tires as you are.

Don't let "Financial Apaches" get away with the story that you mortgaged your home to purchase an automobile.

Don't be sarcastic. If you are able to afford a more pretentious looking car than your casual acquaintance, what of it? No man ever stole to be poor.

Don't argue with a policeman; if you take umbrage at his nationality, remember that he was not consulted; remember also that it is the law he represents—his duty is to call your attention to the defect which resides in your interpretation of the same.

Don't imagine that the Legislature made a mistake in printing the Law, making it read 30 miles per hour instead of 45 miles per hour—the printed figures are probably right.

Don't mope along the road until you come to a corner and then press the accelerator; it may be exciting to go fast on a curve, but the nights are long in a hospital ward.

Don't put a 20-horsepower horn on a 10-horsepower automobile and deceive yourself into believing that you are doing a mile a minute; remember the public; it, too, has ears and a sense of the fitness of things, even if you have not.

Don't fill your gasoline tank at night with the lamps lighted; were it not for the fact that gasoline is quick burning and energetic, the automobile would not run. The piston in the cylinder of the motor is quicker than you; it manages to get away; you may not succeed.

Don't spill as much gasoline on the ground as you put in the tank; it is not only extravagant, but it is dangerous.

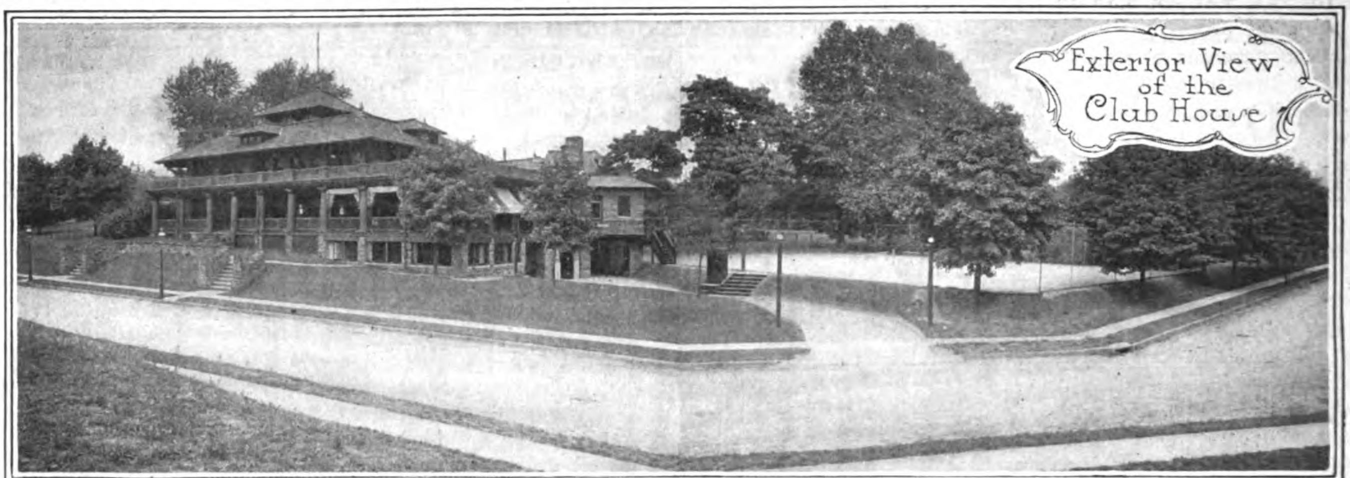
Don't think you can make an automobile go without gasoline; when the motor stops, look in the tank.

Don't reach the conclusion that a full tank is absolute assurance that the gasoline gets to the vitals of the motor; there may be a wad of waste in the piping system—as Maude Adams said, "It 'as been 'erd uv."

Don't reach the conclusion that every cell of the battery is in good order just because you find one cell to be so; test each cell; eliminate the "dead" one and be happy.

Don't neglect the auxiliary ignition system for months just because the magneto is a willing worker; even a giant is likely to catch the "grippe."

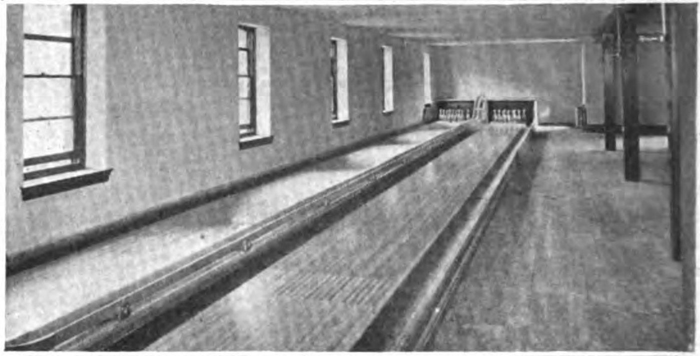
Don't press down on the starting crank; a friend of ours is now sporting a broken arm from this cause; 56 per cent. of all accidents are due to this practice. Pull up (smartly) on the starting crank; let the flywheel do the rest.



Exterior View of the Club House

Garage

Bowling Alleys



Veranda Dining Room

Robt. P. Hooper Pres.

C. H. Wheeler V. Pres.

S. B. Ferguson Sec. and Treas.

The Automobile Club of Germantown

AWAY back in the Dark Ages of motoring—in 1901, to be approximate—ten residents of Germantown, Pa., who owned automobiles, experienced a pressing need for a common garage. They were all men of wealth and prominence in business, social and professional life and when the idea took concrete form, they were not long in giving it definite expression. This expression took the shape of renting the old fire house, located on the Germantown road, and in this ancient building the members of the little syndicate housed their cars.

Thus was born the Automobile Club of Germantown, which stands unique among the automobile clubs of the United States in several particulars.

The cars owned by this little group of motorists would make a strange appearance to-day lined up in Fairmount Park or along Riverside Drive. There were expensive foreign automobiles among them, one in particular having wheels almost as high as those of a buggy; there were curious, asthmatic steam cars of types long dead; racing machines of very moderate speed as judged by the standards of to-day and generally the cars bore characteristics that have been eliminated in present construction.

In order to show how fast has been the development of the automobile since 1901, the fact may be cited that one of the first runs of the club was to Trenton, N. J., and return, a distance of about 50 miles. This was accomplished within twenty-four hours by most of the members. To-day the same run could be made in three hours, without doing anything unlawful or out of the ordinary.

But in that day the "big" tour of the Germantown motorists caused quite a little stir and really marked a step in demonstrating the utility of the automobile.

But the club was not born full-grown. It was at least two years after the period in which the fire house was rented as a garage before the members decided to add a club feature to their project. Letters to leading enthusiasts were sent by the originators of the idea and almost immediately flattering results became apparent. They were invited to ally themselves with the pioneers in an incorporation pledged to build a pretentious clubhouse and formed with the idea of making the pathway of the automobile more pleasant.

Great care was taken in selecting the members and a cast-iron limit was placed upon the membership rolls. While from the very nature of the club money was a secondary object, the financing of the whole project was done with all the skill and finesse known to the world of business. This was possible because the men who formed the club were of the most advanced types of business men and professional men.

The records of the club show that an astonishingly small amount of actual money was necessary to launch the project and from that small beginning the physical assets of the club to-day have increased to more than $60,000.

The first step in the way of progression was the acquisition of a magnificent site for a clubhouse, hard by the Pennsylvania Railroad station at Carpenter. Prescott Adamson was chosen first president of the club, which assumed the chartered name of the Automobile Club of Germantown. In 1904, the original building was completed and the club took possession. It sat upon a little hill and its walls were of rough stone. On the level of the road a cemented garage was built, occupying the whole basement of the clubhouse. The main floor consisted of a veranda running the full length of the structure, ending in a wide, open-air dining room. Inside was the lounging room, kitchen and storage rooms of various kinds and a commodious hall for dancing and social functions. Back of the social hall was a suite of rooms devoted to the ladies. These rooms were delicately and delightfully furnished and fitted with sumptuous elegance. Upstairs were the baths, billiard and pool rooms, directors' room and the living apartments of the chef.

Back of the building the club installed tennis courts of perfect construction.

For several years these quarters and arrangements were adequate, but last year it became apparent that the club would have to have more room. This was supplied by an addition to the clubhouse which has recently been completed at a cost of about $15,000. The addition gives the club one of the finest bowling alleys and billiard rooms, similarly situated, in the country. It enlarges the culinary department, so that the eyes of Jules J. Dirac, the major domo and master of ceremonies, shine when he discusses them. It increases 100 per cent. the garage facilities; doubles the bathing accommodations and brings the clubhouse plant right up to the minute in every convenient way.

The building as it stands to-day is vastly larger than it appears. It is 180 feet deep by 125 feet long, and every detail has been supplied with the idea of accommodating its members.

Mr. Adamson was re-elected to the presidency after his first term and was succeeded in office by Thomas B. Prosser, who served two years. Then Robert P. Hooper was chosen head of the organization and for three years he has conducted the administration of club affairs.

The organization, as noted, has several unique distinctions. Its object, according to its constitution, is "to maintain facilities for the sport of automobiling and other innocent or athletic sports and for the purpose of maintaining a club for social enjoyments and for the development of social intercourse."

From September 15 until after Ash Wednesday the clubhouse is the scene of social activity several times each week. The cuisine has gained a name for itself, and at this time, when a majority of its members are traveling or enjoying recreation abroad or at American summer resorts, the memorandum book of Mons. Dirac contains numerous orders for formal dinners to be given next winter. The ladies take advantage of the facilities offered by the club, and bridge parties, luncheons, dinners and dances are being scheduled now for the coming season.

The Automobile Club of Germantown is the only organization of its kind that has a bona-fide "waiting list," as far as data at hand shows. Applicants whose names have been favorably acted upon by the governors are obliged to wait until a vacancy exists before being received into full membership. As a result, it means something to belong to the club.

While the club is a negligible quantity so far as racing and hill-climbs and contests are concerned, it is a power in other ways. Its roster contains the names of men whose membership spells power and progress. It works through the Pennsylvania Motor Federation in State-wide matters of importance to motordom, but takes small part in the administration of such matters. It is said of the Automobile Club of Germantown that when it comes to the important matter of settling the bills or providing finances for big matters touching close to the heart of the pleasure of motoring, its position is unassailable. When a job of sign posting has been done or when the legislative committee of the State body wishes to push some important legal matter, the Germantown organization always "comes to the front handsomely."

Now as to the details of the club: The garage has space for forty-eight automobiles and there is a waiting list for such space as "long as one's arm." The club goes in for billiard and pool tournaments, tennis matches and tournaments, bowling and various other contests outside of motoring. Its list of honorary members includes the names of the clergymen of Germantown, who frequently take advantage of the club privileges.

Aside from Mr. Hooper, who is president of the club and who says that after the current year, when his term expires, he will retire to a plain membership, the officers of the club are as follows: Vice-President, Clifton H. Wheeler; secretary and treasurer, Stephen B. Ferguson; chairman of the house committee, Dr. Edward F. Kamerly; garage committee, William R. Harper; automobile affairs and entertainment, Clifton H. Wheeler; membership, Stephen B. Ferguson; bowling, W. T. Betts; billiards and pool, Dr. Herbert P. Fisher; tennis, James Poole Hooper, and good roads, Charles H. Thompson.

Robert P. Hooper is also president of the Pennsylvania State Motor Federation and several of the officers of the club are active in its councils.

Coming Events in the Automobile World

Dec. 1............Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 16-21, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4. 11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11, '11.Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill Climbs, Etc.

Aug. 16-27.......Munsey Tour.
Aug. 23..........Cheyenne, Wyo., Track Meet.
Aug. 26-27.......Elgin, Ill., Road Race, Chicago Motor Club of Chicago, Ill.
Aug. 31..........Minnesota State Automobile Association's Reliability Run.
Aug. 31-Sept. 8..Kansas City, Mo., Reliability Run, Auto Club of Kansas City.
Sept. 2-5.........Indianapolis, Ind., Speedway Meet.
Sept. 3-5.........Run and Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 7-10........Buffalo, N. Y., Reliability Run, Auto Club of Buffalo.
Sept. 15..........Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.

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AMONG communications from autoists, as they come to the Editor from time to time, there are quite a number of the character that indicate more or less dissatisfaction. Some of them speak unkindly of two-speed transmission systems, but we note that they hail from mountainous districts, which rather goes to indicate that the purchasers themselves were lacking in judgment. Every purchaser should know that there is no sense in going to the expense of placing a transmission gear in an automobile if it is not there for a purpose. No automobile should require a transmission gear on a level hard road; the flexibility of the motor should be sufficient to permit of running the car fast or slow at the will of the driver under all hard road conditions.

* * *

WHEN the road becomes soft, or the grade exceeds 1 or 2 per cent., the flexibility of the motor begins to peter out and the necessity of the transmission gear arrives. Just how many speed changes are necessary under bad road conditions depends upon how bad the road is. It would be an error in judgment in all probability to attempt to brave Pike's Peak in a small car fitted with a two-speed planetary gear. Would this be the fault of the planetary gear, or should the difficulty be charged up to Pike's Peak? It is scarcely to be expected that anything would be gained by attaching the blame to either the planetary gear or Pike's Peak, nor can the purchaser evade the consequences.

IF it is an error in judgment to attempt too much with a runabout, the only remaining question is whose judgment is at fault? Common law presents the dictum "Let the buyer beware" (*Caveat Emptor*). Every business man acting in his normal capacity understands this legal situation perfectly. Why should he disregard this basic principle in law when he goes forth to select an automobile for his own use?

* * *

NOTHING thus far set down can be construed as giving the seller the right to perpetrate a palpable fraud. Misrepresentation of the deliberate and premeditated sort is not authorized by law, but failure to point out incapacity for the purchaser's service cannot be construed as misrepresentation. The vendor, in offering a machine, necessarily takes into account the character of machine he has to sell, nor can he be expected to waste any time upon the vendee's question of service, unless he sees fit.

* * *

THE most successful companies in the world are numbered among those which do take the greatest possible interest in the ability of their wares in service, and the absolutely gilt-edge commercial companies positively refuse to permit their wares to go out without knowing what they are to be used for, or without knowing whether or not they will serve properly in that service. This policy works out in the automobile business just as it does in other commercial pursuits, and in the long run when the roll call of the survivors is concluded it is not believed that there will be one among them if its policy is based upon *Caveat Emptor*.

* * *

ONE of the points brought out at the Summer meeting of the Society of Automobile Engineers referred to the "cold end" of the pyrometer as used in heat treatment work. If indications are reasonably conclusive, the chances are that quite a number of those who rely upon pyrometers for the proper determination of heat-treatment temperatures neglect to maintain the cold end of the pyrometer at the melting point of ice (0 degrees centigrade). In the article on pyrometers now running in THE AUTOMOBILE it is clearly indicated that failure to maintain the proper temperature of the cold end results in the maluse of the instrument.

* * *

IN attempting to get away from the so-called "rule of thumb" practice of the old line shop man, it will be well to substitute something more accurate than that due to experience. The old-fashioned manipulator of the heat treatment equipment has a keen eye, and he makes up in cleverness for the defect in his empirical method. Substituting a pyrometer, if it is not properly employed, constitutes the most direct method by which a poor result may be obtained.

* * *

IT will be a step in the right direction if the various makers of automobiles will afford to their engineering staff an opportunity, including the necessary time, to become thoroughly acquainted with the instruments of precision they are supposed to employ in their regular work, the pyrometer being but one of the number.

Economics

DEALING WITH THE FUTURE PROSPECTS OF THE AUTOMOBILE INDUSTRY, DISCUSSING NEW FIELDS AND MORE THAT HAVE BEEN BUT POORLY WORKED, IF AT ALL

DESPITE the pessimistic views of those who least understand the automobile business, but have the most time available for its discussion, the future of the industry is on a settled basis. There are dozens of fields that are crying for attention. Moreover, it will be some time before the makers of automobiles will have an opportunity to work into the newer fields. Take, for illustration, the question of fire department equipment. Every fire department in every city and town in the land will adopt the automobile sooner or later, and the only reason they have not done so up to the present time is because they could not get the equipment.

* * *

WHEN a fire breaks out its automatic progress is picturesquely startling, and the amount of damage a first-rate fire will do in a short time greatly exceeds the rate at which money can be drawn out of a bank by a panic-stricken mob of depositors. It is a little difficult to quench the thirst of a depositor for his money in the face of a panic, but a fire responds to prompt application of stout streams of water. It will be understood, however, that promptness is of far greater virtue than water when a fire is to be quenched, and the automobile type of fire-fighting equipment is conspicuous for its ability to serve with dispatch.

* * *

IT is a matter of absolutely no consequence as to the first cost of the fire apparatus; the sole argument worth taking into account has speed for its foundation. Automobile fire apparatus is inherently endowed with speed, nor is it less capable in the measure of the streams it will throw when the scene of action is reached.

* * *

AUTOMOBILE makers are not waiting for municipalities to awaken to the virtues of automobile fire-fighting equipment; the reverse is true. Enlightened municipal officials are doing their best to procure the equipment; they will have to wait until automobile makers have time to produce it. Fire Commissioner Waldo, of New York, having investigated the virtues of the automobile type of apparatus, endorses it in all its phases, going the length of stating that gasoline underbids oats when it comes to cost. Announcing that bids will be advertised for a quantity of automobile fire equipment, the most progressive Fire Commissioner that the City of New York has honored for a long time expresses the hope that every engine house in the "Five Boroughs" will soon be equipped with automobile fire-fighting apparatus.

* * *

ALL the fire departments in the land, were they to be equipped with automobile apparatus, would fall far short of the necessities if the automobile business is to continue and prosper. The value of the equipment required for Greater New York, for illustration, might be put down as $100,000,000, which is a comfortable sum, but small, as the automobile business is measured. If fire departments are efficient to the extent that they save property, they are no less valuable to the community at large than the equipment employed in the cleaning of streets. The mortality in a great city is only kept down by everlasting vigilance and municipal cleanliness, which calls for efficient equipment.

* * *

THIS field, from the automobile point of view, is virgin, but it is large, and fortunately for the makers of automobile equipment, the contractors who handle this class of work are under the influence of the opiate which is extracted from lack of knowledge. When these contractors discover that they can do more and better work at a lower cost, using automobiles, than they can in the old way, the automobile industry will have at its disposal a coterie of willing purchasers, who will look upon automobile salesmen as mere obstructionists.

* * *

MUNICIPAL work is by no means the basis for the substantial outlook of the automobile industry. It may not be generally understood, for instance, that 25,000 tons of coal are handled daily in the City of New York by automobiles; there is no telling what the demand will be when contractors in general become acquainted with the facts as they are.

* * *

FORTUNATELY, inertia must be overcome before the demand will spread and become general, but it is a pitiable sight to call at the training camps of the army, there to observe that transportation is scarcely different from that which obtained with Grant in the Wilderness. But the army mule will have to go, although it is possible that the situation will not become acute until the mule's friend is placed securely upon the retired list. So far as the automobile business is concerned there is no hurry at all. Besides, the mule régime in the army has been one of conspicuous and honorable service.

* * *

IN the meantime, foreign armies are taking very kindly to automobile forms of transportation, and headway is being made at a rapid rate, now that immature and foolish ideas are being eliminated. During the creative stage the men who had charge of this class of work, although they knew that horse-drawn vehicles were incapable of supporting armor-plate, did not have the sense to understand that automobiles are substantially in the same fix. The natural inference was that automobile trains for army work would fall short of the best requirements, as measured by the standards of the day, unless they could be made bomb-proof, although the men who established the standards made no attempt to state how they would fasten armor to horses and obtain result.

Communications

AT THE CROSSING OF THE WAYS BY AN OBSERVER; WANTS TO AIR A GRIEVANCE; TAKES UMBRAGE AT A HALF-BAKED PLANETARY GEAR; MAN WANTS TO BECOME A CHAUFFEUR, ETC.

At the Crossing of the Ways.—Pedestrian was angry. The bluecoat ruler of the traffic has whistled when Pedestrian was in the middle of the crossing. The taxicabbies and chauffeurs had driven ahead as if Pedestrian did not exist. He had been obliged to jump to reach the sidewalk and his dignity was ruffled; in fact, he was red in the face and trembling with rage. "The pack of ruffians," he mumbled audibly, including the bluecoat and the whole automobile world in one sweeping glance of denunciation.

The man who conducts an automobile is not always highly considerate. But he bears comparison smilingly with the high-perched teamster whose quids and invectives hit where they may, with the wanton spitter from rear platforms, with the hustler of packing boxes and with many others whose ready insolence springs from the possession of tools that may be turned into arms as deadly as the automobile. Even in a round-up of policemen and chauffeurs it may be doubtful if there would not be as many polite ones among the latter as among the guardians of peace who draw pay for being helpful.

Pedestrian himself, when his rage brims over, intimates what *he* might do to help the situation if he were equipped with means for holding his own against the superior momentum of the offenders. Moved with compassion for manufacturers of whips who have lost much trade since the automobile came in vogue, he might unite with himself and form a society for the popularizing of the combined walking stick and *chambrière,* or he might prefer the rawhide dog whip, and whenever a cocksure driver of the hated automobile threatened his ambling leisure he, too, would draw arms, presumably. Oh, but what a smarting slash would mark the cheeks of that chauffeur! Or, Pedestrian with a real grievance, and studying for vengeance and prevention, might discover that shining little steel pellets, exact spheres within 1-500 of one inch, though not good enough for automobiles, may be bought for 30 cents per thousand and, handy from the pocket, would make excellent missiles, carrying a message of chastisement to the facial cuticle of his foes. A *corpus delicti* would be almost as hard to find as an absconding witness in a political trial.

Between retaliation in kind and religion in spirit the resources of Pedestrian are by no means exhausted. Philosophically he may set himself the task of deciding which end of his dilemma will cause the lesser amount of vexation. Then, too, he may follow the example of the intelligent Sarah Bernhardt, who as early as 1900 detested automobiles and forthwith mortgaged her next performance and bought a car for the proceeds. She was as wise as Mohamet who went to the mountain when it would not come to him.—Observer.

Wants to Air a Grievance.—As you appear to be entirely willing to discuss any questions your readers bring up, I will air my grievance. Will some one kindly explain why it is that although the manufacturers of motor cars keep on steadily improving their machines in every other way, none of them ever think of improving the pan under the engine, but continue to use the same pattern of mud pan as Nebuchadnezzar used on his chariot? Of course. I cannot swear that every machine manufactured is deficient in this respect, but every one I ever had any experience with is the same way—a roughly and poorly constructed sheet of sheet iron fastened on with hooks or clips, there being only one job on earth harder than removing it, and that is getting it back on again. As for the pan on my own car, I couldn't express my opinion in language fit to go through the mail. A number of these monstrosities get bent all out of shape by the time the car has been run two or three thousand miles, and scrape against the flywheel or other parts of the motor. It always looks to me as if this was a place that they were compelled to cover in some way and were at a loss to know how to do it and accordingly were obliged to let it go through with the first makeshift device that came to hand.

I don't know about the auto users in general, but for my part I would gladly pay a little more money on my next car and get a part constructed to fit its place in this section of the car instead of a thing resembling a piece of tin roof after a bad fire. There does not seem to be any reason why the pan cannot be constructed to retain its shape, either by making it of inflexible material or building it over a light, stiff frame, and also to make the front portion of it to fit into grooves or over lugs so that it may be put back into position without the aid of a surveyor and a crowbar.

This may seem like a silly kick, but I feel sure that there are plenty of people driving cars who feel the same way about this as I do, and I do sincerely believe that in at least fifteen makes of machines, and probably others, there is a pan provided that ought to be legislated against.—R. W. McDowell.

Takes Umbrage at Half-Baked Planetary Gear.—Will you allow me a little space to record the very low opinion I hold of some planetary gears?

I have often wondered why makers put some of these contemptibly inefficient gears in automobiles costing so much that the extra cost of good gears would not increase the cost of the car more than 5 per cent. Some makes are different, and give satisfaction; but I have one of those cars whos surname might well be Blarneyite, but isn't, and whom Mr. Unoften accuses of not paying royalties on the Unoften patent. Well, it is the third car I have owned, and I would not give 30 cents on the dollar for my choice of his whole output, if I had to take the ensemble of the planet along with it in the shape of a transmission.

How is it a nuisance? In more ways than an ingenious inventor of fiction could imagine. In the first place the noise of the low gear is like unto the dumping of a garbage load of tin cans. An editor of a leading automobile journal has said that a motor car is worn out when it gets on the nerves of the owner. Measured by that criterion, my car has already enjoyed twice seven lives. Again, the gears require constant adjusting. I have to tighten up the low in order to climb a hill, and, if I get it the least too tight, the high drags so that I can't climb any kind of a grade until I loosen the low. Also the high requires frequent adjustment regardless of the condition of the low. As a Pandora's box of troubles carries off the whole peach crop of Oregon.

And to think it's just because the maker wishes to squeeze a little more profit out of his cars in addition to the royalties he is beating Mr. Unfrequent out of. I was talking to a physician lately about what cars are the best to buy to-day. He is also the owner of a screecher, and he said he wouldn't buy another. We were unanimous on that point, and both our objections were founded on the transmission. He spoke of a neighbor of his having another, and said that he could hear that neighbor leaving for his office every morning. I had had a neighbor whose morning departure I could also note, and, at times, his going was the cause of my waking. Say what you please about light cars needing only two speeds, but take my word for it that any car which is intended to road it in this section needs a very low gear—I would call it an "emergency low." Two gears are usually enough, but it is the unusual happening that causes the motorist to hire a team once in a while and that costs money.—S. Ross Parker.

Mester Editer.—Jag vant yob for shofer. En Salvation lady. vant me vork for salvation men jag sa: No, jag vil work shofer. She sa: You vork shofer och vork for salvation samma time. Jag sa: No, no man kan vara shoper och vork for salvation a samma time.

Jag ban til shoper schoola samma time ven jag vore in hospital met en broken leg. Jag ban marrit tirty year och jag er sober man yet. Jag vork met mashiner somme time. Jag see man draiv kar ofver bank, men jag know ven to turna hveelet. Jag har drifvet oxen. Jag kan vorka unner car. Jag haf dig ditch unner hous. Jag vant goot yob met fine close och blanka buttons. You get me yob for shoper, och jag gif you mit pikter som jag yoost haft takit.—Eric Ericsson.

Expert's View of the Trade.—There is no question but that a certain amount of anxiety that has prevailed all along the line within the past two months in the automobile industry, has been justified but the conditions which have brought about this anxiety have been the logical result of a certain trend of events which have not been under the control of the automobile manufacturers. In the past, the automobile business has been a season business, (i.e) the manufacturer attempted to build a large number of cars in two or three months during the selling season, with always the same result—that it was found absolutely impossible to fill orders.

This year the majority of manufacturers ran their plants at full force during Fall and Winter, storing up some cars with the expectation of being able to come nearer to filling orders during the Spring season by drawing on this storage stock. Without doubt this would have been a wise move had it not been for the exceedingly inclement weather that prevailed during the Spring and early Summer months and which made it impossible for the agent to dispose of cars, as he could readily have done had the weather been normal.

The factories, however, have been running at full force until this year's production was practically completed, which in most cases was much sooner than expected, owing to the early start made by the different companies. This, therefore, necessitates a temporary decrease in the number of cars produced daily by the manufacturers until the 1910 season has been ended and until they can get ready for the 1911 models.

The banks have discouraged the farmer and the small agent by refusing loans on anything pertaining to automobiles. The wonderful crops in the west have enabled the farmer (and, of course, the people he comes in contact with) to buy automobiles without recourse to the bank and, as the farmer looks upon the automobile now as a necessity and not with the feeling of antagonism shown in former years, there is no question in my mind but what the Fall purchases of machines will be greater than ever before known.

I am confident that the 1911 season will see more automobiles manufactured and sold in the United States than ever before.—Fred W. Haines, General Manager of the Regal Motor Car Company.

Why Country Bankers Object to the Automobile—We hear a great deal nowadays of the non-productive capital which the money invested in automobiles has withdrawn from useful purposes. It is true that the depreciation on an automobile must necessarily represent a shrinkage which cannot be overcome, but aside from this natural depreciation, do not the dollars and cents put in automobiles represent vast industries, with well-paid workmen, skilled mechanics, intelligent salesmen, and enterprises radiating from this business through hundreds of different channels and industries?

We have 70 agents in the United States. A careful investigation of our retail business reveals not a single instance of a car sold, where the funds had to be derived from a mortgage, either of the car, or upon the home of the buyer in question.

Investment security sellers, small town bankers and stock brokers are not blaming the automobile as a source of injury to the country, but simply because they can point to the heavy purchase of motor cars as the item which has affected their individual profits, and a great many people are apt to judge the welfare of their country by their individual affairs.

Take, for instance, an Iowa town, of, say, 2,500 people with a rich farming community contiguous. You will find say six banks, with aggregate deposits of $500,000. This, I think, is considered a good average. Good banking calls for at least 25 per cent. of this to be kept in reserve, the remainder no doubt being loaned out on farm mortgages, live stock, term notes or high-grade investments. The reserve, though, was very seldom kept at home but a very considerable portion of it is invested in Chicago, St. Louis, Des Moines or Kansas City banks in the shape of deposits upon which they receive between 2 and 3 per cent. interest.

In such a country it has been no uncommon thing for 100 automobiles to be placed in one year. A safe estimate would average the cost of these cars at $1,000 apiece, or a net total sum expended on motor cars of $100,000.

It is, therefore, obvious that the deposits in the six banks referred to above have shrunk $100,000, and the money left the community. Since the money has merely been transferred to some manufacturing center, there is no loss in the country. The local financiers, though, have lost all but $25,000 of their reserve and instead of sitting back complacently as a depositor in Chicago, St. Louis and Des Moines banks, and drawing 2 to 3 per cent. interest on the other fellow's money, he is forced to go to the same bankers and borrow exactly the same amount that has left the community and pay generally between 5 and 6 per cent. for it, or curtail loans, and hence earnings.

It is, therefore, apparent that nobody has lost any money except the banker. His business is not as profitable as it was before, because his depositors are not keeping the idle money in his bank, and he is not getting the use of it.

History shows that every tremendous step forward that the world has taken has been due to some radical improvement in transportation. The Roman carts subdued the Pagans. Napoleon's swift marches overran Europe; the steam engine and the steamboat made America and the United States, and without them, St. Louis and Chicago would still be fur-trading posts. So also to its own degree will the automobile revolutionize transportation, improve farm values, and create untold benefits, and it is hardly justice to the automobile industry to hold up the few exceptions, as horrid examples and blame the automobile for conditions which it is not responsible for.—Joseph W. Moon, president Moon Motor Car Company.

Automobile Vogue Menaces "Confidence" Industry.—In the current issue of *Farm Machinery*, a publication devoted to the interests of that trade, a leading position is given to a symposium of alleged and anonymous bankers on the subject of the danger that menaces the financial, moral and political existence of the country through the vogue of the automobile.

Half a dozen bankers who have grown so used to drawing down 2 or 3 per cent. on legal reserve have forgotten that depositors still have the right to do as they please with their own property, and bewail the fact that the depositors have withdrawn this surplus money.

But one banker from Keokuk, Iowa, told the truth, even if it was an unpalatable mouthful. He is quoted as saying: "Money formerly lost in speculation in mining and other worthless stocks is now invested in automobiles, and this city now has one automobile for every 100 of population."

This should prove a valuable pointer to industrious "con" men who contemplate a campaign in that delightful section of the country. If the general public has advanced so far along lines of worldly wisdom in Keokuk, that it prefers the sensation of riding in an automobile to the desperation that follows investment in fake securities, lighting rod contracts or even the feeling of misery that results from failure of banks following the unsuccessful speculation of the bankers in Wall Street or elsewhere, it is time to seek other fields.

The automobile undoubtedly cuts out funds that might feather the nest of "green" goods swindlers, but the fact should be remembered by the bankers and green goods men that the owner of the money may do with it what he pleases and the record shows that he pleases to play with the automobile rather than to furnish "fat" for the carrion buzzards who so long enjoyed unearned the fruits of his labors.—Reviewer.

The Munsey Run

HISTORIC TOUR STARTS FROM PHILADELPHIA NEXT TUESDAY. WILL BE THE MOST IMPORTANT ENDURANCE TEST OF THE YEAR. ROUTE LIES THROUGH TERRITORY RICH IN HISTORIC INTEREST AND SCENIC BEAUTY.

OVER a route laid out through ten States, which saw a large part of the history-making events of the early days of the Republic, the Munsey Historic Tour of 1910 will start from Philadelphia next Tuesday. For the next dozen days the long string of automobiles entered in the tour and contest will wind in and out among the scenes of struggles that are written immortally upon the tablets of the nation's remembrance.

The territory covers a thousand points of patriotic interest, the least of which contains enough of fascination to center attention in passing, while the names of a dozen of the more important points are sufficient to set the pulses thrilling. The route of the tour follows one road in New Jersey where Washington and his frost-bitten soldiers swooped down and captured two garrisons of mercenary troops, out-generaled the relieving columns of the British commander and faded away in the night behind the protection of unguarded camp fires. In another place it follows the route taken by Benedict Arnold in escaping to the boat landing below West Point, from which he succeeded in gaining the deck of the warship *Vulture*. It goes over the old Boston Post Road in Connecticut and through the historic territory of that State to New London, which was ravaged by Benedict Arnold, after he had taken up arms for the British cause, and thence through Rhode Island to Boston, touching a hundred spots of national importance in the formative years of the Republic and the scenes of numberless encounters with hostile savages in a still earlier period.

The very name of Boston is thrilling to the red-blooded American, no matter what section of the land he may claim as his home. There it was that the militant spirit of revolution was fostered; there it was that the Pilgrims landed about three centuries ago and there it was that the impetus of armed resistance to tyranny found expression long before the actual declaration of hostility against the injustice and aggression of George III. Bunker Hill and the glorious defeat sustained by the infant nation, in which the Americans discovered that their enemies were merely men and that the missiles of their squirrel rifles would make even the British regulars waver and run before their spiteful stings, will be particularly noted by the tourists.

From Boston the way follows the rugged coast of the Ocean, through New Hampshire and Maine to the city of Portland and thence striking westward it climbs through the foothills until the heights of the White Mountain country have been attained. Passing through the Green Mountains of Vermont to Burlington, the Sunday stop-over having been made at Bethlehem, N. H., the tourists will approach Lake Champlain on the seventh day of actual running. The course of this day's run is particularly attractive, as it is laid Northward over several of the islands in that beautiful body of water, to the upper end, where the cars will be ferried to Chazy on the New York side. Turning Southward, the tourists will proceed toward Saratoga over the roads used by Burgoyne during the invasion from Canada, in that ill-fated campaign that proved the turning point in the fortunes of the Revolutionary War. The cars will pass various points where the distracted British troops, decoyed farther and farther from their base of supplies, puzzled with false information and bewildered by forays of the Americans, finally yielded.

From Saratoga to Binghamton the way is through the land that was known as the "Bread Basket of the Nation." during those early days. It is the country that was settled by pioneer farmers long before the struggle for Independence and proved to be of marvelous fertility and agricultural potency. Dotted across the map of this day's run are the names of hamlets and localities that were the scenes of horrible Indian massacres.

Southward from Binghamton, the road is to Wilkes-Barre and the actual route of the travelers is via a stretch of highway that was built by General Sullivan and his Revolutionary soldiers during the campaign in which he had been commissioned to punish the Indians for an atrocious massacre inspired by the British and Tories. This bit of roadway was constructed with immense labor and while it is passable to-day, it will undoubtedly prove to be the most trying stretch of the tour.

Coming into the homestretch the tourists will leave Wilkes-Barre and the run to Harrisburg is one of the best scenic bits of the whole journey. The mountains of Pennsylvania are rugged and difficult and this portion of the run will give a supreme test to the cars entered, coming as it does after such a long and trying trip. The last day of the tour is to Washington, D. C., where the cars will be checked in. The total mileage is about 1550 and the whole route has been picked out with the idea of giving a wide variety of road experience.

Entirely aside from the historic interest of the tour, the contest feature as a reliability test of the automobile will be valuable and illuminative. Most of the roads are excellent, but enough stiff grades and difficult highways have been included to test the stamina of the entered cars.

The Munsey Tour is fathered and managed by the Munsey newspapers, *The Washington Times, Baltimore News, Philadelphia Evening Times* and the *Boston Journal.*

It is fully recognized and sanctioned by the Contest Board and this year has received a vast amount of attention from manufacturers, as is evidenced by the magnificent entry list. There are several more makes of automobiles represented in the list than contested in both divisions of the Glidden Tour of 1910 and a number of the leading contestants in that event will be found in the Historic Tour.

A spirit of fairness and consideration has been apparent in all the official actions of the management during the preliminaries. Everybody connected with the enterprise has been working to anticipate problems likely to arise during the run and to prepare to meet them justly.

The officials of the tour are E. L. Ferguson, of New York, referee; Technical committee, E. L. Ferguson, Joseph Tracy and J. A. Hemstreet, Harry Ward and M. M. Mauger, of the Munsey papers, will be in charge of the two pilot cars and Francisco Juarez Byrne, the noted Spanish-American author, will write the newspaper reports for the Munsey string.

From present indications there is not a shadow to darken the prospects for a successful tour. The route is ideal. It lies through a territory closely in touch with the great centers of population. It is sufficiently varied to give an adequate test of the machines without torturing cars and drivers and passengers. The officials are among the most competent in their line of business and the field is about as good as any that ever went to the post in a similar contest.

The entry list includes the following: Premier, Columbia, Maxwell (3), Washington (2), Reading "40", Ford (3), Elmore, Warren-Detroit, Corbin, Spoerer 1911, Brush runabout (2), Regal "Plugger," Pierce-Racine, K-R-I-T, Enger, Great Western, Cino, Ohio, Staver-Chicago, Stoddard-Dayton, Crawford, Glide, Moon, Kline, Matheson, and Inter-State. All these are in the contesting class. A Randolph truck has been entered as a non-contestant to carry baggage as well as a Reading "6" and the officials' cars include an E-M-F, pilot and press car; Selden, pilot; Columbia, pacemaker; American Roadster, starter's car; Thomas, press; Washington, press, and Brush, photographer's car.

The Elgin Races

CHICAGO MOTOR CLUB PREPARING FOR THE TWO-DAY ROAD RACING CARNIVAL TO BE HELD OVER ITS NEW COURSE ON AUGUST 26-27. LIST OF OFFICIALS AND MAP OF COURSE.

STARTING August 26, and continuing over the following day, national stock chassis races of the simon-pure variety, and conducted over a typical road course will be held on the Elgin, Ill., raceway, and the winners of the various events may well lay claim to the national road racing championships.

The plans of the Chicago Motor Club in conjunction with the Elgin Automobile Road Race Association are in full blossom which will come to fruition the latter part of this month.

Official sanction was only recently granted, but within a few hours after the announcement had been made entries and the promise of entries began to pour in.

Arthur Greiner, an amateur, has named a National for the Elgin National trophy race, and the National Automobile Company, of Chicago, has entered a National for the Illinois trophy. Two Coles have been named by telephone from Indianapolis, and a Ford car has been entered by the Chicago branch, while assurances are given by the Lozier, Benz, Renault, Marmon, E-M-F, Parry, Falcar, Black Crow, Oldsmobile, Herreshoff, Cino, Matheson, Velie, Marion, Alco, Corbin, Simplex, Jackson, Midland and Stover, that they will make nominiations. The Lozier, which has been out of road racing for a couple of years, has gone so far as to secure headquarters at Elgin, which is taken as a guaranty of the company's serious intentions.

Chairman Harry T. Clinton and his associates on the Contest Board of the Chicago Motor Club have selected the officials who will handle the National Stock Chassis Road Races as follows:

Honorary referee, C. H. Hulburd; referee, David Beecroft; judges, F. C. Donald, Everett C. Brown, T. J. Hyman, W. C. Thorne, W. F. Grower, A. J. Banta, F. W. Jencks, G. E. Hunter and Frank H. Trego; starter, Fred. J. Wagner; assistant starter, Oliver G. Temme; clerk of the course, Harry T. Clinton; assistants, W. J. Zucker and J. S. Woodworth; technical committee, A. E. Edwards, Berne Nadall, Otto Von Bachelle; timers, C. H. Warner, J. P. Frisby, R. T. Laughlin, H. W. Cooper; chief checker, John H. Kelly, assistants, L. Z. Sheldon, Ralph Hoagland, W. Nussbaum, Frank Sparks, Ed. Guston, O. L. Foote, Hosmer H. Allen, Lyle Miller and L. R. Campbell; chief scorer, Charles E. Gregory; chief flagman, Frank B. Wood; military aid, C. A. Tilt; chief announcer, L. B. Sanders; chief electrician, Al. Adams.

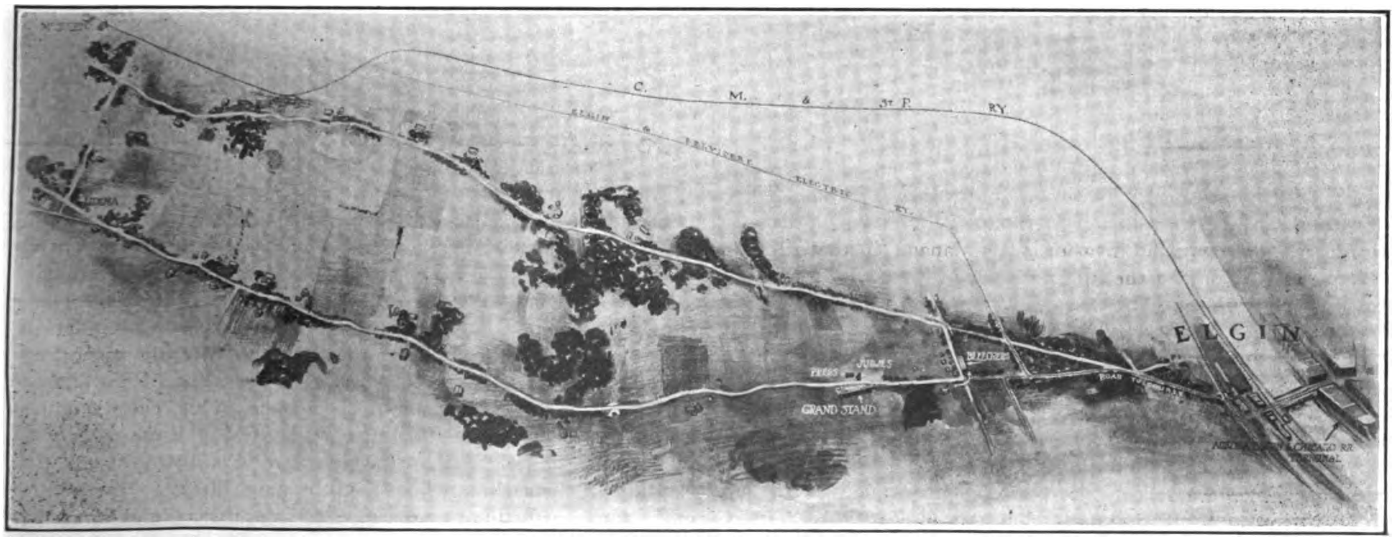
At the same meeting it was decided to postpone the club's annual hill climb at Algonquin, Ill., the new date selected being Thursday, September 15. This action was taken because it was found that it would be impossible to finish by September 10 the artificial hill which will be used for the standing start climb.

The club has had trouble getting Perry Hill for this, the grade being in another county. The Algonquinites, however, have promised to build a special hill 1,000 feet in length and which, it is said, will be one of the stiffest propositions a motor car ever has been called upon to tackle. Ten teams and twenty men started at the hill immediately; it will be done by September 1.

The motor club has received the design of the Elgin National trophy, which is to be the prize in the big race the second day, the event for cars under 600 cubic inches piston displacement. It is best described as a classic vase, 3 feet 8 inches high above the pedestal. It is a two-handled cup, the main decorations being the laurel oak and water leaves. This cup is designed to take six wreaths with inscriptions and two panels, one for the motor car scene on the obverse side, and on the reverse side the main description of the cup. On the neck of the cup is the figure of Father Time. The trophy is valued at $4,500.

The Chicago Motor Club and the Elgin Automobile Road Race Association have decided to sell the seats at popular prices. They have formed a combination with the property owners, so that everyone who sees the races will have to pay 50 cents. Then grand stand seats will be sold for $1 for each day; box seats will be sold at $1.50 each, while bleacher seats can be made for 50 cents. Parking spaces will be sold at $1 per car. The seating accommodations will be for 7,000 people, but more can be added if needed.

The course has been found to be 8 miles, 2499 feet in length.



Bird's-eye view of Chicago Motor Club's National Stock Chassis road race couse at Elgin, Ill.

Commercial Car Run

NEARLY FOUR-SCORE ENTRIES FOR THE MOST IMPORTANT AFFAIR OF THE KIND EVER HELD IN THIS COUNTRY. THE CONTEST WILL SURELY DEMONSTRATE UTLITY OF BUSINESS VEHICLES.

WITH a probability of seventy entries, representing many styles of commercial trucks and freight vehicles, the endurance contest under the auspices of the Philadelphia *North American*, which will be run August 12 and 13 from Philadelphia to Atlantic City and return, is attracting wide attention.

The idea of the contest is to demonstrate the ability of the truck to make a time schedule with economy of fuel or current, and the newspaper has offered prizes aggregating $1,000 for the winners. The running of the affair is in the hands of the Quaker City Motor Club. The roads selected for the trial are in excellent condition, but in order to show that the cars can surmount ordinary road difficulties, several trying stretches of highway have been included in the itinerary.

The distance to Atlantic City is about 62 miles and under the plan that has been worked out the gasoline cars will be divided into four classes. In class A, a schedule of fifteen miles an hour will be required. This class is the manufacturers' division for trucks of 1 1-2 tons capacity and less.

In Class B, with capacity of from 3,001 to 5,999 pounds, a running time of twelve miles will be asked. In Class C, from three to four tons, ten miles an hour must be made and in the same class, but for cars of over four tons capacity, the schedule calls for eight miles an hour.

In the electric division, Class A must make 12 miles an hour; Class B, ten miles and Class C, eight miles an hour. An accurate record will be kept of the gasoline and oil used by the gasoline cars and of the electric current used by cars of that variety and due allowance will be made in computing the result.

The cars are all required to carry their advertised loads and the figures on the proportionate consumption of power will give a basis of cost of transportation.

The list of entries to date includes the following:

MANUFACTURERS' DIVISION

Class A (1½ tons capacity and less)

Car	Entrant	Driver
Strenuous Randolph	Randolph M. C. Co.	R. G. Shuert
Chase	Commercial M. C. Co.	W. F. Wood
Chase	Commercial M. C. Co.	R. L. Ferris
Franklin	Franklin M. C. Co.	W. R. Coughty
Martin	Martin Carriage Works	E. L. Kraft
Martin	Martin Carriage Works	John M. Bowers
Torbenson	Torbenson M. C. Co.	Allen Torbenson
I. H. C. Wagon	International Har. Co.	W. A. Bauer
I. H. C. Wagon	International Har. Co.	Daniel B. Shock
Buick	Buick Motor Car Co.	Hubert Cato
Buick	Buick Motor Car Co.	William Thompson
Atterbury	Finnesey & Korber	M. Korber
Chase	Commercial M. C. Co.	W. J. Burns
Rapid	Rapid Motor Vehicle Co.	James Parrey
Hartkraft	Hartkraft Mot. Truck Co.	R. B. Lawrence

Class B (between 3001 and 5999 pounds capacity)

Car	Entrant	Driver
Garford	Garford M. Truck Wks.	Mr. Ritter
Grabowsky	Edgar W. Hawley	G. G. Stranahan

Class C (three tons and above)

Car	Entrant	Driver
Frayer-Miller	Kelley M. Truck Co.	Harry Weber
Schleicher	Schleicher M. V. Co.	Alfred Besser
Standard	Standard G. & El P. Co.	W. Hunsburger
Gramm	A. E. Gardiner	Archie Nobb
Gaggenau	Benz Import Co.	P. W. Gaylor
Packers	Packers M. T. Co.	C. H. Smith

PRIVATE OWNERS' DIVISION

Class A

Car	Entrant	Driver
Autocar	Strawbridge & Clothier	
Autocar	John Wanamaker	R. Crossing
Autocar	Bailey, Banks & Biddle	John J. Frewen
Autocar	Bailey, Banks & Biddle	Jos. P. F. Daly
Stoddard-Dayton	Bailey, Banks & Biddle	
Autocar	Lindsay Bros., Inc.	J. Horace Lindsay
Autocar	Consolidated Tire Co.	James Justice
Maxwell	Coca Cola Co.	A. A. Whitcomb
Chase	Freihoffer Baking Co.	
Autocar	Cluett-Peabody Co.	John A. O'Neil
Autocar	Cluett-Peabody Co.	J. M. Beatty
Autocar	E. Bradford Clark	Frank Donnelly
Autocar	Fritz & Larue	Frank J. Scullin
Rowan	Wright & Co.	A. W. Kneer
Autocar	Michael del Collo	M. del Collo
Autocar	Eshelman & Craig	Elmer Baurichter
Autocar	Gurnse Butter Co.	
Autocar	Gurnse Butter Co.	
Autocar	J. E. Coggswell	E. L. Keller
Autocar	A. F. Burnot Bros. Co.	J. G. Carvill
Renault	A. F. Burnot Bros. Co.	G. Meyers
Autocar	Theo F. Siefert	B. Siefert
Autocar	J. S. Ivins Sons	H. V. Fancey
Cartercar	Kellogg T. C. F. Co.	Kennetty

Class B

Car	Entrant	Driver
Reliance	J. B. Van Sciver Co.	
Motor Commercial	Suburban Auto Ex. Co.	M. Plush

Class C

Car	Entrant	Driver
Mack	Shane Bros. & Wilson	
Saurer	Baldwin Loco. Wks.	H. Brostrand
Saurer	Baldwin Loco. Wks.	Thos. Carberry
Saurer	Baldwin Loco. Wks.	W. C. Hampton
Packard	John Wanamaker	W. Hampton
Reliance	J. B. Van Sciver Co.	
Alco	Gimbel Bros.	
Alco	Gimbel Bros.	
Frayer-Miller	Fleck Bros	A. Jones

ELECTRIC VEHICLE DIVISION

Class A

Car	Entrant	Driver
Commercial	John Wanamaker	John Dillon
Commercial	Bergdoll Brewing Co.	Fred Baurer

Class B

Car	Entrant	Driver
General Vehicle	Bergdoll Brewing Co.	Harry Wright
Commercial	John Wanamaker	Thos. Kelly
Commercial	American Brewing Co.	F. Flubacher

Class C

Car	Entrant	Driver
Commercial	American Brewing Co.	Robt. Rother

Croxton-Keeton Motor Company Will Come Back

H. A. Croxton, president of the Croxton-Keeton Motor Company of Massillon, O., which was thrown into the hands of a receiver August 1 on Mr. Croxton's application to the Federal Court at Cleveland, was in New York Tuesday making arrangements looking to a reorganization.

According to Mr. Croxton the receivership will be lifted within sixty days and the 1911 line of cars will be ready for market by September 15. He stated that the troubles of the company were due to a disagreement between some of the officers and that he only resorted to a receivership in order to protect the creditors from ill-advised and hasty action.

He says that the assets of the company, pruned down to the last degree, amount to $295,000 and the liabilities are $273,000. Mr. Croxton says he is the owner of 90 per cent. of the stock of the company. P. L. McLain has been named as receiver.

Garage Owner Charged with Swindling

Edward Underhill, proprietor of the Garage de Luxe, 57 East 108th street, and Henry Roy, chauffeur, employed by Underhill, were held to Special Sessions last Friday by Magistrate Cortel of the Harlem Court on a charge of violating the short-measure ordinance. Bonds were fixed at $500.

Inspectors Mills and Morgan are the accusers of Underhill and his employee. They charge that on July 16, while inspecting garages, they stopped at the place of Underhill and purchased what purported to be ten gallons of gasoline. This, they say, did not measure up to the full amount by two gallons.

The officers declare that the shortage was brought to the attention of Underhill, who failed to have his gasoline pump repaired, and after the passage of a few days warrants of arrest were sworn out and bail fixed at $1,000 each, the Garage Owners' Association taking an active part in the prosecution.

Some 1911 Automobiles

(*Continued from page* 219)

point. Models 31 and 32 differ from 1910 designs in that the bore of cylinders is increased from 4 7-8 to 5 inches, bringing the cylinder dimensions to 5 x 5 1-2 inches. In model 31 the wheelbase is 1 inch more than in the previous model, bringing it up to 123 inches. In the ignition system the Bosch high-tension magneto replaces the low-tension type previously used. This change simplifies the dashboard equipment materially, cutting out the induction coil formerly employed in the low-tension system. A means is provided in the new cars for the independent operation of the magneto, or auxiliary ignition. A Yale lock is incorporated into the switch, securing it in the neutral position when the car is shut down, and affording excellent protection to the owner of the car by preventing a purloiner from closing the electrical circuit of the ignition system. Lubrication is reduced to the most simple form, involving the splash method and a circulating means. There are two splash compartments in the four-cylinder motor, and the hand pump provided is so arranged that the supply of oil may be replenished in either of the compartments independent of the others. The plunger pump used for circulating is located at the bottom of the case and is driven by a gear taking power from the camshaft. In view of the increase in the size of the motor the dimensions of radiators were adjusted in conformity with the needs, and the extent of refinement at all points in these models is carried even to the length of locating the battery in a suitably contrived compartment inside of the chassis frame in a protected position beneath the floor boards of the tonneau. Dress guards cover the forward end of the rear springs, thus facilitating access and improving the appearance of the models. The front fenders are brought to a higher state of perfection and take the curvature of the front wheels, presenting an artistic appearance. The steering column is provided with an 18 1-2-inch hand steering wheel mounting the spark and throttle control of the same design as last year. The clutch of the internal expanding leather face band type is the same as formerly, and the connections from the foot pedals are with ball and socket jointed rods. Transmission gearsets are of the selective type and the mechanisms for manipulating and locking the gears are enclosed within the case.

In the Flanders "Twenty," made by the E-M-F Company, Detroit, the motor is of the "bloc" type with four cylinders, bore 3 5-8 inches and 3 3-4-inch stroke, with the valves located all on the left side, making the block casting of the L-type. The lubrication in this motor is what is known as the vacuum type, designed for a constant level with a gravity feed. Cooling is with water, using a gear-driven centrifugal pump, aided by a vertical tube radiator and a fan driven belt. Ignition is of the jump type with a Splitdorf magneto and auxiliary coil. The carbureter is of the float feed type with auxiliary air valve and gravity feed. The clutch is of the inverted cone type with a leather facing against cast iron, and the selective sliding gear, with two forward speeds, and reverse, is swung on the rear axle.

The Inter-State motor, made by the Inter-State Automobile Company, Muncie, Ind., is of the four-cylinder type, rated by the makers at 40 horsepower, with a 4 1-2 inch bore and 5-inch stroke. The cylinders are of the L design, cast in pairs, with all valves located on the right side. Lubrication is by constant level splash maintained by a gear pump which is shaft driven. Gravity feed is relied upon for the rest. The water-cooling system includes a circulating pump, honeycomb type of radiator and a belt-driven fan. Ignition is by jump spark with a double system, including a U & H magneto and dry cells in conjunction with a coil for the auxiliary system. A Stromberg carbureter with a gravity feed takes care of the full situation. A multiple disc clutch with cork inserts takes the power from the motor and delivers it at the will of the operator to a selective sliding gearset, located amidships, affording three forward speeds and reverse. From the transmission gear to the live rear axle a shaft is used.

In the Franklin product as made by the H. H. Franklin Manufacturing Company, Syracuse, N. Y., four models of open cars are offered for the new year, two of which are "sixes" and two are "fours." One of the Franklin bodies is given in the plate of body illustrations. It is of the full flush-sided type and is an excellent illustration of the Franklin line, remembering, however, that the body work on the four-cylinder cars is a long conventional touring line. The new models are with increased wheelbase lengths, namely, 133 inches, 122 3-4 inches, 107 1-2 inches and 99 5-8 inches. The air-cooled motor, based upon the general design as brought out in 1902, is retained for 1911, subject to the modifications indicated by a year's experience. The method of cooling is substantially as in 1910 motors, including a metal air jacket surrounding each cylinder, and the cooling air is drawn from grilled openings located in the front of the hood, a fan in the flywheel being used for the purpose. In the several models of cars the cylinder dimensions are as follows: 4 1-2 inches x 4 1-2 inches, 4 inches x 4 inches (for two models) and 3 3-8 inches x 4 inches for the remaining models. Fiber gears are used for the camshaft gears, also for the magneto idle gear. The one great change of the year lies in the location of the valves. It will be remembered that concentric valves were employed in the 1910 motors, whereas this year the intake valve and the regular exhaust valve are placed side by side in the cylinder head. The new valves, operating separately, are claimed to be more nearly noiseless. An auxiliary spring is placed at the bottom of the valve lifters to hold the walking beam in constant contact with the end of the valve stem for the purpose of reducing lost motion and aborting noise. The auxiliary exhaust valve at the base of each cylinder is retained. A new oiling device is adopted; the oil is fed by a force-feed oiler through the crankshaft and into the engine base. Oil is introduced into cups on the internal base bearings, whence it runs directly onto the shaft through a groove and thence through a hole drilled in the shaft which extends through to the connecting-rod end. By centrifugal force the oil is passed to the connecting-rod bearings through oilways in the crankshaft. The cylinder walls are lubricated by a spray of oil as it is thrown off of the connecting-rods. Splash is depended upon to some extent to add to the profusion of oiling.

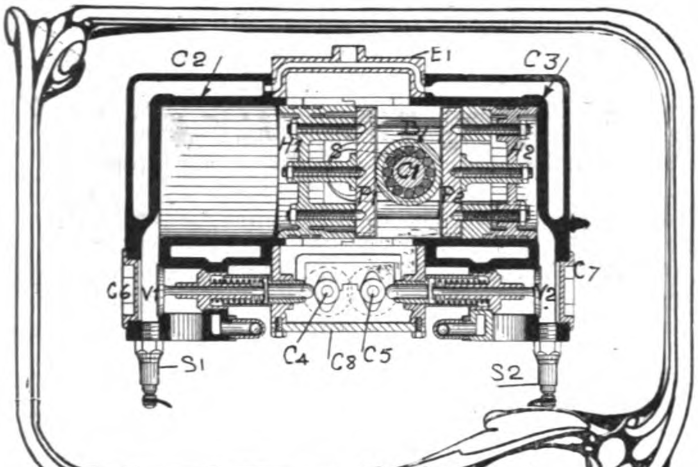
The Chalmers power plants, made by the Chalmers Motor Company, Detroit, remain substantially as in the 1910 models, excepting, of course, that the necessary shop process modifications have been made and are rapidly being brought to a high state of perfection, with the idea of inducing a greater measure of stability and adding to the uniformity of production. The finer methods of heat-treatment that come with the introduction of the latest and most approved pyrometers and facilities are available in the new addition to the plant, and matters such as this, while they do not make a change in the construction features of the output such as can be noted down in a dimensional way, do, nevertheless, constitute a material advance. The company states that mechanically the 1911 models are merely refined; a number of little changes constitute this refinement, rather than any radical departure. The "Thirty" motor is now being built in the plant of the company, and the material advance in its construction is by reducing vibration and improving the general appearance as well as the workmanship of the motor. In the "Forty" motor the valve springs are encased and noise is thereby muffled. The wiring system on both the "Thirty" and "Forty" models is much simplified and rendered more stable, otherwise the ignition devices remain as before on the "Thirty" horsepower model, but the "Forty" horsepower ignition system has been materially improved, the Bosch dual system of ignition with a unit coil and four spark plugs having been adopted. The improved Mayer type of carbureter is regular on the "Thirty," but the Stromberg carbureter is adopted for the "Forty." The constant level splash system of lubrication obtains in both models. On the "Forty," however, the gear pump has been supplanted by a plunger type of oil pump. The multiple disc clutch, using steel and bronze plates alternately, running in oil, is retained for the "Thirty," and the cone clutch is continued on the "Forty." There is no material change in the steering gear for 1911 over 1910.

Twombly Automobile

EXHIBITING to the representatives of the metropolitan press in New York City on August 8, the Twombly Motors Company, 220 E. 41st street, New York City, presented a new motor car with so many advanced ideas in it that it amounts to a revolution of the conventions. Whether or not the ideas incorporated into this car will consummate a revolution depends upon the judgment of the autoing public. The foundation of the new design is based upon the question of accessibility of the power plant as a paramount issue, and the convertibility of the body as an important consideration. From year to year many autoists have persistently maintained that a single type of body should be available, not only for fine weather in the Summer time, but with protective measures at hand should the weather become inclement. This school of autoists also maintained that in Winter autoing, protection of the first order should be afforded without having to buy a new automobile to get it. They also contend that when the Sun shines in the Winter time, and the invigorating atmosphere augurs for health, there should be some way of opening up the limousine and enjoying the invigorating conditions. The Twombly limousine offers all these attractions, and the designer has mastered almost insurmountable difficulties in the attainment of the objects. All that remains in this regard is for the company to place its product at the disposal of users and find out if they were in earnest.

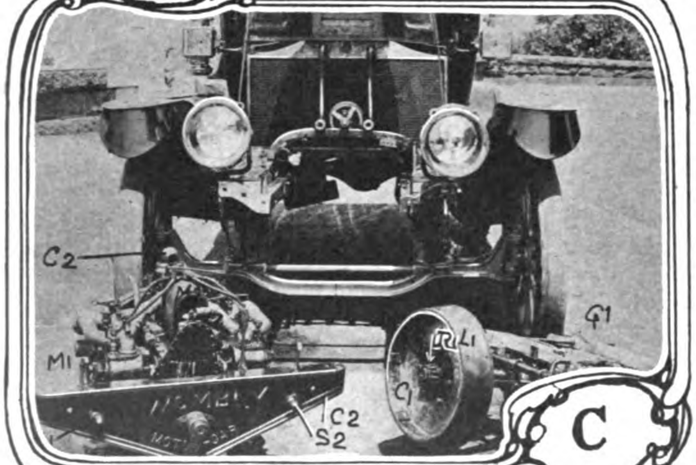
Despite the attractions offered by the type of limousine illustrated herein, the greatest change seems to be in connection with the power plant, in which the motor may be removed together with its accessories, inspected, if the occasion requires, and put back again within a few moments, it being light enough so that two men can handle it with ease. If it becomes necessary to remove the transmission gear also, it will come right out without having to unloosen a bolt or take down a bar. In re-assembling nothing remains but to replace the transmission gear first, and thereafter slide in the motor. The units re-unite with each other in satisfactory alignment and the transmission members take up their accustomed relations without the pursuasion of tools. When they are pushed back into place the locking studs are screwed up tight without having to make a water connection or in any other way tamper with the mechanism; the power plant will go about its business. The details of the power plant and the car as a whole are worked out to a fitting conclusion, and in short the designer of this automobile busied himself assiduously to satisfy a demand which seems to be pressing and forceful.

Among the mechanical features the cooling system is "thermal" and the bonnet is Renault fashion. Ignition is by Bosch Dual Magneto System, and the carbureter is of the float feed type. W. Irving Twombly, the designer of this type of car, having in mind the exigencies of taxicab service and town car work, has introduced another innovation in the form of enclosed helical springs in conjunction with dashpots for the suspension of the body, instead of the customary flat plate forms of springs typified in other makes of cars. The motor is in length equal to the distance of the cross members of the chassis frame, is 8 inches through in the vertical plane, and the cylinders are 5 x 5 inches bore and stroke respectively, of which there are four, working 4-cycle water-cooled. The motor weighs 266 pounds, including a flywheel, and is rated at 40 horsepower. There are many other nice details of design which were necessary to complete the plan, some of which are clearly depicted in the illustrations here afforded.

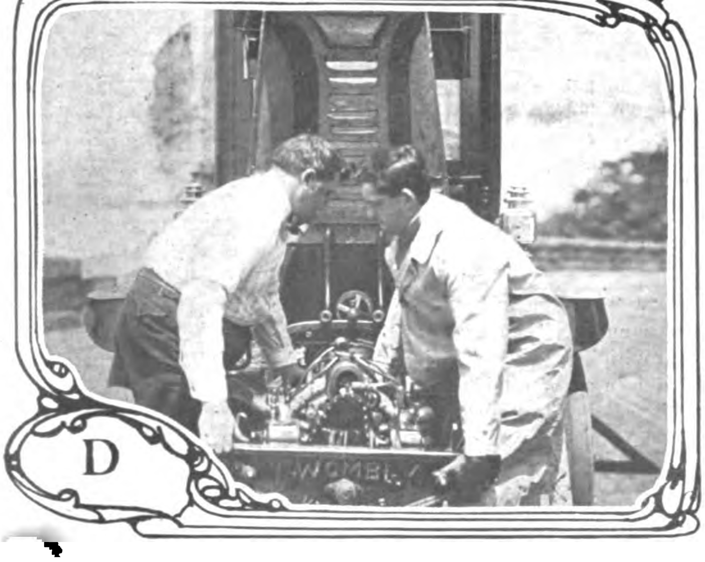


A

B



C



D

DEPICTING AN ENTIRELY NEW IDEA IN AUTOMOBILE DESIGNING WITH A CONVERTIBLE BODY AND A POWER PLANT THAT CAN BE REMOVED AND REPLACED IN THREE MINUTES.

(A) Depicts the motor of the Twombly Car, the same being in cross section showing the opposed cylinders in blackened section of which there are two sets parallel to each other in the horizontal plane. The crankpin C1 has an annular type ball bearing B for each connecting rod and pressure is transmitted from the crankpin C1 to the pressure faces P1 and P2 of the built-up pistons with heads H1 and H2. The built-up piston reciprocates between the pairs of cylinders C2 and C3 in juxtaposition so that to all intents and purposes a single piston serves for two cylinders, and undue pressure from angularity is entirely eliminated in this type of motor. When the crankshaft S rotates, the crankpin C1 describes an arc the radius of which is equal to the stroke of the piston in one direction. The ball bearing B takes the torquing moment, transmits it to the faces of the built-up piston, and since the ball bearing describes an arc equal to that of the connecting rod C1 in addition to reciprocating laterally in the guides, reciprocating motion is transmitted to the built-up piston and it performs precisely as in any other 4-cycle motor. The inlet and exhaust valves are placed one above the other, one valve V1 being shown for the left hand cylinder, and a similar valve V2 is shown for the right hand cylinder. The valves are actuated by cams on the cam shafts C4 and C5; the motion imparted is precisely the same as in a conventional 4-cycle motor. The valves are accessible through the covers C6 and C7 with similar covers in the same vertical plane for the purpose of getting at the valves not here shown. The entire motor is housed in, there being a cover C8 over the valve chamber, and an extension piece E1 between the two pairs of cylinders all around the circumference excepting where the valve housing breaks in. The motor sets horizontally between the two members of the chassis frame, with the cylinders athwartships. The spark plugs are shown S1 and S2 adjacent to the inlet valves, coming to the top of the motor, and the magneto is mounted on the top of the motor in an accessible position with the carbureter just to the back of it.

(B) With the footboards removed, the transmission gear G1 comes into view, it being back of the radiator R1, and the air propeller A1 is also presented. The control system is located amidship with the quadrant Q1 coming up through the floor boards, and the steering gear post P1 is located on the left hand side so that for an enclosed type of body the control system is located conveniently within, and for an open type of body entrance may be had from either side. The ignition system being of the Bosch dual type, the step-up transformer P1 is on the dashboard within the body, coming above the line of the footboards.

(C) This is a view looking at the front of the car with the motor M1 removed and placed on the floor at the left hand side, and the transmission gear G1 also removed and placed on the floor at the right hand side. Referring to the transmission gear, the cone clutch C1 shows plainly with a leather faced cone L1 and a Timken roller bearing R1 which is used for centering and for taking the load as well. Referring to the motor M1, the cross member C2 becomes the front member of the chassis frame and when the motor is slipped back into position in its guides within the side members, the studs S1 and S2 are used for fastening the motor into place, they being the only means for holding the motor in its position, excepting that the cross arms of the motor fit snugly in the guides provided in the chassis frame. The magneto M2 shows on the top of the motor, and the carbureter C2 is in line with the magneto, but to the back of it. At a demonstration which was made at the A. C. A. on August 8 for the benefit of the press, the motor and transmission gear were removed from the chassis and replaced again in 3 minutes and 3 seconds. The motor was running just before the change was made, and it was started again just after it was put back into place. Two men did the work, using nothing but a socket wrench by way of tools. Water and other connections are made automatically and it is the main plan of the company to place at the disposal of users a power plant that can be removed and replaced within a few moments should the occasion require. That is has succeeded in doing so has been proven in the test above referred to.

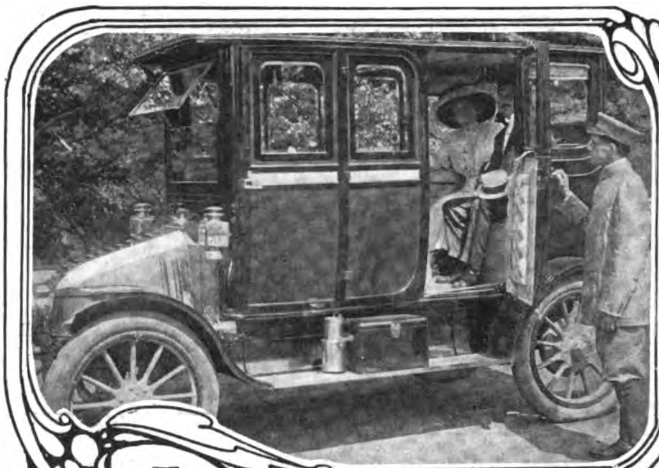
(D) This illustration of the quick removable power plant was taken while the men were in the act of putting the same back into place. When the plant is slid home, the Timken roller bearing R1 (C) self-centers, and a self-centering means is also provided between the transmission gear and the propeller shaft; at this point a suitable jaw drive is utilized, whereas between the power plant and the transmission gear, the clutch C1 serves as the transmitting member.

(E) The limousine type of body as here shown is complete with the front door, making the same entirely enclosed for inclement weather.

(F) This is a view of the same body with the front door taken away, and the back opened up sufficiently to admit air but protect the occupants from wind and dust.

(G) This view shows the side enclosures for the front ready to go into place. By means of dowel pins the panels are self-centering, and through the good office of an eccentric lock, the panels lock tightly and rattling or squeaking is obviated.

(H) This is a view of the body with the front panels removed, the side and back panels removed also, and the top or deck folded up and over so that it rests on the deck of the front end above the front seats. The most remarkable point, perhaps, in relation to this type of body, is one that cannot be appreciated without examining the same. The joints are all worked out so that there are no inartistic crevices or unsymmetrical surfaces due to the taking away of the panels, or the folding up of the deck. It is also worthy of note that the body is substantially made, goes together without any trouble at all, and runs without squeaking or making noises of any kind.



E

F

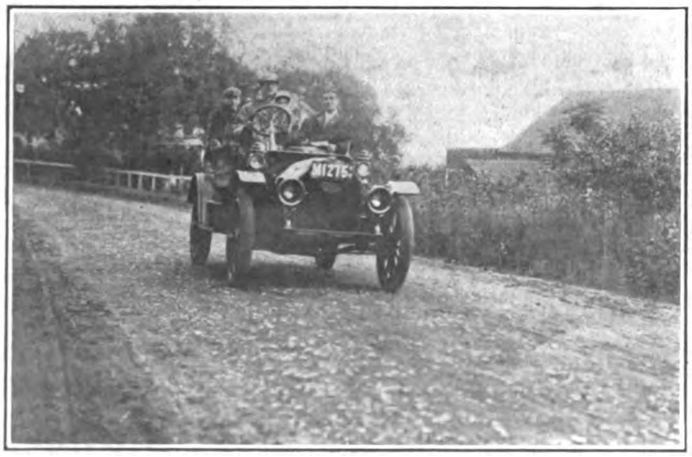
G

H

Contestants getting instructions before the start

Inter-State, No. 6, driven by H. G. Martin

The Hudson, No. 4, with W. H. Bruns at the wheel



The Cartercar performed well in the touring division

Brooklyn Dealers' Run

WITH a field of thirty cars in the contesting division, eight among the tourists and with a considerable escort of non-participating automobiles, the two-day Reliability run of the Brooklyn Motor Vehicle Dealers' Association was started early Tuesday morning from in front of the quarters of the Long Island Automobile Club. The sky was overcast and the weather bureau held out promise of a wet trip. But up to the moment of starting, the roads were in fine condition as the result of the showers of the night before.

The course of the run is about 400 miles and it zig-zags across the island, so as to cover most of the picturesque roads. From the start it leads to the north shore at Little Neck and thence through a dozen small towns to Smithtown, where a checking station was arranged. Crossing the island, the tourists made Patchogue and proceeded along the south shore to Bridgehampton, another control. The Eastern point of the tour was Amagansett where the course cuts northward again to the Sound and thence to Southhampton. The second day's run was along the North shore with frequent detours to make up the distance.

The first day's run consisting of 177 miles was accomplished without special incident or accident. The first dozen miles from the start were laid out over poor roads which were succeeded by better going this side of Flushing. Passing through that place the going was bad, but outside the town, smooth highways were encountered almost to Great Neck. A particularly bad stretch at the outskirts of the town, tested the cars and passengers severely and at intervals, trying spots were traversed all the way to Smithtown. The hill roads proved to be in excellent shape and after taking on fuel at Smithtown, the tourists proceeded to Patchogue, the noon control, over typical Long Island highways.

The back track to Smithtown was over another set of good roads and save for some stiff grades near Speonk, the whole afternoon route was easy. All the cars reached Southhampton, the night control, between five and seven o'clock.

Several clean scores were claimed as a result of the first day's run, but nothing official was given out to verify the claims.

One whole section of the run went astray after leaving Bridgehampton owing to lack of confetti, but this will not be charged against the contestants. The start of the final day's run was made from Southhampton at 8 o'clock in the morning.

At the conclusion of the run, clean road scores were claimed by the following cars: 23, Midland; 11, Winton; 14, Hupmobile; 3, Locomobile; 30, Pullman; 5, Ford; 9, Ford; 7, Stevens-Duryea, and 22, Chalmers. Besides these the official report may include similar claims for several of the other contestants.

Tire troubles were experienced by several of the cars, but not sufficient of this variety of trouble was had to affect the final score of any of the entrants. The Halladay, No. 10, broke a valve on the first day's run; Speedwell, No. 19, was ditched during the second day, but was able to continue. Otherwise the run was singularly free from accidents.

Secret controls had been established at five points and the cars were checked at these places as well as the regular checking stations to determine the consistency of their running time. This feature of the affair resulted in some delay in announcing the scores of the various entrants, and it will probably require at least 24 hours to reach exact figures on all the cars.

The weather at the finish was stormy and all the tourists were well soaked when they arrived at the clubhouse of the L. I. A. C. The rain of the final day started about noon and from that time to the end there was gray drizzle that proved uncomfortable to all hands.

Eight beautiful trophies were offered for the winners in the various classes.

MORE THAN TWO-SCORE CARS PARTICIPATED IN THE TWO-DAYS' RELIABILITY CONTEST UP AND DOWN THE LENGTH OF LONG ISLAND

The officials of the affair were: A. R. Pardington, vice-president of the Motor Parkway, referee; E. L. Ferguson, starter and E. F. Korbel, secretary.

The full list of the entrants is as follows:

No. Car	Entrant	Driver
Class 1A, selling at $800 and less—		
14—Hupmobile	D. M. Bellman	A. H. Bellman
15—K-R-I-T	Schaap Auto S. Co.	A. K. Schaap, Jr.
Class 2A, selling from $801 to $1200—		
4—Hudson	Bruns Auto Co.	W. H. Bruns
5—Ford	B. McC. and Bishop	Walter Blake
9—Ford	F. W. Matthews	F. W. Matthews
25—Maxwell	I. C. Kirkham	G. M. Wagner
Class 3A, selling from $1200 to $1600—		
8—Maxwell	I. C. Kirkham	E. T. Bloxham
17—E-M-F	Carpenter Mot. Veh. Co.	F. A. Ainslee
20—Maxwell	W. H. Fessel	W. H. Fessel
26—Crawford	Prospect Pk. So. Garage	W. H. Houdcroft
28—Overland	C. T. Silver	George Weber
Class 4A, selling from $1601 to $2000—		
2—Haynes	J. D. Rourk	L. A. Rourk
6—Inter-State	H. G. Martin	H. G. Martin
12—Auburn	Enterprise Gar. Co.	Jacob Stark
13—Velie	Cumberland Garage	A. Wilmorth
22—Chalmers	Bruns Auto Co.	Emil Feidler
23—Midland	J. M. Boyle	Leo Anderson
24—Haynes	Haynes A. C. of N. Y.	R. Schmidt
27—Herreshoff	A. W. Blanchard	A. W. Blanchard
29—Pullman	Cimmotti Bros.	Ellis Kulp
30—Pullman	Cimmotti Bros.	John Hoffman
Class 5A, selling from $2001 to $3000—		
1—Columbia	I. C. Kirkham	I. C. Kirkham
10—Halladay	Grant Sq. A. Co.	Jos. Kenny
11—Winton	Carlson A. Co.	William Braden
16—S. G. V.	Mears Auto Co.	J. M. Mears
18—Kline	Bryant Mot. Co.	C. Smith
19—Speedwell	G. W. Garland, Jr.	A. Gross
21—Columbia	I. C. Kirkham	J. N. Wagner
Class 6A, selling for $3001 to $4000—		
3—Locomobile	W. H. Kowenhoven	P. Mahony
7—Stevens-Duryea	I. M. Allen Co.	A. J. McDermott

In the division devoted to touring the following cars were entered: Ford, White, Cadillac, Paterson, Stearns, Cartercar, Winton, Stevens-Duryea and a Pullman.

The officials were carried in a Haynes, Franklin, Locomobile and an Acme.

Mathesons in Next 24-Hour Race

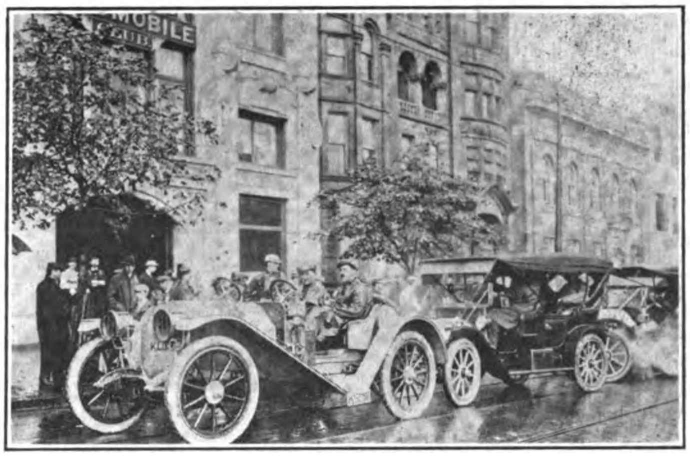
Matheson cars will seen in competition in the next 24-hour race to be held on the Brighton Beach race track under the auspices of the Motor Racing Association of New York, September 16 and 17. In all probability two cars will be entered.

Carriage Builders to Hold Meeting

The thirty-eighth annual meeting of the Carriage Builders' National Association will be held in Cincinnati, Ohio, the week of September 25. In connection with the regular yearly exhibition of carriage parts, wagons and automobiles, there will be a series of business meetings of the association at the Ohio National Guard Armory on Freeman avenue. An elaborate program of entertainment has been prepared.

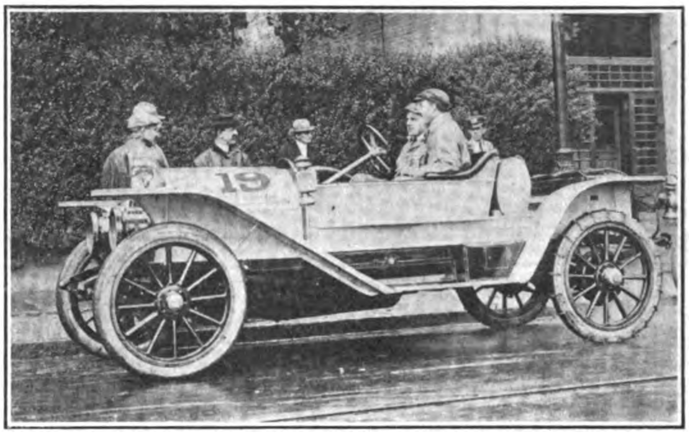
Van Sicklen to Head F-A-L Company

N. H. Van Sicklen, Sr., one of the best known men in the automobile industry, has been chosen president of the F-A-L Motor Company. Mr. Van Sicklen's long experience in motordom and his prominent position in the trade is accepted as a particularly promising evidence of his success as the head of a manufacturing company. His association with the F-A-L Motor Company completes a manufacturing organization of strength and experience.

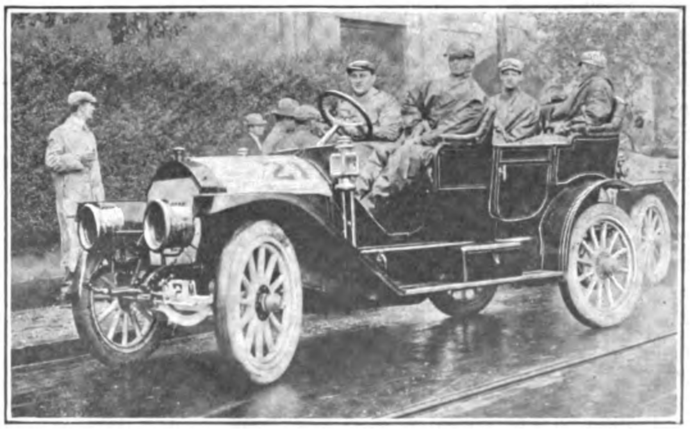


The cars started and finished at the Long Island Club House

Auburn, No. 12, Jacob Stark, driver, gets the word



Speedwell, No. 19, A. Gross in the driver's seat



J. N. Wagner's Columbia, No. 21, a Class 6A entry

Galveston Beach Races

THREE DAYS OF EXCELLENT SPORT FURNISHED TO THOUSANDS OF SPECTATORS. STODDARD-DAYTON AND CHADWICK FEATURED.

GALVESTON, TEX., Aug. 8—Without a hitch, the second annual meeting on the Beach Speedway was run last week in the presence of large crowds of enthusiasts. The feature of the first and second days was the work of Capt. J. W. Munn, president of the Texas State Automobile Association, who drove and won three races in his National 40. The Chadwick captured the 50-mile free-for-all in 42:56 4-5, and established a mile record for the course of 40 3-5 seconds.

The final day of the meet saw a new record hung up for the Beach course in the 200-mile free-for-all, which was won by a Stoddard-Dayton. The summaries:

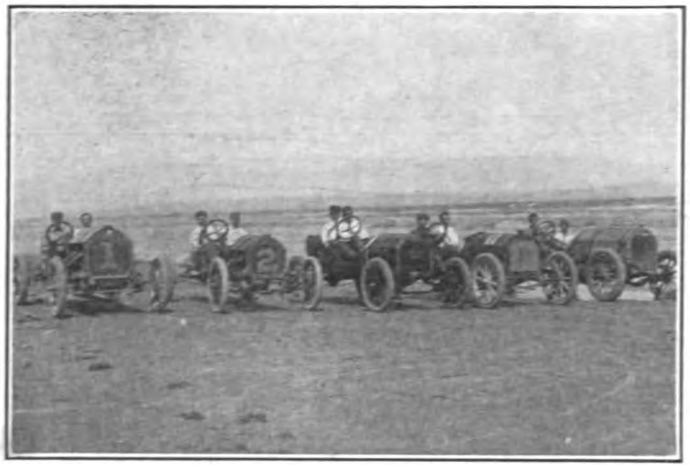
AUGUST 3

Twenty miles; Class B, Division 2B—

Car	Entrant	Driver	Time
Stoddard-Dayton	Alamo Auto. Co	De Hymel	Did not fin.
Buick	Geo. DeWitt	Dewitt	22:41
Buick	L. E. Perry	Petit	21:42

Thirty miles; Class B, Division 4B—

National	J. W. Munn	Munn	27:57 3-5
National	H. F. Sundin	Sundin	29:58 4-5
Inter-State	M. O. Kopperle	Brinker	32:10
Moon	Guy Nunelly	Wells	....



Line-up in one of the big races on the beach—two Stoddard-Daytons, Hudson, Moon and Chadwick

Twenty miles; Class B, Division 3B—

Marion	P. R. Plummer	Plummer	21:52
Marion	F. L. Carroll	Carroll	23:32

Fifty miles; Free-for-all—

Chadwick	Chadwick Eng. Wks.	B. Johnson	42:56 4-5
Buick	Geo. DeWitt	DeWitt	43:23 1-5
Interstate	M. O. Kopperle	Brinker	....
Marion	P. R. Plummer	Plummer	....
Stoddard-Dayton	Alamo Auto. Co.	De Hymel	....
National	J. W. Munn	Munn	....

AUGUST 4.

Twenty miles; 451 to 600 cubic inches—

National	J. W. Munn	Munn	17:23
National	H. F. Sundin	Sundin	18:17 2-5
Stoddard-Dayton	Alamo Auto. Co.	De Hymel	No time kept
Interstate	M. O. Kopperl	Harold S. Brinker	No time kept

Ten miles; 161 to 230 cubic inches—

Stoddard-Dayton	Alamo Auto. Co.	De Hymel	11:52 4-5
Buick	L. E. Perry	Henry Petit	12:01 4-5
Buick	George DeWitt	George DeWitt	12:18 4-5

One mile, Galveston Beach record, flying start—

Chadwick	A. S. Johns	Len Zengel	40 3-5 sec.
Stoddard-Dayton	Alamo Auto. Co.	De Hymel	41 4-5 "
Chadwick	Chadwick E. Wks.	Ben Johnson	42 3-5 "
Buick	George DeWitt	DeWitt	44 1-5 "
National	J. W. Munn	Munn	45 1-5 "

Ten miles; 231 to 300 cubic inches—

Marion	F. Lee Carroll	Carroll	11:10
Stoddard-Dayton	Alamo Auto. Co.	De Hymel	11:35 1-5
Marion	P. R. Plummer	Plummer	12:06 3-5
Moon No. 11	Guy Nunnelly	Phil Wells	No time kept

Ten miles; 301 to 450 cubic inches—

Car	Entrant	Driver	Time
National	J. W. Munn	Munn	8:51 3-5
National	H. F. Sundin	Sundin	9:06 4-5
Moon	Guy Nunnelly	Phil Wells	No time kept

AUGUST 5

Free-for-all, 200 miles—

Stoddard-Dayton	Alamo Auto. Co.	Tobin de Hymel	3:02:22
Chadwick 6-cyl.	Chadwick E. Wks.	Ben Johnson	3:30:21 2-5
National	J. W. Munn	Munn	3:33:33 2-5
Chadwick 6-cyl.	A. S. Johns	Len Zengel	Did not fin.
Buick	George DeWitt	DeWitt	Did not fin.
Hudson	E. H. Labadie	Labadie	Fin. 4th
Marion	F. L. Carroll	Carroll	Did not fin.
Marion	P. R. Plummer	Plummer	Did not fin.
Interstate	M. O. Kopperl	Harold S. Brinker	Did not fin.
National	H. F. Sundin	Sundin	Did not fin.
Marmon	J. P. McNay	Clark	Did not fin.
Stoddard-Dayton	Alamo Auto. Co.	W. F. Steinhardt	Did not fin.

M. R. A. to Stage Another Matinee

Several novel features will be introduced at the matinee to be given by the Motor Racing Association at Brighton Beach Saturday. One of the events carded for that occasion is a pursuit race in which the four contestants are to start from the quarter poles, the race to be divided when one of the entrants laps each of his competitors. An attractive program of sprints has been arranged.

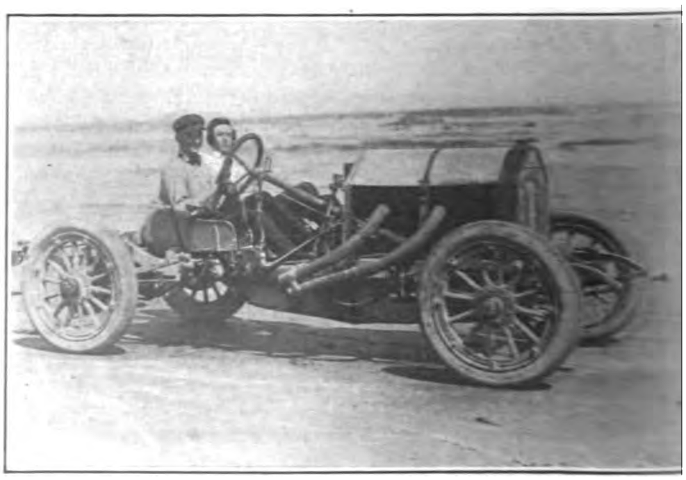
As only four cars can start in such a contest as the pursuit race, the association has announced that it will reserve the right to classify the entrants so as to produce a real contest. In case the entries are of sufficient volume to warrant it there may be two or even more races of this type.

Among the entries so far received are those of a Marion, Cole, S. P. O., Correja, Fiat, Palmer-Singer, Haupt-Rockwell and the probability of still another big car.

One mile time trials against the record of the course, 52 3-5 seconds, will be another feature and considerable promise is held out that the mark will be set lower. It will be recalled that in longer races recently over this course miles have been made over a second faster than the standing record.

In the Class C races, two ten-mile dashes will be run, one for cars of 161-300 cubic inches displacement and the other for 301-600 cubic inches. The amateurs also will have a chance to show their paces. The program will be rounded out with a free-for-all and a one-hour race, similar to the one given recently.

In some respects the program offered for Saturday afternoon is one of the most pretentious of the present season.



Stoddard-Dayton "50" which won the 200-mile race on the Galveston beach in 3 hours, 2 minutes, 22 seconds

Week's Doings in Detroit

NEWS OF TRADE HAPPENINGS DURING THE PAST SEVEN DAYS IN THE GREAT AUTOMOBILE MANUFACTURING CENTER OF THE COUNTRY

DETROIT, Aug. 8—Agents handling the Everitt "30" met here last week in conference with officers of the Metzger Motor Car Company, and spent several days looking over the 1911 line. At the conclusion of the convention it was announced that the distributors in attendance had contracted for 4,000 cars, the entire output of the factory for 1911.

W. S. Piggins is the new president of the K-R-I-T Motor Car Company, assuming the place made vacant by the retirement of Claude S. Briggs. Kenneth Crittenden takes the vice-presidency and B. C. Kaughlin will serve as secretary-treasurer, with J. E. Winney as manager of sales.

Architect Louis Kamper has prepared plans for a factory building for the newly organized Universal Motor Truck Company. The company has purchased a site of three acres in the northeastern section of the city. The building will be of reinforced concrete construction, 254 feet long and 61 feet wide, with a separate power plant. Work will be rushed in the hope of having the factory ready for occupancy November 1. About 500 men will be employed at the start and the company hopes to have its first cars on the market early in February.

It will manufacture commercial trucks of one and one-half and three tons capacity, to be known as the Universal trucks. It is the intention, after the business has become well established, to make a five-ton truck, in addition to the smaller ones. This will make an addition to the plant necessary, but provision has been made for it in the plans. The men principally interested in the new venture are prominent Detroiters for the most part, including C. H. Habercorn, Judge More Rohnert, Louis Kamper, Curt Kling, Edward Barker, Albert Fisher and others. E. Uiklein, of Milwaukee, is another of the incorporators.

Another manufacturing concern is likely to make its début in the near future. As a preliminary step, the Aetna Investment Company was organized last Spring to manufacture a trial car of a new torpedo type. This company has recently increased its capitalization from $5,000 to $20,000. A second corporation, known as the Huron Radiator Company, has been organized by the same people and now has a factory in operation. The officers of the Aetna Investment Company are: President, Malcolm T. Faulkner; vice-president, Dr. L. C. Moore; secretary-treasurer, M. W. Allen. The directors are the officers and John A. Stuart and F. Stephen Kratzett.

The Detroit Auto Specialty Company is building a two-story addition to its plant on Greenwood avenue and has purchased 300 feet of land adjoining its property with a view to further increasing its facilities later on. The company makes gas engines, guards, fenders, tanks and other accessories.

Harold S. Brinker, in his Inter-State "40," which performed well in the Galveston Beach races

The Goodfellow Tire Company, of Detroit, has increased its capital stock from $30,000 to $250,000.

The Lion Motor Sales Company has opened headquarters at 652 Woodward avenue, from which point it will handle the output of Lion cars, made at Adrian, Mich.

Charles F. Garaghty has been appointed assistant to the treasurer of the E-M-F Company, and will also take charge of the repair parts and claims department.

H. A. Mitchell, formerly assistant advertising manager for the Abbott Motor Company, has taken up engineering work with the Hudson Motor Company.

William J. Gaynor, Mayor of New York, Shot

William J. Gaynor, New York's unique mayor, was shot and probably fatally wounded early Tuesday morning by J. J. Gallagher, a discharged employee of the Dock Department. The shooting occurred on the deck of the steamer *Kaiser Wilhelm der Grosse,* upon which Mayor Gaynor had engaged passage to Europe, just prior to the moment of sailing.

Mayor Gaynor, in a Lozier, welcoming the Atlanta-New York Good Roads tourists

Mayor Gaynor, during the few months in which he has been the presiding officer of the metropolis, has taken an important position with regard to good roads and the automobile. He has been alternately in great favor and much blame in the minds of motordom on account of his official activities.

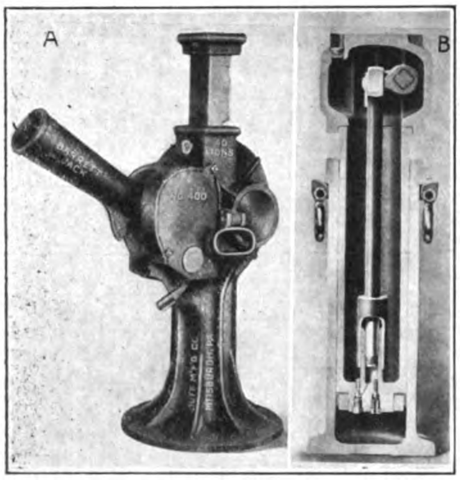
When the legislative matter touching upon the closing of the main automobile course from New York to Coney Island was presented to Mayor Gaynor, he gave the motorists short shrift and a shorter answer; but when the *Herald-Atlanta Journal* good roads tourists reached New York, the Mayor seemed particularly pleased to deliver the address of welcome.

He has been named as an honorary official of numerous contests about New York, but so far as is known he has never served in such capacity. His peculiar personality has made a deep impression upon the people of the whole country, because of his directness and lack of softening diplomacy. The bullet which struck him down took effect below his right ear. The assassin was captured on the spot by "Big" Bill Edwards, Commissioner of Street Cleaning, who was also wounded in the struggle that resulted.

Prominent Automobile Accessories

POWERFUL JACKS FOR AUTOMOBILES

Among the necessaries in the equipment of an automobile tool box is a jack capable of handling the weight of the car without much effort. The Duff Manufacturing Company, of Pittsburg, Pa., is making a specialty of jacks of all sizes, ranging from those suitable for automobile work to large ones with a capacity of 40 tons. The Barrett Ratchet Geared and a sectional view of the Duff-Bethlehem hydraulic jack are here shown. The latter, with its bottom forged integrally, obviates the troublesome problem of packing. A minimum number of parts are employed in the operating mechanism, and any part may be easily replaced without special tools. One man can easily operate this jack to its normal capacity, and no operating valves projecting beyond the body of the jack, there is less likelihood of breaking from rough usage.



Handy jacks for automobile tool boxes

A MODEL QUICK-DEMOUNTABLE RIM

The demountable rim has so proved its convenience and adaptability that it is rapidly approaching the point where it will be included in the regular equipment of all high-class cars.

As quickness of adjustment in the *raison d'être* for the demountable rim, so experts are laboring to still further lessen the time necessary for tire replacements on the road. As a milestone in the progress along these lines the Denegre demountable rim, made by the company of the same name at 1922-24 Avenue F, Birmingham, Ala., is here shown. The illustration shows a steel rim shrunk around the wooden felly of an artillery wheel.

On the inside surface of the tire rim are placed fasteners at equal distances apart. Thirteen are used. These fasteners are 2 inches wide by 2½ inches long and are provided with tongues or ribs ⅝ inch wide. The fasteners taper from the center toward either end and are thus capable of being placed right or left. At the point where the valve extends through the tire rim it is provided with small steel blocks which are cold riveted to the rim. These blocks act as a shoulder by which the rim is pried off. The fasteners are also cold riveted to the rim.

On the steel wheel rim at equal distances apart are a corresponding number of fasteners, which are also cold riveted to the rim. They are provided with grooves ⅝ inch wide, which allow the tongues or ribs of the tire rim fasteners to enter. It will thus be seen that the tongue-and-groove principle is used. These fasteners on the felly rim are the same width and length as those on the tire rim. They are tapered differently, however. The taper extends from one end to the other, or the total length of 2½ inches.

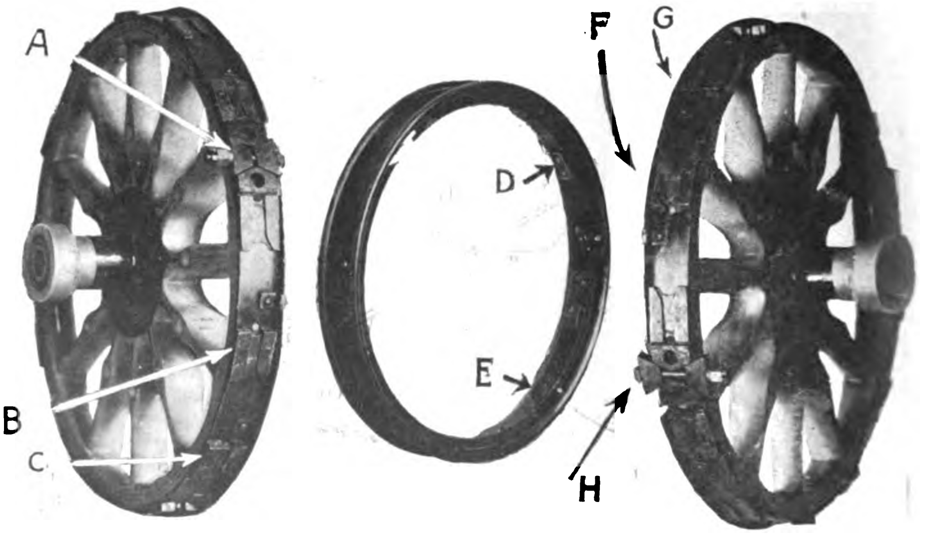
The hole for the valve in the wheel rim and felly is the regulation size, except that it is elongated so as to permit the rotative action when the tire rim is being mounted and fastened. The fasteners are so arranged that the tendency is to tighten by reason of the taper. After the tire rim with the inflated tire has been mounted on the wheel and set into place as much as can be by hand, the key is put in and the final drawing into place is done with the bolt. As but one bolt and nut is necessary, it is an easy matter to have a castle nut with a cotter pin, thus preventing the nut from working off. The felly of the wheel is not cut and weakened by bolts, nor is the tire rim cut through. It is a solid, continuous steel rim. The whole outfit is simple, absolutely safe and reasonably light.

REFINEMENT IN AUTO HORNS

With a view of improving the tone of automobile horns, and especially to avoid the clogging and "muting" common to all horns using the ordinary reed, when the bulb is pressed suddenly or too forcibly, the Gaylor Automatic Stopper Company, of Stamford, Conn., has devised a double-acting reed, which insures a loud blast of the horn under any or all conditions. The tongue, or vibrator, is set exactly central in the reed; this prevents clogging, for one valve is always open and will start the vibration. Besides, the tone produced is smoother and longer with the double-acting, centered reed than with the usual form.

WIND SHIELD WITH GOOD POINTS

The Banker Wind Shield Company has in its No. 2 model De Luxe shield, solved the vexatious problem of producing a clear vision shield with no metal strips across the glass to obstruct the driver's view of the road by using brass channeled shelves which extend from the frame to support the glass. At the same time by the setting of the upper glass fold one-quarter of an inch lower and forward of the lower glass fold, it absolutely prevents any possibility of rain, wind or dust coming through. By the use of adjustable telescoping rods, which are easily operated from the seat, any angle desired may be obtained in connection with ball ratchet hinges. The double fold over the hood is obtained by means of an expander placed inside the telescoping rods, and fitted at the end with a knurled wheel that tightens or releases the tension instantly in raising or lowering the shield. A slight pressure of the hand on any part of the frame will put the shield at any desired angle.



Details of Denegre demountable rim—A, retaining key in closed position; H, the same in open position; B and F, the fasteners; C and G, grooves which take tongues on the tire rim; D, steel fastener, cold riveted to rim; E, showing taper from either end—can be placed right or left

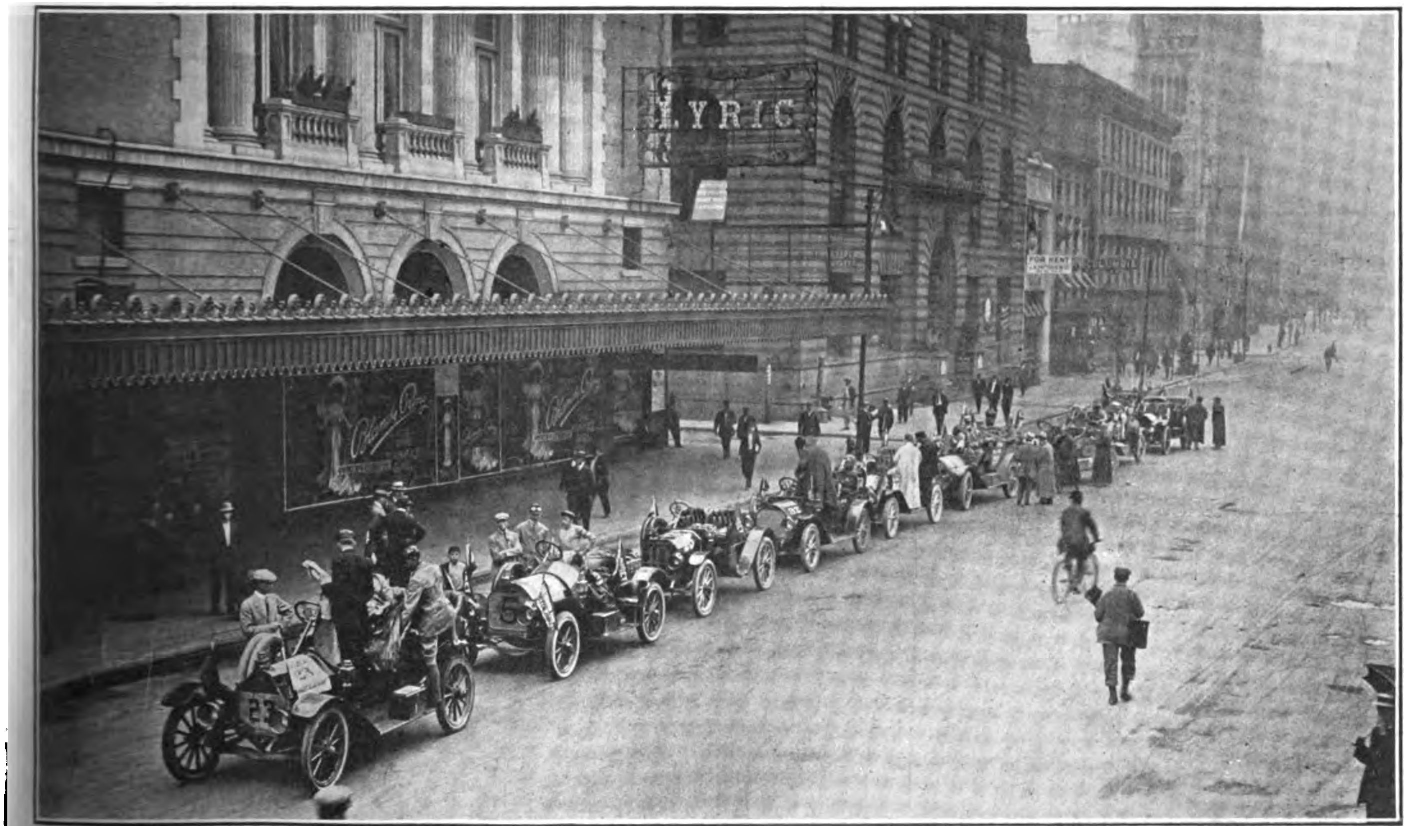
VOL. XXIII NEW YORK—THURSDAY, AUGUST 18, 1910—CHICAGO No. 7

THE AUTOMOBILE

Munsey Tour Starts

MOST IMPORTANT RELIABILITY CONTEST OF THE YEAR OFF ON ITS LONG JOURNEY THROUGH TEN STATES—28 CONTESTANTS AND 8 OFFICIAL CARS IN THE LINE-UP

PHILADELPHIA, Aug. 16—With a typical field of starters in the contesting division, the Munsey Historic Tour of 1910 commenced its long grind of 1,550 miles this morning from Philadelphia. Twenty-three different makes are represented and the cars are running in six divisions under the regular price classification.



THE CARS LINING UP ON NORTH BROAD STREET FOR THEIR 1600-MILE JOURNEY

The route to be followed has been laid out to cover points of historic interest through the scenes of Revolutionary and earlier [illegible] the annals of the United States, as well as touching the great battleground of the Civil War at Gettysburg and some of the places made famous by the conflict of 1812, finishing at Washington on Aug. 27.

The first day's run from Philadelphia to West Point was 160.1 miles, requiring 8 hours running time for the larger cars. The course was over the Old York Road, over which the British troops dashed when Washington met his severe check at the battle of Germantown. Passing through Ogontz, Bustleton, La Trappe and Oxford Valley, the tourists reach Trenton and for a part of the journey follow the path taken by Washington when he surprised the Hessians at Trenton and afterward moved swiftly upon the detachment entrenched at Princeton. From the scene of these two victories for the patriot arms, the course lies along the identical road taken by Washington in reaching Morristown.

A considerable portion of the road going into that place and leaving it was built by the Continental soldiers during the winter that followed the actions at Trenton and Princeton. History says that Washington experienced much trouble in keeping his men busy in winter quarters, and in his wisdom he ordered them to build roads and other strategic and engineering works rather than lie idle and plot mischief. In this way certain sections that were occupied by the Continental forces during the war, received the impetus always given to communities by the possession of good roads.

From that point clear to the New York State line the way lies through a series of roads that antedate the Revolution. Scarcely a mile is passed that does not contain some point of historic interest; either an ancient dwelling that once sheltered the Commander-in-Chief or the site of a block-house or little fort that was the scene of desperate conflict.

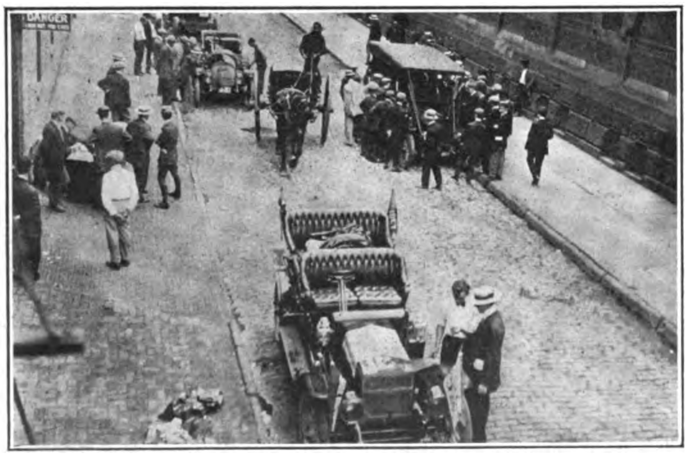

Starter Newmyer, Referee Ferguson, and Hemstreet, Tracy and McMurtry, the "technical" sharps

After entering New York State, the course of the tour is even more interesting for it traverses hallowed ground for much of its distance. Stony Point, where "Mad" Anthony Wayne and his band captured a British stronghold with the bayonet, is one of the features and West Point, once considered the Gibraltar of America and now the seat of the National Military Academy, was the objective point of the day.

The day broke gray and cloudy with prospect of more rain, but the tourists were astir early and sharply at 7 o'clock the first of the cars was sent away.

The officials in charge of the run have been preparing for it for several weeks and as a result every item of detail was carefully arranged in advance. There was no confusion or hurry or tangle and everything moved with the precision of clockwork.

The tour is the second annual of the Munsey newspapers. Last year there was more or less informality about the run; laxity in the administration of the rules and a general tendency to mix pleasure with business to an undue degree. This year, however, the affair is being conducted on a plane with which no fault may be found on that score.


Preliminary inspection of the cars by the Technical Committee

The most searching technical examination was imposed upon the contestants by a committee consisting of E. L. Ferguson, Joseph Tracy and J. A. Hemstreet, which was supervised by Alden L. McMurtry, of the Automobile Club of America. So strict was this examination that three cars failed to qualify and two were allowed to start only after special investigation.

The route to be followed is in no way comparable to that of the recent Glidden Tour. The Munsey Tour runs through a civilized country all the way. There are no such bogs and neglected highways as were found in North Alabama and no such desperate trails as the one that led into Texarkana and through Oklahoma. There are some pretty tough spots in the Munsey itinerary, but nothing like those encountered in the Glidden. Practically from the start to the finish, the tourists will be within hailing distance of populous and prosperous communities in which the automobile already is held in affectionate regard.

Only three 1911 models are in the caravan, although a dozen of the contestants are of almost identical patterns with the models for the coming year so far announced by their manufacturers. The avowed 1911 models are the Crawford, Inter-State and Kline-Kar, all the others being of the current year.

Following a banquet Monday night at the Hotel Walton for those who are participating in the tour, E. L. Ferguson, referee, announced a new system of checking and daily scoring that is intended to do away with much of the annoyance and delay that have been experienced in other runs. The crew of each car is furnished with a book of blank forms containing spaces for car number, division and day. Then follows a skeleton of both morning and afternoon schedules with the starting time, running time, tire time, allowances and time due to arrive at each control. Opposite to these sections is a space for the observer to note the happenings of the day and attached to this blank is the driver's time card, which cross checks against the observer's record. In this card, space is left for the starter to note the time of beginning the run, the rate of the running time, and for the checker to note arrival at controls. Both of these sections must be handed in at the end of each day and obviously must check with one another.


Columbia, No. 2, with G. M. Wagner at the wheel

Mr. Ferguson and the officials hope that an extra degree of promptness can be attained in making up the daily records of penalizations by following this system.

The rule about a car carrying its advertised capacity load has been strictly enforced and those that do not carry as many passengers as might seem to be required have large bags of sand stowed away to make up the legal weight.

The technical examination was decidedly severe. The tread of every machine was measured. The height of the frame from the axle was accurately ascertained. The springs were measured in a most thorough manner, both the width of the leaves and the thickness of the leaves being taken into consideration, and the springs were afterward counted, the whole operation being attended to strictly to make certain that the springs are the springs of the stock certificates and not taken from a heavier model. The distance from the front axle to the end of the front springs was measured to see that the springs do not shift back and forth. Three men were constantly engaged in taking these measurements to check up the makers' certificates.

While this work was going on another man was checking up the spare parts, putting them in bags and sealing them up. Other measurements were also taken. The diameter and length of the spokes were ascertained, and the floor boards and hood covering were removed and an inspection made of the power plant. All the information obtained was carefully jotted down, and the finished page was signed by the driver and the representative of the entrant, so that no dispute could possibly arise.

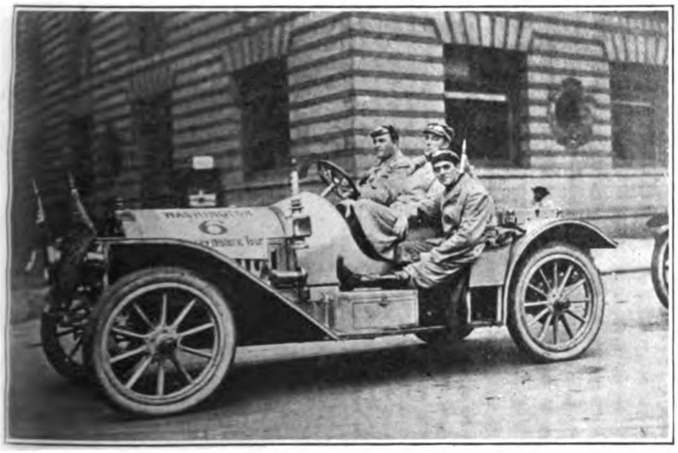
The official cars include the following:

Car	Entrant	Use
Columbia	Columbia Mot. Car Co.	Pacemaker
Thomas	E. R. Thomas M. C. Co.	Press
Washington	Carter Mot. Car Co.	Press
E-M-F	E-M-F Co.	Press
Selden	Selden Mot. Veh. Co.	Pilot
E-M-F	E-M-F Co.	Pilot
Ohio Roadster	Ohio Motor Car Co.	Starter
Brush	Brush Runabout Co.	Photographer

A Randolph truck carries the baggage as a non-contestant.

Under the schedule arranged divisions 4, 5 and 6 must make 20 miles an hour; divisions 2 and 3, 18 miles an hour and division 1 is required to do 16 miles an hour.

The complete list of the officials in charge is as follows: E L. Ferguson, referee; Technical Committee, E. L. Ferguson, Joseph Tracy and J. A. Hemstreet; Arthur G. Newmyer, starter and chief observer; A. J. Irvin, assistant starter and chief observer; Harry Ward, pilot number 1; M. M. Mauger, pilot number 2; J. A. Hemstreet, noon checker; T. C. Willis, checker-in and advance man; Francis J. Byrne, press representative and Olin W. Kennedy, manager for the Munsey newspapers.



One of the Washington pair—W. D. Arrison driving

The day was remarkable for careful driving, every man at the wheel taking no chances for getting points against his machine. Although the pacemaking car was well in advance of the contestants, there was no effort on the part of the cars to pass each other at high speed, every one being content to keep well to his time limit.

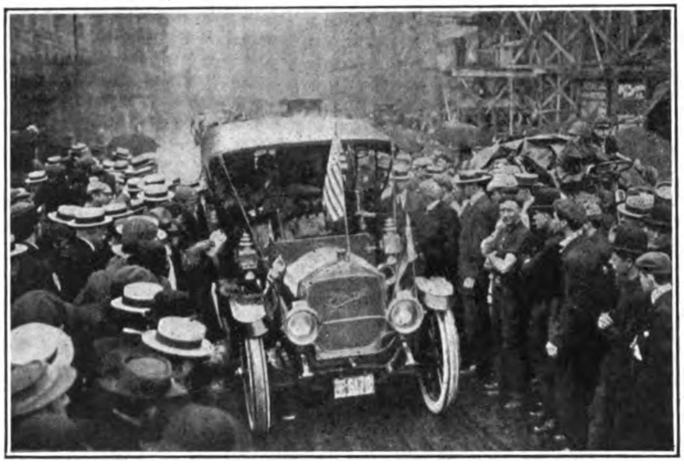
The ferry at West Point, which it was thought would offer some difficulty, was easily manipulated. Arrangements were made to have all the cars ferried over, and this was done before 7 o'clock. Through the kindness of L. Lawson of Garrison, N. Y., a fine place was secured to park the cars in front of the station, but a short walk from the ferry.

The greatest enthusiasm exists among all the men in regard to making perfect scores, all recognizing that a good showing in this tour means glory for their cars.

The scores of the day's run were posted on the official bulletin board at 8 o'clock to-night.

As soon as the data were collected this evening Referee Ferguson summoned the officials of the tour to his room and at once made out the reports so that the men could see them in plenty of time and avoid the irritating delays in posting scores which have marred so many tours.

The observers' assignments for the next day were also given out and the other business of the tour despatched early. This thorough method of handling the official business of the tour on the very first day made an agreeable impression on the contestants.



Last year's winner, Frank Hardart, and his new Elmore

The official cars of the tour maintained their reputation for good work. The E-M-F pilot car carried the confetti men along the route in fine shape. In spite of the fact that the car shifted off the track several times because of bad directions, it was always able to regain the right course and hold its distance well in the lead without ever being sighted by the other machines.

The Selden pilot car did the work for which it was called on flawlessly, covering a score or more of miles more than were scheduled and still scattering confetti well in advance of the contestants.

The Columbia pacemaker car and the Washington and E-M-F press cars carried the newsmen of the trip through the entire journey in speedy time, running back along the route whenever it was necessary and still covering the course with the contesting cars.

The only untoward incident that occurred during the day happened when the Ohio car was midway between Morristown, N. J., and West Point. A passing team became frightened and plunged into the machine which Ross Henwood, the driver, had brought to a standstill. Two women occupants of the carriage were badly frightened, and the carriage was damaged.

Warren-Detroit, No. 10, a candidate for Class 3A honors

The starters' car came up at that moment and drove the women to their home, nearby, afterwards assisting in taking the carriage to a neighboring blacksmith shop. The owner of the carriage refused to accept any money compensation for the injury done.

Every arrangement which had been made for the handling of the contesting cars en route and the performance of official duties has been found to work out well in practice.

The plan to carry a checker along with the pilot car and then to drop him at the noon control so that he could check in the machines has met with general satisfaction and has resulted in carrying on the business of the tour splendidly. The noon checker is picked up by the last press car and brought into the night control.

The Bay State Automobile Club, of Boston, will have several representatives to go over the road to Providence to meet the tourists and escort them to the Hub.

The selection of the Hotel Lenox as headquarters for the tourists is especially pleasing to the Bay Staters for they have just opened their new rooms there and will give the tourists, during their brief stay, the freedom of the place.

The club is especially well located, its rooms being on the Boylston street side and on the ground floor.

The complete itinerary of the tour follows:

August 16 from Philadelphia to West Point, N. Y..........	160.2
August 17 from West Point to New London, Conn............	167.8
August 18 from New London to Boston, Mass.............	117.2
August 19 from Boston to Portland, Me..................	140.8
August 20 from Portland to Bethlehem, N. H.............	122.7
August 21 (Sunday) Lay-over at Bethlehem, N. H.	
August 22 from Bethlehem to Burlington, Vt..............	102.8
August 23 from Burlington to Saratoga, N. Y.............	200.5
August 24 from Saratoga to Binghamton, N. Y.............	164.7
August 25 from Binghamton to Wilkes-Barre, Pa...........	98.5
August 26 from Wilkes-Barre to Harrisburg, Pa...........	115.8
August 27 from Harrisburg to Washington, D. C...........	159.3
Total Mileage	1,550.3

West Point, N. Y., Aug. 16—Under leaden skies the first day's run of the Munsey Historic Tour of 1910 was run off. A severe shower soaked all hands during the morning, but proved not to be of sufficient weight to make the roads muddy. This is due in large part to the fact that the rain fell in a circumscribed area of New Jersey, where the roads are largely made up of stone or well-kept macadam. All day the threat of more rain was impending, but it did not materialize.

The roughest spot in the entire itinerary of the day was a mile within the limits of Philadelphia, where the asphalt pavement had been suffered to deteriorate and was filled with backbreaking chuck-holes. Next to that terrible stretch of street, a hill paved with cobblestones "au naturel," the edges of the living rock, made many of the tourists wonder why they had undertaken the trip. But these difficulties were easily surmounted by all the entered cars, and it was a 30 per cent. grade, twenty miles south of West Point, that caused the most trouble. The Thomas press car, the same machine that made the world-girdling tour some time ago, was the principal sufferer. The car was ditched half-way up the hill and the whole crew consisting of two newspapermen, passenger and driver were shaken up. None of the injuries to the members of the crew proved to be of moment. The car, however, was laid out on the hill all night.

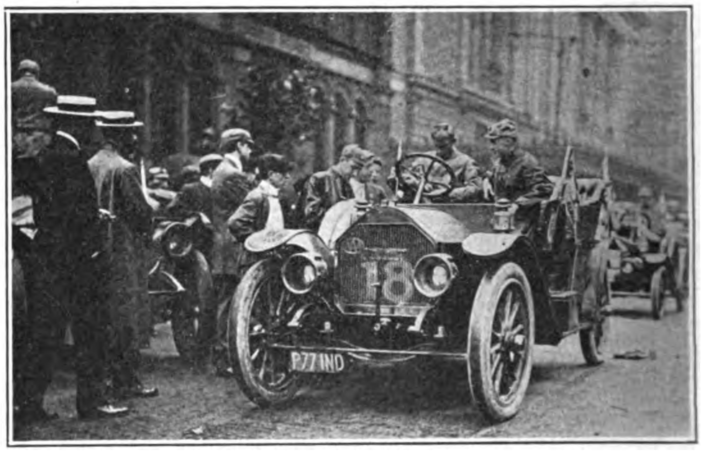
The Inter-State entry was the real sufferer as the result of the day's work as its crew was obliged to put in 46 minutes examining the vitals of the car before it was discovered that a soft steel bolt had been ground up in the transmission and was lodged in the teeth of the gears. I. W. Dill, driver, intimated broadly that the presence of the soft steel bolt was entirely unknown to him and stated that he believed it was put where it would do damage by some malicious person.

Aside from these incidents the day proved an excellent test for both cars and crews.

Arriving at West Point, the tourists witnessed a dress parade of the cadet corps before dinner.

The new scoring plan of Referee Ferguson demonstrated its merit and the complete technical and road showing of all contestants was announced early in the evening.

Only two out of the twenty-eight starters suffered penalties on account of the first day's run. These were Brush Runabout, No. 13, which received three demerits for an involuntary motor stop, and Inter-State, No. 29, which was penalized 46 points for 46 minutes' work in discovering the broken bolt in the transmission and the further penalty of 3 points for taking on lubricating oil out of control—a grand total of 49 demerits for the day.



Great Western, No. 18—C. LaMar—a 3A entry that looks good

The eight-mile-an-hour speed regulation of the military reservation resulted in the arrest of the crew of the pacemaking E-M-F car. The crew of the Corbin were also given a warning. The E-M-F car was summarily banished from the reservation.

The Munsey Historic Tour of 1910 is the second annual automobile reliability event of national importance promoted under the auspices of the Munsey papers—The Washington *Times*, the

Regal Plugger, Class 3A, driven by A. W. LaRoche

Louis Strang and the Pierce-Racine, out for the Class 4A trophy


K. Crittenden's K-R-I-T, contesting for the small car emblem


Ohio, No. 21, looked upon as a possibility for Class 4A prize

Baltimore *News*, the *Evening Times* of Philadelphia and the Boston *Journal*. The Munsey Tour of 1909 from Washington to Boston and return was eminently successful. This year's route is longer than that of 1909, covering 1,550.3 miles. Starting from Philadelphia the course runs to West Point, N. Y., New London, Conn., Boston, Mass., Portsmouth, N. H., and Portland, Me., then through the White Mountains and Green Mountains to Burlington, Vt., and to the Isle La Motte in the upper reaches of Lake Champlain. The course from there is through Plattsburg, Saratoga, Binghamton, Wilkes-Barre, Gettysburg, Frederick and Baltimore, ending in Washington at the office of the Washington *Times*.


Glide, No. 28, Fred Cassel driving, a strong Class 5A probability

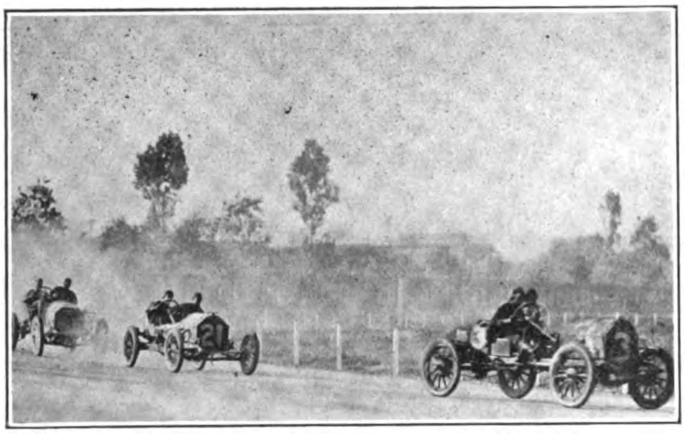
Twenty Clean Scores in Brooklyn Dealers' Run

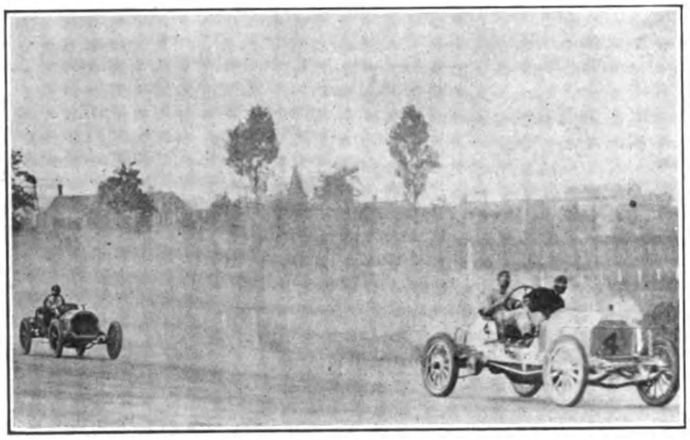
Official announcement of the road work performed by the cars that competed in the two-day reliability contest of the Brooklyn Motor Vehicle Dealers' Association last week was made Saturday by Referee A. R. Pardington. Twenty out of the thirty cars that started finished with perfect scores, as follows:

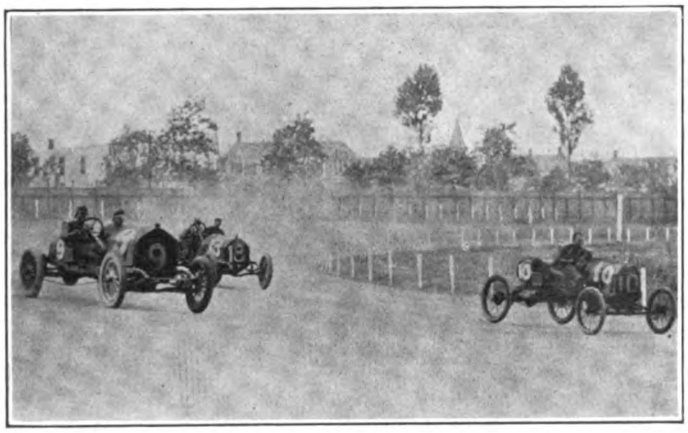
No. Car	Driver
1—Columbia	I. C. Kirkham
2—Haynes	L. A. Rourk
3—Locomobile	P. Mahoney
4—Hudson	W. H. A. Bruns
6—Inter-State	H. G. Martin
7—Stevens-Duryea	P. J. McDermott
8—Maxwell	E. T. Bloxham
11—Winton	William Braden
12—Auburn	Jacob Stark
16—S. G. V.	J. W. Mears
17—E-M-F	F. A. Ainslee
18—Kline	C. Smith
19—Speedwell	Arthur Gross
21—Columbia	G. M. Wagner
22—Chalmers "30"	Emil Fiedler
23—Midland	Leo Anderson
24—Haynes	R. Smidt
25—Maxwell	C. Fleming
26—Crawford	W. J. Houldcroft
30—Pullman	Ellis Kulp

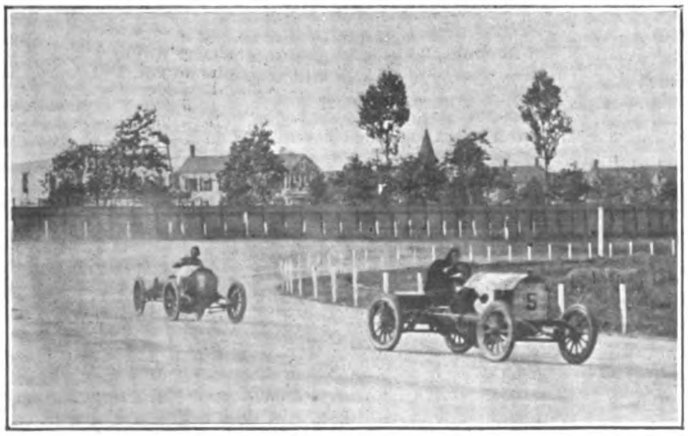
DETAILS AND DAILY PENALIZATIONS OF THE 28 CARS WHICH STARTED ON THE MUNSEY HISTORIC TOUR

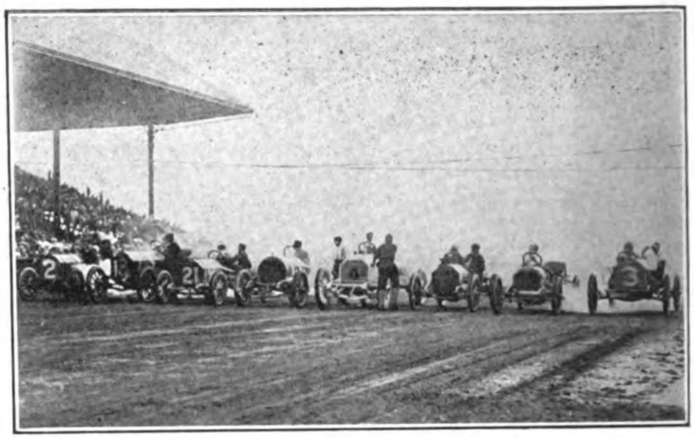
No.	Car	No. Cyl.	A.L.A.M. H.P.	Cyl. Bore	Piston Stroke	Car Model	Entrant	Driver	Price	Ignition	Tires	No. Pass.	Body	Penalties 1st day	Penalties 2d day
							CLASS 1A—CARS SELLING UNDER $800								
13	Brush	1	6 2-5	4	5	D .	Frank Briscoe	E. McCoy	$ 485	Bosch	Ajax	2	Runab't	3	...
14	Brush	1	6 2-5	4	5	D 26	Frank Briscoe	P. R. Kenny	600	Bosch	Ajax	2	Runab't	...	...
15	K-R-I-T	4	21	3 5-8	4	A	K-R-I-T Mot. Car Co.	K. Crittenden	800	Bosch	Diamond	2	Runab't	...	...
							CLASS 2A—CARS SELLING FROM $801 TO $1,200								
8	Ford	4	22 1-2	3 3-4	4	"T"	Chas. E. Miller & Bro.	C. E. Miller	900	Ford	Firestone	2	Roadst'r	...	...
26	Maxwell	4	22 1-2	3 3-4	4	"Q"	Max. Briscoe M. Co.	C. F. Fleming	900	Splitdorf	Ajax	2	Runab't	...	...
30	Ford	4	22 1-2	3 3-4	4	"T"	Ford Motor Co.	F. K. Peabody	825	Ford	Firestone	2	Runab't	...	...
34	Ford	4	22 1-2	3 3-4	4	"T"	Ford Mot. Co. (Phil.)	J. A. Cherry	825	Ford	Goodrich	2	Roadst'r	...	...
							CLASS 3A—CARS SELLING FROM $1,201 TO $1,600								
10	Warren-Detroit	4	25 3-5	4	4 1-2	A 108	Taylor Mot. Dis. Co.	Tom Berger	1,250	Bosch	Firestone	4	D. Ton.	...	...
15	Regal	4	25 3-5	4	4	E	Regal Motor Co.	A. W. La Roche	1,250	Remy	Empire	2	Runab't	...	...
18	Great Western	4	28 9-10	4 1-4	5	"30"	G. W. Auto Co.	C. La Mar	1,600	Remy	Goodrich	5	Touring	...	...
23	Staver-Chicago	4	25 3-5	4	4	H	Staver Carriage Co.	E. T. Knutsen	1,600	Bosch	Diamond	4	Touring	...	...
25	Maxwell	4	28 9-10	4 1-4	4 1-4	E	Max. Briscoe M. Co.	H. E. Walls	1,500	Splitdorf	Ajax	5	Touring	...	...
27	Crawford	4	28 9-10	4 1-4	4 1-2	1911	Crawford Auto Co.	A. A. Miller	1,450	Remy	Goodrich	4	Touring	...	...
[illegible]	Moon	4	28 9-10	4 1-4	5	30	Moon M. C. Co .	R. M. Upton	1,500	Bosch	Firestone	3	Runab't	...	...
							CLASS 4A—CARS SELLING FROM $1,601 TO $2,000								
[illegible]	Washington	4	27 1-8	4 1-8	5 1-4	C 40	Carter Mot. Car Co.	A. A. Carter	1,750	Bosch	Republic	2	Runab't	...	...
[illegible]	Washington	4	27 1-4	4 1-8	5 1-4	C 40	Carter Mot. Car Co.	W. D. Arrison	1,750	Bosch	Republic	2	Runab't	...	...
[illegible]	Pierce-Racine	4	28 9-10	4 1-4	5	K	Pierce Motor Co.	L. Strang	1,750	Remy	Diamond	5	Touring	...	...
[illegible]	Enger	4	30 6-10	4 3-8	4 3-4	"40"	Enger Mot. Car Co.	H. Frisch	2,000	Eisemann	Falls	5	Touring	...	...
[illegible]	Ohio	4	28 9-10	4 1-4	4 3-4	40 A	Ohio Motor C. Co.	Ross Henwood	1,850	Splitdorf	Goodrich	5	Touring	...	...
[illegible]	Inter-State	4	32 3-5	4 1-2	5	34A 1911	Inter-State Auto Co.	I. W. Dill	2,000	U. & H.	Mansfield	4	Touring	49	...
							CLASS 5A—CARS SELLING FROM $2,001 TO $3,000								
2	Columbia	4	32 3-5	4 1-2	4 7-10	48	Col. Mot. Car Co.	G. M. Wagner	2,750	Bosch	Ajax	4	Min. ton.	...	...
9	Elmore	4	32 3-5	4 1-2	4	46	Frank Hardart	A. S. Hardart	2,500	Atwa'r-K	Goodrich	7	Touring	...	...
11	Corbin	4	32 3-5	4 1-2	4 1-4	18	Corbin M. V. Co.	A. T. Bailey	2,759	U. & H.	Diamond	4	Db. rum.	...	...
22	Cino	4	25 3-5	4	4 3-8	A	Haberer & Co.	W. Donnelly	2,250	Remy	Diamond	5	Touring	...	...
24	Stoddard-Dayt'n	4	36 1-10	4 3-4	5	10 K	L. H. Shaab	Leo Shaab	2,750	Bosch	Goodrich	4	Toy Ton	...	...
28	Glide	4	36 1-10	4 3-4	5	Spec. 45	The Bartholomew Co.	Fred Cassel	2,500	Eisemann	Goodyear	4	Touring	...	...
31	Kline Kar	6	40	4 3-32	5	1911	B. C. K. M. C. Co.	C. Fairman	2,700	Bosch	Firestone	5	Touring	...	...
							CLASS 6A—CARS SELLING OVER $3,000								
33	Matheson	6	48 3-5	4 1-2	5	18	Math. Mot. Car Co.	D. A. Hall	3,500	Bosch	Firestone	5	Touring	...	...


Marion and Stearns passing the Cole "30"


S. P. O. No. 17 overtaking the Stearns


National and Palmer-Singer chasing the Ford


Simplex beat the Fiat in both heats of the match race


Line-up for the hour race, won by the S. P. O.

Brighton Races

S. P. O. AND FORD FEATURES OF A FINE AFTERNOON'S SPORT

FOUR new track records were hung up Saturday at the racing matinée of the Motor Racing Association at Brighton Beach track. The hour mark was set at 59 miles by S. P. O. car No. 20. while the Fiat No. 1 lowered the track record for the mile to 52.26; the five-mile to 4:36.60, and the ten-mile to 9.31.51.

The Simplex "90" administered another beating to the Fiat "60," winning two straight heats after fierce struggles.

The hour race went to the S. P. O. No. 20, which covered 59 miles, the Rainier, No. 15, beating out another S. P. O., No. 17, for the place.

H. M. Swetland acted as referee, while the judges were: J. A. Clark, J. C. Nichols, L. D. Rockwell and George C. John. A crowd of full 10,000 was present. The summaries:

	Car	Entrant	Driver	Time
One-Mile Time Trials				
5	Simplex	Simplex Auto Co.	Robertson	52.71
1	Fiat	Fiat Auto Co.	De Palma	54.76
Pursuit Race				
10	Ford	Ford Motor Co.	F. Kulick	3:29 4-5
7	Hupmobile	H. J. Koehler Co.	A. C. Dam	
6	Staver	Short & Wright	Chris White	
Ten Miles, Class C, Divs. 1, 2 and 3 C				
20	S.P.O.	Henry S. Lake	J. Juhasz	10:40.58
14	Mercer	Mercer Auto Co.	E. H. Sherwood	10:48.88
10	Ford	Ford Motor Co.	Kulick	10:49.22
3	Cole "30"	Colt-Stratton Co.	Endicott	
11	Correja	Correja Motor Car Co.	Joe Taylor	
Ten Miles, Class C, Divs. 4 and 5 C				
1	Fiat	Fiat Auto Co.	De Palma	9:31.51
2	Fiat	Fiat Auto Co.	E. H. Parker	
9	National	Poertner M. C. Co.	W. King Smith	
Pursuit Race, Ten Miles				
20	S.P.O.	H. S. Lake	J. Juhasz	10:27.87
11	Correja	Correja Motor Car Co.	Joe Taylor	10:39.57
3	Cole "30"	Colt-Stratton Co.	Endicott	10:48.07
21	Marion	C. E. Reiss	Disbrow	
Special Match Race, Three-Mile Heats, Best Two in Three				
5	Simplex	Simplex Auto Co.	Robertson	Won straight heats
1	Fiat	Fiat Auto Co.	De Palma	
	Time of winner: 2:43.67 and 2:43.41.			
Pursuit Race, Ten Miles				
9	National	Poertner M. C. Co.	Disbrow	9:55.58
19	Midland	J. M. Boyle	Leo Anderson	10:30.68
2	Fiat	Fiat Auto Co.	Parker	
18	Palmer-Singer	P.-S. Mfg. Co.	Wilson	
Five Miles, Free-for-All				
1	Fiat	Fiat Auto Co.	De Palma	4:36.60
9	National	Poertner Auto Co.	Disbrow	5:07.09
10	Ford	Ford Motor Co.	Kiulick	5:22.50
One-Hour Race				
20	S.P.O.	H. S. Lake	J. Juhasz	59 miles
15	Rainier	Rainier M. C. Co.	Wally Owen	56 1-4
17	S.P.O.	M. P. Batts	Batts	56 1-8
18	Palmer-Singer	P. S. Mfg. Co.	Wilson	56
4	Stearns	J. Rutherford	Rutherford	55
3	Cole "30"	Colt-Stratton Co.	Endicott	53
21	Marion	C. E. Reiss	Disbrow	51
2	Fiat	Fiat Auto Co.	Parker	48


Checking out from Market Street Ferry, Camden


Checking in at "the half-way point," Hammonton

69 BUSINESS WAGONS CONTESTED IN NORTH AMERICAN'S Commercial Run

PHILADELPHIA, Aug. 13—Accompanied by an escort of motorcycle policemen, sixty-nine motor trucks of all sizes, powers and types, participated in the *North American's* Motor Commercial Vehicle Run to Atlantic City, which left here yesterday and ended in Camden, N. J., to-day.

The event was as successful as it was unique, and, being the first contest of the kind ever held, attracted a great deal of attention. It was a wholesale demonstration of the remarkable strides that have taken place in methods of transportation. According to the rules governing the contest, each truck was weighed-in, both empty and full, and in order to facilitate matters three weighing-in stations were established in this city and Camden, where the trucks were weighed-in empty on Thursday and then again weighed loaded to capacity on Friday morning, just before their starting time. All sorts and conditions of truck were represented, ranging in capacity from 600 pounds, the smallest, to seven tons. Each truck before starting was allowed only its minimum amount of gasoline in order to propel it to Camden, where each was loaded and where the actual start of the run was made.

The run was in no sense a speed contest, the trucks at all times conforming to the speed rules, the schedule of which was as follows:

GASOLINE

Class A. 1½ tons capacity and less, 15 miles per hour; Class B, 3001 to 5999 pounds, 12 miles per hour; Class C, under four tons, 10 miles per hour; Class C, over four tons, 8 miles per hour.

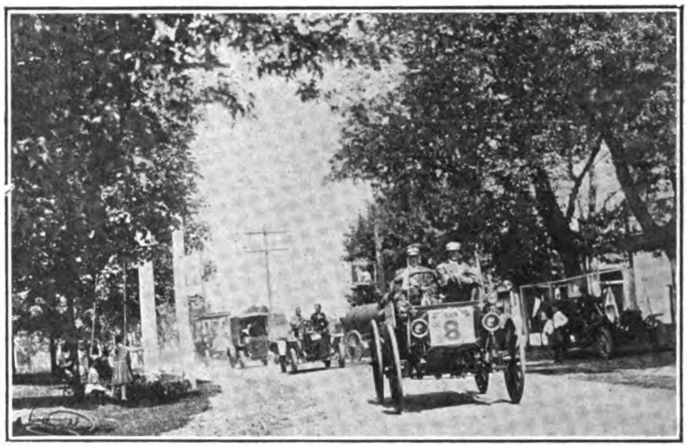
ELECTRIC

Class A. 1½ tons capacity and less, 12 miles per hour; Class B, 3001 to 5999 pounds, 10 miles per hour; Class C, 3 tons and over, 8 miles per hour.

The midway control was established at Hammonton, where each contestant was compelled to make a stop of 15 minutes. Winners of the run will be determined from ability to make time schedule, economy of gasoline, lubricating oil and electric current consumption, and penalties being inflicted for violations of speed rules.

The run down was made by what is called the short route—Camden, Hammonton, Egg Harbor, Absecon, Pleasantville, thence to Park Place, Atlantic City, where the vehicles checked in, right in the heart of the hotel district, and a great crowd gave the contestants a rousing welcome.

Of the 73 original entries but four withdrew, and of the 69 that started 61 completed the entire run. Of the eight that did not finish, five were in Class A and three in Class C. Six of them were from the manufacturers' division and two from the private owners' division.


Passing the White Horse Hotel, Torbensen leading


The big Frayer-Miller checking in at Atlantic City

Reliance, with its big load, reaches the shore

The Autocar had the best representation in line and of twenty cars of this make only one failed to get through. After checking in at Park Place, Atlantic City, the trucks were driven to Young's Million-Dollar Pier, and the exhibition of so many cars of so varied a type attracted a great crowd. Mayor Stoy, of Atlantic City, welcomed the participants last night in Convention Hall.

One of the difficulties feared before the run was held was the effect of the heavily-loaded trucks on the roads, but in spite of the pounding to which the roads were subjected by the weight of the trucks and the tires, some constructed especially for the occasion, no complaints were heard along the route. All of the cars upon their arrival in Camden were found to be in excellent condition.

An unusually large number of press cars accompanied the run, supplied by Automobile Row, consisting of a Welch-Detroit, Premier, Regal, two Buicks, Autocar, Chalmers and Locomobile. The Quaker City Motor Club conducted the event admirably, and, despite the fact that it was an entirely novel affair, everything was carried out with that attention to detail which usually characterizes the Quakers' efforts.

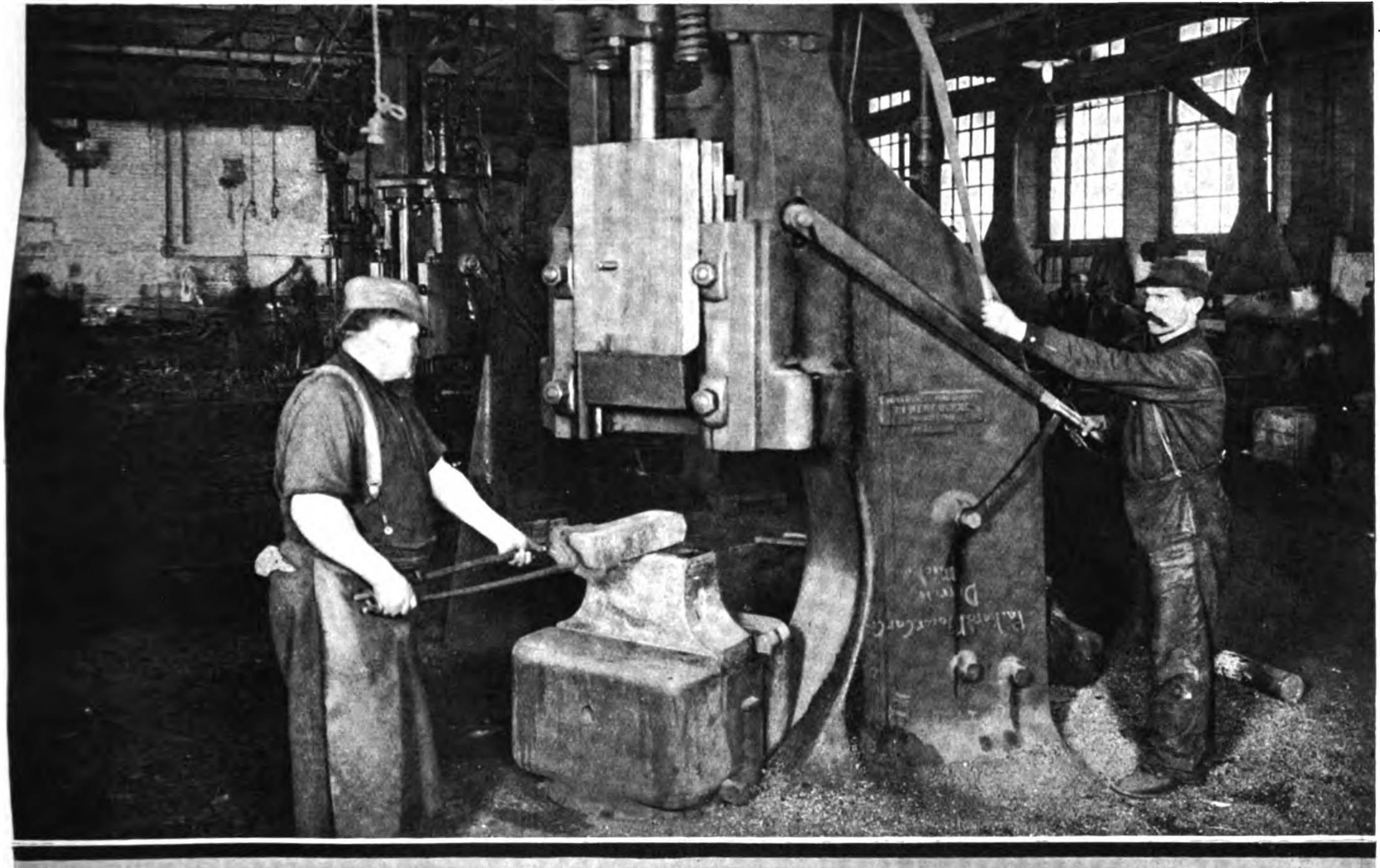
Ten prizes to the amount of $1,000 are to be awarded by the North American, the winners of which will not be announced for several days. Those who had the affair in charge were: Referee, R. E. Ross; starters, G. Hilton Gantert and Joseph L. Keir; chief timer, Paul B. Huyette; members of Quaker City Motor Club's Contest Committee—George M. Graham, Fred. C. Dunlap, A. T. James, A. E. Maltby, Evans Church; chairman of Technical Committee—Charles Stead; judges of weighing-in, Harry C. Volk, Clarence Cranmer, Clyde Woolson; judges, E. K. Leech, Robert M. McCormick, George W. Hipple, H. L. Hornberger, George E. Daniels, H. de B. Keim, J. Archer Paul, E. S. Foljambe, W. C. Jackson, E. H. Lewis.

In reckoning the results, a penalty of 1 point was imposed for every half minute a car was late and awards were based on the ability of cars to make time schedule and for smallest outlay for gasoline, lubricating oil and electric current. The summary:

No.	Car	Entrant	Driver	Time Penalties	Cost per mile per ton
		MANUFACTURERS' DIVISION—Class A (1½ tons capacity and less)			
1	Strenuous Randolph	Randolph Motor Car Company	H. Powers	†	†
2	Chase	Commercial Motor Car Company	C. Trustell	47	$.04173
3	Chase	Commercial Motor Car Company	H. L. Ferris	0	.02618
4	Chase	Commercial Motor Car Company	W. J. Burns	0	.05139
5	Martin	Martin Carriage Works	E. L. Kraft	4	.02775
6	Martin	Martin Carriage Works	J. M. Bowers	†	†
7	Torbensen	Torbensen Motor Car Co.	A. Torbensen	238	.02867
8	I. H. C. Auto Del. Wagon	International Harvester Co	W. A. Bauer	14	.06814
9	I. H. C. Auto Del. Wagon	International Harvester Co.	S. B. Shock	0	.05920
10	Buick	Buick Motor Car Co. (Phila. Branch)	W. Thompson	0	.03354
11	Buick	Buick Motor Car Co. (Phila. Branch)	E. Davis	14	.04377
12	Atterbury	Finnesey & Kobler	M. Kobler	9	.02531
13	Franklin	Franklin Motor Car Co.	W. R. Coughtry	0	*.01285
14	Rapid	Rapid Motor Vehicle Co.	J. Carey	890	.02382
15	Hart-Kraft	Hart-Kraft Motor Truck Co.	R. B. Lawrence	0	.03498
16	Overland	W. J. Sprankle	M. Craig	0	.04141
17	Victor	Victor Motor Truck Co.	C. E. Shaw	0	.01756
18	Grabowsky	Edgar W. Hawley	T. Richings	†	†
		Class B (between 3001 pounds and 5999 pounds)			
50	Garford	Garford Motor Truck Works	W. L. Ritter	0	*.01990
		Class C (between three and four tons)			
56	Frayer-Miller	Kelly Motor Truck Co. of Philadelphia	H. Webber	0	*.00765
57	Schleicher	Schleicher Motor Vehicle Co.	A. Besser	†	†
58	Standard Gas & Electric	Standard Gas & Electric Power Co.	W. Hunsberger	0	.00814
59	Gramm	A. T. Gardiner	A. Nott	0	.01226
60	Packers	Packers Motor Truck Co.	C. H. Smith	†	†
		PRIVATE OWNERS' DIVISION—Class A (1½ tons capacity and less)			
19	Autocar	Strawbridge & Clothier	G. Smith	0	.01354
20	Autocar	John Wanamaker	O. Green	0	*.00898
21	Autocar	Bailey, Banks & Biddle	J. J. Frewen	0	.01539
22	Autocar	Bailey, Banks & Biddle	J. A. Hess	0	.02183
23	Autocar	Lindsay Bros., Inc.	J. H. Lindsay	13	.01282
24	Autocar	Consolidated Rubber Tire Co.	J. Justice	0	.01697
25	Maxwell	Coca-Cola Co.	A. H. Whitcomb	0	.05188
27	Autocar	Cluett, Peabody & Co.	J. A. O'Neill	0	.01386
28	Autocar	Cluett, Peabody & Co.	J. M. Beatty	28	.01407
29	Autocar	E. Bradford Clarke	F. Donnelly	59	.01096
30	Autocar	Fritz & Larue	F. J. Scullin	5	.01135
31	Rowan	Wright, Tindale & Van Roden	A. W. Knerr	2	.03784
32	Autocar	Michael Del Collo	M. Del Collo	145	.01569
33	Autocar	Eshelman & Craig	E. Baurichter	0	.01266
34	Autocar	J. E. Caldwell & Co.	Mr. Lyman	0	.01450
35	Autocar	A. F. Bornot Bros. Co.	G. Myers	0	.01341
36	Renault	A. F. Bornot Bros. Co.	J. G. Carvill	†	†
37	Autocar	Theo. F. Siefert	B. Siefert	408	.01446
38	Autocar	J. S. Ivins' Son.	H. V. Fancey	‡	‡
39	Cartercar	Kellogg Toasted Corn Flake Co.	W. S. Kennathy	4	.01044
40	Autocar	Crane Ice Cream Co.	N. Althouse	0	.01403
41	I. H. C.	C. M. Ware	A. Brown	0	.04485
42	I. H. C.	S. F. Slaymaker	W. Shoch	0	.05743
43	Autocar	C. J. Heppe & Sons	K. W. Poole	0	.01490
44	Autocar	Chas. W. Young & Co.	W. W. Heeley	0	.01262
45	Autocar	R. G. Wood	J. Callopy	2	.01416
		Class B (3001 pounds to 5999 pounds)			
51	Motor Commercial	Suburban Auto Express Co.	M. Plush	137	*.01642
52	Frayer-Miller	Dives, Pomeroy & Stewart	E. O. Bennett	†	†
		Class C (between three and four tons)			
64	Packard	John Wanamaker	W. Danforth	0	.01238
65	Reliance Truck	J. B. Van Sciver Company	W. Beachboard	0	.01757
66	Alco	Gimbel Brothers	G. Pohlman	2	.01401
67	Alco	Gimbel Brothers	P. J. Jones	0	.01444
68	Frayer-Miller	Fleck Brothers	A. Jones	0	*.00705
		ELECTRIC VEHICLE DIVISION—Class A (1½ tons capacity and less)			
46	Commercial Truck	John Wanamaker	H. McCargo	6	.01394
47	Commercial Truck	Bergdoll Brewing Co.	F. Bauer	14	.01280
48	Commercial Truck	American Brewing Co.	R. Rother	0	.01345
49	General Vehicle	General Electric	F. Ayres	8	*.01013
		Class B (3001 pounds to 5999 pounds)			
53	General Vehicle	Bergdoll Brewing Co.	H. Wright	15	*.00706
54	Commercial Truck	John Wanamaker	M. Melia	93	.00966
55	Commercial Truck	American Brewing Co.	F. Flubacher	144	Meter failed
		Class C (between three and four tons)			
69	Commercial Truck	American Brewing Co.	K. Bey	0	*.00792
70	General Vehicle	Shane Bros. & Wilson	J. J. Craig	30	.00828
		MAMMOTH TRUCKS (Gasoline above four tons)			
71	Mack	Shane Bros. & Wilson	E. Turgeon	2	.01258
72	Gaggenau	Benz Import Co. of America	P. W. Gaylor	0	.00818
73	Mack	W. W. Wilson	A. Cattell	1	.00738

Note—* Winner. † Did not finish. ‡ Did not start.

Quality is Induced in the Process of Forging



UNDER THE HAMMER—TAKEN FROM LIFE IN THE PACKARD PLANT AT DETROIT

THAT there is an undercurrent of strength which will sooner or later dominate the engineering side of the automobile situation is apparent to those who penetrate below the commercial level and discover what engineers are thinking about and what the problems are that confront them. When an automobile is completed and the last coat of varnish is applied, it represents crystallized endeavor, but not necessarily an engineer's complete version. Unfortunately, or otherwise, it is not always possible to accept the versions of engineers. The object in building a car is to put it into commercial service, and frequently it is found that the commercial demand is in high discord with the engineer's version. Were the engineer's complete plan to be adopted under conditions as above enumerated, the commercial history of a completed automobile would never be written.

It may seem strange to a casual observer that automobiles are revised year after year. Each new model as it is presented to an indulgent public is represented as embodying all that is good, and the casual observer wonders why there should be any change. This character of observer is like one of the subscribers of THE AUTOMOBILE, who, when requested to renew his subscription, appended a foot-note to the request which read like this: "Kind Friends—Your journal has furnished me all the information I require and I will not be able to subscribe further; so please discontinue." If this subscriber wakes up in two years, and will then look at the automobiles of that time, he will have to ask somebody what they are.

The word "standard" as applied to anything means absolutely nothing, excepting that it conveys the impression that contemporaneous things may be on a certain basis. Evolution is ever going on, and standards shift, due to its onslaught. When an engineer lays out the latest and most approved type of automobile he does the best he can with his light, considering the character of materials available, not forgetting the wants of the supporters of the industry. If the best materials available can be improved upon by fabricators thereof, it stands to reason that the designer will find himself behind progress the very instant that the new materials arrive. If the purchasing public reaches new conclusions the engineer will take the hint.

Each year brings its crop of refinements, and they permeate every phase of the entire situation. In summing up the possibilities for improvement there will scarcely be any chance of disagreement if they take on the phases as follows:

(A) Improvements in manufacturing processes have the effect of (a) reducing the cost of manufacture and (b) making it possible to finish stronger and better materials.

(B) A closer study of designs suggests the possibility of utilizing different methods, multiplying production processes, and taking advantage of automatic means.

(C) Experience on the road enlightens the users who transmit that experience through commercial departments back to the designing office, and attempts are made to incorporate the new ideas.

(D) Stress of circumstances, as a famine of certain kinds of material, introduces new complications, affecting not only the methods of design, but the processes of manufacture as well.

(E) Style has its marked effect. The artistic eye is no more fixed than the standard. As the eye is trained it sees things differently. The result is a change in the appearance of the product.

(F) Legal restrictions are loosened up in time, and designs are changed to conform with the new demands.

(G) Racing and other contests, while they are in a sense sporting events, are in all fairness severe methods of testing, and the capable engineer learns more about the factor of safety than he might otherwise know, with the chance that changes have to be made to bring about unity in the factor of safety as it resides in the several members in order that all the links in the chain will be of the same length.

(H) Locality influences the situation. If a car is produced with the intention that it will best serve in a certain locality, and it proves to be so, the idea will spread, and despite the fact that the car, as produced, is only intended for service in that locality, it will be adopted for other places for no good reason.

With pressure coming from many sources, it would seem as if the time will never arrive when cars will be on a so-called standard basis, nor should there be any complaint on this score. The Navies of the world afford the best illustration of progress along standard lines than anything else ready at hand. The Dreadnought of to-day is probably just as near finality as the 44-gun frigate of the line which was affected by the Navies of the world before even the Monitor was thought of. Each new creation promises to be the best attainable, but those who accept such versions fail to take into account the fact that the promise is invariably advanced by the creator, and that no allowance is made for those who, in the light of all experience, take up the burden with greater vim and advance the work.

Transmission of an Automobile

WHAT K. W. NAJDER, M.E., HAS TO SAY ABOUT A TRANSMISSION GEAR; DEALING WITH IT IN A TECHNICAL WAY

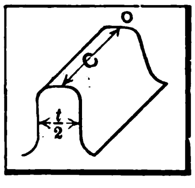


Fig. 1—Diagram of tooth as used in rendering elucidation of formulæ of same

THE speed of a motor may vary between certain limits, and thereby the speed of the car is also affected. Because the power of the motor is directly proportional to the speed, therefore, when the maximum power of the motor is required it must run at its highest velocity. We see that the ratio of the revolutions of the engine to the revolutions of the driving wheels must be capable of variation.

To design a transmission for an automobile, the following data must be known: (1) Normal speed of the motor in r.p.m. (2) Number of speeds required. (3) Value of these speeds in miles per hour. (4) Diameter of the driving wheels. (5) Horsepower of the motor.

Let: V = velocity of an automobile, 20 miles per hour.
D = diameter of the driving wheels, $2r = 36$ inches.
N = normal speed of the motor, 1,000 r.p.m.
n = number of revolutions of the wheels.
12 HP of motor. Then:

$$n = \frac{V \times 60}{2 r \pi}, \quad V = 20 \text{ miles per hour},$$

As 1 mile = 5280 feet, then $V = \frac{20 \times 5280}{60 \times 60} = 29.3$ ft. per sec.

36 inches = 3 feet, so $n = \frac{29.3 \times 60}{3 \times \pi} = \sim 186$ revolutions.

As the speed of the motor is 1,000 r.p.m., therefore, the transmission must be of ratio $T = \frac{1,000}{186} = \sim 5.3$ or $T = 1:5.3$.

Assuming that the maximum velocity should be 20 miles, and the minimum velocity 5 miles per hour, then the ratio must be:

$$T = \frac{5}{20} = 1:4, \text{ or 250 revolutions.}$$

We must figure the strength of the tooth:

$$\text{Circular pitch } t = \sqrt[3]{\frac{M d \times 2\pi}{\Phi K \times Z}} \text{ (from Hütte).}$$

$$\text{Twisting moment } Md = \frac{63,025 \times HP}{\text{r.p.m}} = \frac{63,025 \times 12}{1,000} = 756 \text{ inch-pounds.}$$

$$\Phi = \frac{b}{t} = 1.2 \text{ for auto transmission gears.}$$

Z_1 = 16 teeth on the first gear.
K = 1,000 pounds per square inch.

$t = \sqrt[3]{\frac{756 \times 2\pi}{1.2 \times 1000 \times 16}} = \sqrt[3]{\sim 0.24} = 0.62''$, or the thickness of the tooth is $\frac{t}{2} = 0.31'' = \sim 5/16''$, and this corresponds with 6-8 diametral pitch.

The length of tooth is $C = t \times \Phi = 0.62'' \times 1.2'' = 0.744 = \sim 3/4''$.

$$\text{Pitch diameter} = \frac{\text{number of teeth}}{\text{diametral pitch}} = \frac{16}{6} = 2\tfrac{2}{3}''.$$

$$Z_1 \begin{cases} \text{Pitch diameter} = 2\tfrac{2}{3}'' \\ \text{Number of teeth} = 16 \\ \text{Length of tooth } C = \tfrac{3}{4}'' \\ \text{D. P.} = 6-8 \end{cases}$$

The transmission countershaft shall make half revolutions of the motor, or:

$$Z_1 N_1 = Z_2 \frac{N_1}{2} = Z_2 \times N_2.$$

$$N_2 = \frac{N_1}{2} = \frac{1000}{2} = 500 \text{ revolutions.}$$

$$Z_2 = \frac{Z_1 N_1}{N_2} = \frac{16 \times 1000}{500} = 32.$$

$$\text{Pitch diameter} = \frac{32}{6} = 5\tfrac{1}{3}''.$$

$$Z_2 \left\{ \begin{array}{ll} \text{Pitch diameter} & = 5\tfrac{1}{8}'' \\ \text{Number of teeth} & = 32 \\ \text{Length of tooth C} & = \tfrac{3}{4}'' \\ \text{D. P.} & = 6-8 \end{array} \right.$$

We took the maximum velocity 20 miles and the minimum 5 miles per hour. It is suitable to take for the second speed the mediate speed of these two maximum and minimum speeds:

$$V_2 = \frac{20+5}{2} = 12.5 \text{ miles.}$$

$$N = \frac{1000+250}{2} = 625 - 640 \text{ revolutions.}$$

We need for these revolutions following ratio of pair of gear:

$$\frac{Z_4}{Z_3} \times N_2 = N_3.$$

$$\frac{Z_4}{Z_3} \times 500 = 640,\ Z_4 + Z_3 = 48 \text{ teeth.}$$

$$\frac{Z_4}{Z_3} = \frac{640}{500} = \sim \frac{27}{21}, \text{ then } Z_4 = 27;\ Z_3 = 21.$$

$$\text{Pitch diameter } D_3 = \frac{21}{6} = 3\tfrac{1}{2}''.$$

$$\text{Pitch diameter } D_4 = \frac{27}{6} = 4\tfrac{1}{2}''.$$

$$Z_3 \left\{ \begin{array}{ll} \text{Pitch diameter} & = 3\tfrac{1}{2}'' \\ \text{Number of teeth} & = 21 \\ \text{Length of tooth C} & = \tfrac{3}{4}'' \\ \text{D. P.} & = 6-8 \end{array} \right.$$

$$Z_4 \left\{ \begin{array}{ll} \text{Pitch diameter} & = 4\tfrac{1}{2}'' \\ \text{Number of teeth} & = 27 \\ \text{Length of tooth C} & = \tfrac{3}{4}'' \\ \text{D. P.} & = 6-8 \end{array} \right.$$

The minimum velocity is $N_4 = 250$ revolutions.

$$N_4 Z_5 = N_2 Z_6, \text{ or}$$

$$1000 \times Z_5 = 500 \times Z_6, \text{ then } Z_5 + Z_6 = 48 \text{ teeth.}$$

$$\frac{Z_6}{Z_5} = \frac{500}{1000} = \frac{16}{32}, \text{ then } Z_5 = 32;\ Z_6 = 16.$$

$$\text{Pitch diameter } D_5 = \frac{32}{6} = 5\tfrac{1}{3}''$$

$$\text{Pitch diameter } D_6 = \frac{16}{6} = 2\tfrac{2}{3}''$$

$$Z_5 \left\{ \begin{array}{ll} \text{Pitch diameter} & = 5\tfrac{1}{3}'' \\ \text{Number of teeth} & = 32 \\ \text{Length of tooth} & = \tfrac{3}{4}'' \\ \text{D. P.} & = 6-8 \end{array} \right.$$

$$Z_6 \left\{ \begin{array}{ll} \text{Pitch diameter} & = 2\tfrac{2}{3}'' \\ \text{Number of teeth} & = 16 \\ \text{Length of tooth} & = \tfrac{3}{4}'' \\ \text{D. P.} & = 6-8 \end{array} \right.$$

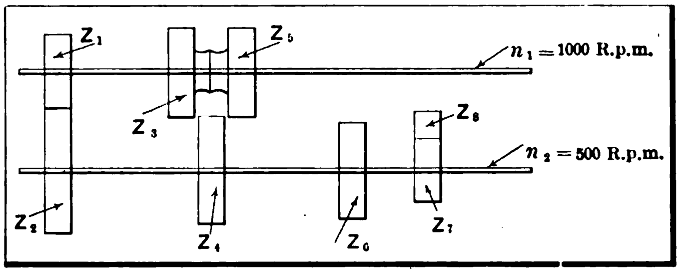


Fig. 2—Sketch showing relation of prime and lay shafts of a sliding gear transmission used in figuring speeds and other relations

We take for reverse 220 revolutions

$$Z_5 + Z_8 = 48 \text{ teeth.}$$

$$Z_8 = 48 - Z_5 = 48 - 32 = 16.$$

$$\text{Pitch diameter} = \frac{16}{6} = 2\tfrac{2}{3}''$$

$$Z_5 \times 220 = Z_8 \times N_8.$$

$$N_8 = \frac{32 \times 220}{16} = 440 \text{ revolutions.}$$

$$Z_7 \times 500 = Z_8 \times 440.$$

$$Z_7 = \frac{Z_8 \times 440}{500} = \frac{16 \times 440}{500} = \sim 14.$$

$$\text{Pitch diameter} = \frac{14}{6} = 2\tfrac{1}{3}''.$$

$$Z_7 \left\{ \begin{array}{ll} \text{Pitch diameter} & = 2\tfrac{1}{3}'' \\ \text{Number of teeth} & = 14 \\ \text{Length of tooth} & = \tfrac{3}{4}'' \\ \text{D. P.} & = 6-8 \end{array} \right.$$

$$Z_8 \left\{ \begin{array}{ll} \text{Pitch diameter} & = 2\tfrac{2}{3}'' \\ \text{Number of teeth} & = 16 \\ \text{Length of tooth} & = \tfrac{3}{4}'' \\ \text{D. P.} & = 6-8 \end{array} \right.$$

Applying the direct drive we get:

$$N_1 = 1000 \text{ revolutions} = 20 \text{ miles per hour.}$$

Applying the second speed we get:

(Z_3 with Z_4)

$$N_2 = 500 \frac{Z_4}{Z_3} = \frac{500 \times 27}{21} = 650 \text{ revolutions} = \sim 12.5 \text{ miles.}$$

Applying the third speed we get:

(Z_5 with Z_6)

$$N_3 = 500 \frac{Z_6}{Z_5} = \frac{500 \times 16}{32} = 250 \text{ revolutions} = 5 \text{ miles.}$$

Applying the reverse speed we get:

(Z_5 with Z_8)

$$N_4 = 500 \frac{Z_7}{Z_8} \times \frac{Z_8}{Z_5} = 500 \frac{14}{16} \times \frac{16}{32} = \sim 220 \text{ revol.} = 4.4 \text{ miles.}$$

Vulgarized Pyrometry

BY MARIUS C. KRARUP. HOW THE PRACTICAL MAN MAY MEASURE THE HEAT OF STEEL ACCURATELY BY IMPROVED METHODS FOR COLOR COMPARISON

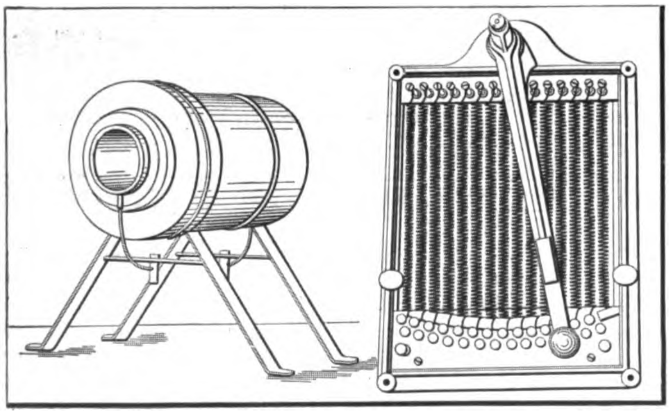
NEARLY every scientific instrument destined for popular uses passes through a stage in its employment at which a certain fondness for its difficulties permits its most obvious practical utility to be obscured. Successively the micrometer, the plotted curve which shows the inwardness of things (when it is not doctored), and the diagrams of the manograph (which dexterously used will prove any theory to be right or wrong), have passed from the scientific stage into daily life and work, and now the pyrometer, the birth companion of special steels, seems to be shedding the fuzzy feathers of the laboratory and donning its overalls.

For a few years it has been pointed out to visitors at ambitious factories as the *pièce de résistance* of the technial manager's intelligent care and discrimination, and in some instances the "temper man" has been induced to believe in its readings almost with as much confidence as he would repose in his own eyesight and native judgment of heat colors. But this is far from saying that he would ordinarily consult it when work was brisk and unobserved or would exercise spontaneous zeal to see that the heat at the hot couple and the heat in the work were alike. It was a nice, instructive pet, however, abundantly fruitful in hot, persuasive terms of more than one syllable. With its catalytic, platinogene metals and the eccentricities of recalescence humps for Ar 1, 2 and 3, it was a dear little storehouse for Latin and Greek derivatives and reflected real dignity on the shop and the calling; and it could very properly, if needs be, charged to the advertising department, which carries all those other overhead expenses for which no one wishes to be responsible.

Finally the pyrometer, by sheer intrinsic merit, is emerging from under the encumbering load of erudition and is proving its ability to pay real money for board and lodging. The recent discourse on its evolution and possibilities at the meeting of automobile engineers at Detroit and the subsequent articles in this journal on the same subject have excellently defined its status in the factory and blacksmith shop. It is useful for all and necessary for those who are determined to produce the best from any given set of steel materials, whether the materials be the most expensive or selected on a strictly economical basis. Among the simple and practical methods for using the pyrometer properly one seems to be omitted, however, which the writer would judge to be particularly well adapted for rapid work under all circumstances, for hand and drop forging, for which a pyrometer is now seldom used, and for hardening, tempering, casehardening and annealing in all shops in which the furnaces and ovens cannot be relied upon to give an absolutely uniform heat. As the suggested method has evidently not been tried very widely, there may be drawbacks to it which have escaped the writer's attention, and it is offered with those reservations which should accompany untried propositions.

Among ladies and dry goods men the human faculty for matching colors by sight is as well established as the disappointment which follows attempts at matching colors by memory or description. On the very rapid and spontaneous action of this faculty the proposed method is based. If a sample of steel may be kept heated to the degree which it is desired that the work shall reach for any given process of heat treatment or forging, the comparison of the work with the sample gives immediate ocular evidence as to whether the heat of the work is right. It must be of the same color as the sample. The eye detects at once the slightest shade of difference. It is not even necessary that the sample shall be the same grade or kind of steel as the work. The same heat produces the same color in all steels.

The makers of pyrometers themselves offer the means for always having a sample of steel at hand heated to any desired degree. The diminutive electric furnaces employed in connection with a recording pyrometer for plotting the rescalescence curve of any sample inserted in the crucible, are in some instances arranged so as to have the sample visible and in other cases may be so arranged without difficulty. They are also equipped with a rheostat and may be equipped with a better or more finely graduated one, if necessary; one which will prevent the heat of the sample from rising above any desired degree. And if the current is produced in the shop its regularity may be assured so as to further safeguard the control by rheostat.



One type of Heraeus horizontal electric laboratory furnace, with rheostat

The blacksmith usually has a dark place near at hand if he judges heat color by sight and from experience. In a corresponding place, preferably shaped as a box with one side open, the little electric furnace with the steel sample may be placed and the recording pyrometer should be conveniently near. When the work is to begin, the current is turned on and the rheostat is adjusted to arrest the heat generation at the temperature which is the desired one for the operation in hand, whether this be forging or any other. The foreman may do the adjusting, with the pyrometer-reading for his guide, and may return occasionally to observe that the reading remains unchanged. If more than one temperature is desired to be represented, as for two or more operations or two different steels requiring different temperatures, a corresponding number of electric furnaces may be placed side by side, each with its rheostat, and they may be adjusted from a single pyrometer, successively, though one pyrometer for each furnace gives a better chance for checking the work as it proceeds.

For work with particularly delicate steels, the use of two crucibles, one with a sample at highest permissible heat and another with the lowest permissible heat, would probably be highly advisable and would train the blacksmith to rapid accuracy in the matching of colors.

By comparison, the most elaborate provisions made at present for the use of pyrometers in factories offer no handy method for deciding when the work has cooled too much for proceeding without reheating, while with the method proposed the workman can readily stick the work into the dark box and make an instantaneous comparison with his heat samples.

Evidently the "constant-heat sample"—to coin a brief term for designating the proposed method—cannot replace either the salt bath, where this is employed mainly for securing the uniform penetration of heat into the work or for the rapid heating of the surface, with the core maintained at the finer texture of a more reduced temperature. Neither can it take the place of a pyrometer connected directly with the forge, the casehardening oven or the annealing oven, since it is necessary to protect against overheating in these places, but it may be a matter of development to arrange for employing the same set of pyrometers for all these purposes.

In practice there may be a few other things to look out for. While it is known that electric furnaces on a large scale may be constructed with very satisfactory guarantees for the steady maintenance of the same identical heat and are so built in conjunction with salt bath apparatus of very moderate size, the requirements in this respect are not very strict with regard to those used for ascertaining the critical points in steel, because they are simply run up to a high temperature and the observations of recalescence are made on "the cooling curve," so that no necessity exists for employing a high grade of materials. It seems possible that the steady, prolonged use of the apparatus might develop inequalities from day to day and perhaps during the progress of a day's work, but even so it would seem that, so long as the pyrometer itself remains in working order, and is consulted once in a while, no misleading can result. But in using this method for guidance in the hardening and tempering of high-speed steels, where it would be especially useful, an apparatus which is known to be reliable above 1,000° C. is of course necessary, and, on the other hand, as salt baths are rarely used here for high-speed heats, while quick work is extremely desirable, the "constant-heat sample" may in the end prove itself more necessary and economical for high-speed tool making than in any other field of work.

The accompanying illustration shows a type of the electric furnaces at present used for recalescence research in the laboratory, and statements may doubtless be obtained from the makers of similar devices with regard to the principal points of interest. The feasibility of making a goodly portion of the area of the steel sample visible is one of these points in question, which perhaps suggests the use of hollow rather than solid cylindrical samples. The other relates to exact data on the variations of temperature to which a steel sample is subject under certain normal conditions of current and resistance, such as at two different trials each maintained for a given length of time. From casual observations it seems safe to predict that the range of variations under test will be found sufficiently contracted to afford all needed security, only one question remaining undecided after such test and this having reference to the sensitiveness of the pyrometer and its faithfulness in recording whatever changes in temperature actually take place in the sample; and this uncertainty applies with equal force to every other method for employing pyrometers.

A trial of the "constant heat sample" method is recommended to engineers and shop managers in the belief that its practical development will prove congenial under average labor conditions and a source of both saving and safety in production.

Export Possibilities

EXTRACTS FROM THE REPORTS OF UNITED STATES CONSULS IN VARIOUS PARTS OF THE WORLD SHOW MANY OPPORTUNITIES FOR OUR AUTOMOBILE MAKERS

One of the recent issues of the Daily Consular Reports by the Federal Department of Commerce and Labor contains seven articles from as many countries, all dealing with some phase of the automobile trade. The leading article is by Consul-General George N. West, of Vancouver, B. C., in which he sets forth the need of an adequate establishment in Vancouver for supplying automobile parts for replacements and repairs.

In his report the Consul General says that 250 new American automobiles have been brought into Vancouver this year and that the motor car is of particular value there because of the rapid growth of the city and the heavy demands for quick transportation.

Under the Canadian customs rules, a second-hand car, two or more years old, is required to pay duty only on the actual cost price, while newer cars must pay the same rate as those of current make. This has resulted in a considerable trade in used cars.

He points out the fact that runabouts are growing in popularity on account of the unpaved streets, which are more easily and economically negotiated in a light car than in the heavier types.

"No establishment here carries a full line of parts for repairs to auto cars," says the Consul-General, "and owners have great delay in procuring parts that may be broken."

Consul William J. Pike, of Kiel, Germany, furnishes some interesting figures on the vogue of the automobile in the German Empire. He reports that there are 49,922 automobiles registered in the Empire, and of the 12,934 foreign cars classified, the United States furnished 686. The increase in registration over the preceding period considered was 7,500 cars.

From Malaga, Spain, Consul Edward J. Norton reports that there are only 32 gasoline cars registered in that city. None of these is an American car. Consul Norton says that the field is limited in Malaga; that there are few wealthy persons residing there; that the streets are very narrow and that the regular price of gasoline is 60 cents a gallon. He says that despite these drawbacks, a few low-priced American cars might find a market.

In this connection it may be stated that Thomsen & Co., of Sydney, Australia, have applied for and have accepted the terms of the Cole Motor Car Company for the exclusive selling rights for the Cole in that territory.

Automobiles are curiosities in Venezuela and are unknown even in such a large island as Curaçao. The use of the motor so far has proved rather too much for the average Venezuelan to grasp and it is recounted in the report of Consul Isaac A. Manning, of Maracaibo, that while the need of such motors is quite apparent little effort has been expended in trying to introduce them. He says there is only one good automobile in Caracas, despite the fact that there are hundreds of miles of excellent roads adjacent to the city. In the island of Curaçao there is not a single machine. As to other uses of the motor, he says that recently the owner of several coasting sail vessels sought to augment his equipment by the purchase of a power boat of some size. He received the boat in due course, but owing to the unfamiliarity of the native and resident engineers with the use of gasoline motors, the boat is still lying up, out of commission.

Consul-General Frank D. Hill, at Barcelona, Spain, outlines a great highway project that may be undertaken in Spain in the near future. Mr. Hill states that there are only 3,000 automobiles registered in Spain and that parties of intending tourists have sometimes been warned not to undertake contemplated pleasure trips through the country on account of the uncertainty of getting through and the likelihood of encountering unbridged streams at awkward periods.

He says, however, that the Barcelona Automobile Club, through its president, the Marquis de Marianao, is urging the construction of a circuit highway from Bayonne through Central Spain to Seville, thence following the Mediterranean Coast to the French frontier, touching many of the chief cities of interest in the land. The circuit highway as proposed would be about 1,674 miles long. The initial outlay would only be about $1,500,000 and the annual upkeep in the neighborhood of $300,000. It is proposed to inaugurate the new road when it is finished with a road contest over its full length under the auspices of the Government.

Consul-General Richard Guenther, at Frankfort-on-Main, Germany, outlines the uses of the international certificate, recently adopted at the conference at Paris and endorsed by seven European countries and the United Kingdom.

He says: "An international certificate has been adopted which will only be issued if the cars and the drivers meet the requirements agreed upon. This certificate is in the form of a booklet, on the cover of which and on the first and last pages the certificate is stated in the language of the country where it was issued. On the other pages this text appears in the language of the various countries parties to the agreement, so that the frontier officials can examine the certificate without difficulty. It is also provided that the motor cars in addition to the home number must show a sign denoting their nationality. The present German mode of attaching a sign to the car by the frontier officials is therefore done away with for the traffic between the several countries to the agreement. For marking dangerous places along the roads, special numbers have been agreed upon. This international agreement became effective recently."

An American Consul reports that a European government is contemplating the purchase of quite a number of automobiles, not the armored automobile type for actual fighting purposes, but for transportation and scouting purposes. The Consul states that a high-class American machine would stand a good chance for performent to the extent of several orders, merely for the purposes of trial, and these might lead to a very large order six months hence; consequently, American manufacturers who are interested should take note before it is too late to demonstrate their product and make preparations accordingly. The Bureau of Manufactures can furnish details.

Letters

ANSWERS TO INQUIRIES WHICH WILL THROW SOME LIGHT ON THE COMPLEX RELATIONS OF FUEL AND TIMING, GIVE ADVICE AS TO GEARING A CAR HIGHER, AND DISPENSE OTHER INFORMATION OF A GENERAL CHARACTER WHICH MOTORISTS WILL FIND OF INTEREST

Complex Relations of Fuel and Timing

Editor THE AUTOMOBILE:

[2,352]—Will you please enlighten me through "Letters Interesting, Answered and Discussed" on the following subject which has puzzled me for some time. What is the variable quantity which causes varying explosion pressures and thereby varying engine speeds and power output when the throttle is manipulated? I believe it is accepted that there is an ideal point in the cycle for the explosion to begin and that the spark should be timed with the idea of firing the charge at this point rather than with any thought of controlling the speed of the engine by this means. The variable, then, that I speak of must be some condition of the charge. Now there are only two things that I can think of which would affect the final explosive pressure, either the proportion of air to gasoline in the mixture, or the quantity of the mixture taken into the cylinder. On the latter depends the initial pressure and the compression pressure. Now as there is a certain proportion of air to liquid fuel that the carbureter is supposed to maintain, there is left but one conclusion, namely, that the amount of a mixture (which proportions are constant) taken into the cylinder, varies with the speed and the power output. If this is so, what is the condition of the charge at the beginning of the induction stroke? If it is at atmospheric pressure, what is the pressure at five times the power output or one-fifth the power output? It would seem that the proportions of the mixture being constant the power would be proportional to the volume at any given engine speed, which I suppose is true. This being the case, how is it that the compression of engines, as shown by experiments, is so nearly constant whether the engine is delivering 10 horsepower or 60? I understand that the engine was turning much faster at 60 than at 10 horsepower, possibly six times as fast, which would permit of the same amount of gas per explosion in both cases; but this only leads me to wonder why the engine accelerated to the faster speed when the throttle was opened. Please let me hear from you on this point, explaining exactly the causes which make an engine turning at, say, 300 R.P.M. under load to accelerate to 1,000 R.P.M. or more when the passage between carbureter and cylinder is more fully opened.

Memphis, Tenn. EVERETT D. WOODS.

Time. If the ignition is early some of the force of the expanding gas will be wasted in arresting the motion of the mass. If the ignition is late, the terminal pressure will be relatively high, but the efficiency of the gas performance will be below the normal level. The ignition should be so timed that the ignition line on an indicator card will be substantially straight. There should be no continuation of the ignition, such as would fatten the expansion curve, nor should the ignition swell the compression curve. This entire subject is very thoroughly elucidated in the engineering number of the THE AUTOMOBILE of July 28, under the caption "The Prediction of Efficiency in Internal Combustion Motors," in which Fig. 1 represents an indicator diagram for the Otto cycle; in other words, for an ordinary four-cycle motor, or as it is properly termed, a four-stroke cycle motor, but if we are to be precise, the so-called Otto cycle is really the Beau de Rochas cycle because the inventor of this name discovered the plan before Otto introduced it, the date of discovery being 1862. If the reader will take the pains to examine the article in engineering number above referred to, even though it is somewhat mathematical, enlightenment will follow, since the indicator card, Fig. 1, brings out very clearly the fact that ignition should become effective at the instant of compression and before the beginning of the expansion stroke. Effective ignition, then, must take place while the piston is on the dwell point at the top of the stroke of a vertical motor as used in automobile work. There is no objection to controlling the speed of a motor by varying the timing of the spark, with the proviso, however, that the motor is not permitted to overheat, which will be true if the spark is maintained too far retarded for too long a time. It cannot be claimed that the thermal efficiency will be maintained at its maximum if the spark variation is used for speed regulation, it being the case that this method of regulating is one which is based upon reducing the efficiency of the motor until it is barely capable of doing the work to be done under certain conditions of speed. The correspondent in this case raises a considerable number of questions, and it is doubtless true that thew hole matter might be discussed much more efficaciously were he to confine himself to some one angle of this large problem for the time being. However, the ignition question has at least five proper subdivisions: (a) the efficacy of the sparking mechanism, (b) the timing of the spark, (c) if the mixture is rich, (d) if the mixture is poor, (e) involving the compression.

(a) There are a hundred reasons why the ignition system might fall below the most fitting requirement, and even with a very efficient magneto, there still remains the question of the ability of the spark plug. It has been found by a series of laboratory tests that spark plugs are frequently incapable of interpreting good magnetos; in fact, it is useless to employ a magneto that is capable of delivering a 30,000-volt spark if the spark plug breaks down at 2,000 volts. This condition obtains in practice to some extent, and it is necessary to find out just what the ignition in a given case is capable of, rather than to assure that the ignition equipment is operating in a satisfactory way, then lay all the trouble onto the mixture or timing.

(b) In the timing of the spark, to blindly assume that some angle of advance as measured upon the flywheel should prove to be satisfactory is to court a fallacy. In the first place, the timing depends for its value upon the compression, then upon speed, again upon the lag angle of the coil, finally upon the burning qualities of the mixture. In solving any complex problem it is necessary to eliminate some of the unknown quantities in order to fix values for the others; this is a particular example of a complex nature, and a process of elimination must be utilized before stable values can be arrived at.

(c) In discussing the quality of the mixture, it will be a waste of time to talk about what it will do before an attempt is made to find out what it is composed of. The chief constituents of gasoline are as follows:

CHARACTERISTICS OF CONSTITUENTS OF AUTOMOBILE GASOLINE

Constituent	Specific Gravity	Chemical Composition
Pentane	0.640	$C_5 H_{12}$
Hexane	0.676	$C_6 H_{14}$
Heptane	0.718	$C_7 H_{16}$

Pentane is a mixture of hexane and heptane, the proportions varying with specific gravity. The composition of the product as it is to be had varies considerably, depending upon the source of supply, but if the specific gravity is 0.683 with a boiling point of 154 degrees Fahrenheit, the proportions by weight are a reasonable expectation, as follows:

PROPORTIONS BY WEIGHT OF GASOLINE

Pentane 2 per cent., hexane 80 per cent., heptane 18 per cent., total 100 per cent.

This composition would carry 83.8 per cent. carbon and 16.2 per cent. hydrogen, requiring about 3.5 pounds of air for a theoretically right mixture per pound of the gasoline.

(d) If the mixture is rich, the low limit will be between 3,400 and 4,000 volumes of air to 1 volume of liquid gasoline. At 3,400 volumes of air per volume of liquid gasoline, the mixture is substantially non-burning; at all events, the ignition system would have to be highly efficient to start the burning and the rate of flame travel would be very slow, indeed. For the best result there should be 1 volume of liquid gasoline to about 8,000 volumes of air, and a poor mixture would be made up of 1 volume of gasoline to about 10,000 volumes of air.

It is a reasonable assumption that some results may be realized under the worst conditions between 4,000 and 10,000 volumes of air per volume of liquid gasoline, but it is also plainly evident that the highest efficiency will only be realized when the air is in the ratio of 8,000 volumes to 1, and there are an infinite number of possibilities within the allowable limits which, if given consideration, will adequately account for many of the variations to be noted in every-day practice.

(e) Involving the compression it will be remembered that the amount of air required will have to be increased as the compression is increased for the reason that there must be a greater excess of oxygen present, otherwise the hydro-carbon fuel will not be burned to carbonic acid and water in its entirety due to the fact that the time is so shortened that in the absence of an excess of oxygen some of the hydro-carbon will fail to grab an oxygen mate. But the very fact that increasing compression increases the inflammability of the mixture adds to the efficiency of the process if enough oxygen is present, and, theoretically, the higher the compression the better will be the result, although in practice premature ignition creeps in when the compression approximates 95 pounds per square inch absolute pressure, beyond which it is not feasible to go under the conditions which govern a four-cycle motor in automobile practice.

Some of the Facts Are Slightly Deranged

Editor THE AUTOMOBILE:

[2,353]—Please answer the following questions in "Letters Interesting, Answered and Discussed."

1. Why should not friction transmission of the simple disc type be on the high gear as well as the car with any other transmission?

2. Why should manufacturers equip their cars with a dual ignition when there are some makers of magnetos who guarantee their magnetos to start any engine of any size and horsepower on a quarter turn of the crank without the use of batteries?

3. Which do you think it would pay a prospective purchaser to buy, a car equipped with solid or pneumatic tires?

4. Will an air-cooled motor stand as much hard usage and last as long as a water-cooled motor?

5. Why can some manufacturers build six-cylinder, 50-horsepower cars and sell them for $2,000 when other manufacturers ask from $1,000 to $2,000 more for the same style car, made of the same grade of material, or is it true that the material is the same?

Palm, Ala. R. F. HENRY, JR.

1. Some cars are built that way.
2. Habit.
3. Pneumatic tires.
4. Yes.
5. Do they?

Rather Pointed Questions About Important Matters

Editor THE AUTOMOBILE:

[2,354]—Will you please answer the following inquiries:

1. In turning a curve, which of the two hind wheels pulls the most, and why is the propelling power lessened?

2. Will more or less gasoline be consumed by running under the same conditions for a certain distance at the rates of, say, 15 and 40 miles per hour?

3. When will the Selden patents now in force expire?

4. Is there any relation between the horsepower used by a horse in pulling a machine and the same power applied by the engine in self-propelling?

5. Is the impact on a pneumatic tire under a certain pressure, against an obstacle, required to be greater than the pressure in pounds per square inch before the pressure in the tube will be raised? In other words, will a loaded car show greater pressure on the tires than when the wheels are jacked up?

Rome, Ga. R. M. H.

1. The outer wheel. The reason for this lies in the fact that it presses on the roadbed with greater force. The reason it presses on the roadbed with greater force is because it serves as the fulcrum when the car tends to turn over, and the inner wheel tends to leave the ground. The propelling power may not be less. If the speed of the car is not reduced it is self-evident that it takes more power to maintain that speed on a curve than it would on a tangent (straight line).

2. Power is required by a car on an increasing basis as the speed is increased. Just what the increase in power will be depends upon the condition of the roadbed, shape of the car, wind resistance, etc. In view of the variable nature of the problem, it is not possible to definitely state just what the increasing power will be unless definite measures are taken in the process of finding out. It is certain, in any event, that the power required to go a certain distance at 15 miles per hour will be less than the power required to go the same distance at 40 miles per hour.

3. The Selden patent is No. 549,160 and was taken out November 5, 1895. The life of a patent is 16 years. There is a chance that this patent may be given a new lease of life; if so, it will run for 16 years more.

4. One horsepower is equal to the force of 33,000 pounds lifted 1 foot in 1 minute, or the equivalent. It makes no difference how the effort is made, whether it be by a horse or an automobile; it is immaterial as to whether the weight is lifted 1 foot in 1 minute or if the reverse holds and the weight falls 1 foot in 1 minute. It will be the same horsepower if 33,000 foot-pounds are expended in 1 minute in drawing a vehicle. It will be the same effort if the vehicle is propelled.

5. Any force that will compress the gas in the tube will raise the pressure in pounds per square inch. When the wheel is jacked up the volume of air in the tire is afforded a certain space, hence a certain pressure will be manifest; but when the wheel is supporting the load, the volume of the air will be reduced, hence the pressure per square inch will increase accordingly.

Looking for Trouble in the Most Direct Way

Editor THE AUTOMOBILE:

[2,355]—I have a 40-horsepower shaft-drive motor geared about 3 1-2 to 1. My desire is to gear the car higher, as I want more speed. Could you suggest a proper gearing, and the best way to change the original? The transmission is of the progressive type and no "direct on the high" or third speed.

New York City. ARTHUR J. SHAFER.

The sum of the teeth in each set of gears in the transmission system must be the same. This means that the sum of the teeth of any one set cannot be changed; it will be possible, however, to subtract from one gear as many teeth as are added to another, but it is highly improbable that there is sufficient room in the gearset to allow of increasing the number of teeth in any one of the gears. The bevel-gear set offers small opportunity for the purpose here mentioned for the reason that there may be no room available which will permit of using a large diameter gear, although the bevel pinion could be reduced in size if it has more than 14 teeth as now constituted. In all probability the motor would be overloaded were the ratio changed to give a higher speed to the car. It is also to be remembered that the life of the car will be enormously decreased if its speed is increased. It is well to remember that tire depreciation becomes a serious matter with increasing speed.

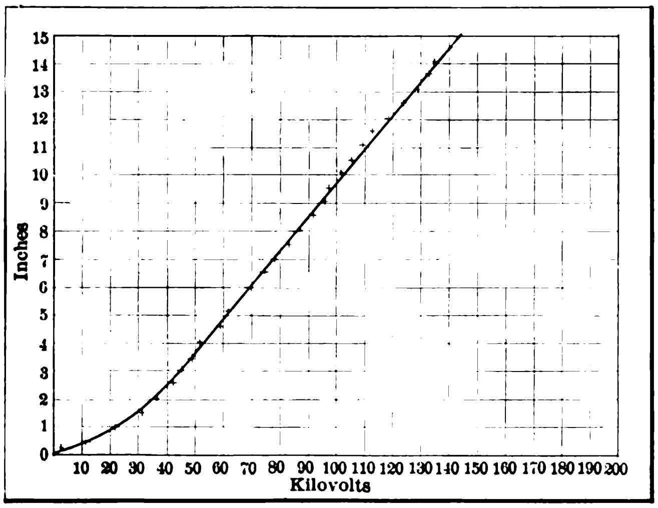
Questions That Arise

FORMULAE FOR SPRINGS; STUB TOOTH GEARS; AUTOMATIC VALVES; SHOCK ABSORBERS; HIGH VOLTAGE MEASUREMENTS; THE FLAMING ARC

[205]—There seems to be a good deal of uncertainty in the minds of users of automobiles as to the legitimate scope and practicability of shock absorbers. Just what is the reasonable expectation with their use, and why do some of them seem to fall short of the requirement?

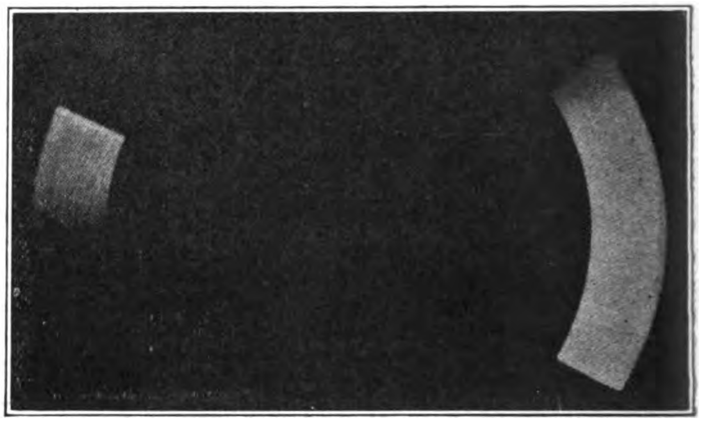
There is absolutely nothing new about the shock-absorber idea; it had its inception when railroad trains were brought into vogue, and the so-called bumper on a freight car would be incomplete without a shock absorber. In freight-car work, where the shock absorber has to contend with strenuous conditions, there are two principles in common use, one of which depends upon the action of a spring, and the other upon friction. Discussing these two principles, it will be readily appreciated that the spring idea takes into account the desirability of gradually absorbing the energy stored in the moving mass. Spring bumpers produce train oscillations, due to the fact that the springs give back, in a reactive sense, the energy stored in them, and enough work is done in the form of oscillations to absorb the energy of impact of the cars as they bump into each other. That the energy must be absorbed before the cars will be brought to rest is self-evident, but a more quiet way of obtaining the desired result is represented in the form of bumper that dissipates the energy through the medium of friction, which is the second principle involved. The friction bumper has no reaction component; all the work is dissipated in the form of heat. As regards the instability of some forms of shock absorbers employed in automobile work, it can only be explained on the ground that the method of utilizing the principle is too frail. If bumpers can be made which will do the work in freight-car practice, involving long trains, surely they can be so contrived that they will serve perfectly in stopping the vertical bounce of the chassis frame and its load as represented in an automobile. The illustration here afforded shows the performance of a friction type of shock absorber under road conditions. The vertical bounce of the chassis frame is represented by the series of irregular lines above and below zero. The zero position is representative of the position of the chassis frame when the car is standing still. The test was made on a 50-horsepower Léon Bollée touring car with an Ellsworth Bumpometer.

[206]—How are high voltages measured in spark coil work? Are there any instruments, as voltmeters, of the conventional sort that will do this work?



Ratio of length of spark gap to voltage in the arc as arrived at in regular alternating current work

When it is desired to measure thousands of volts, conventional forms of instruments fall short of the requirement, and the length of the spark gap is measured instead, from which length, through the use of a calibrating curve, the voltage is estimated. The estimate is of course somewhat inaccurate, but the chances are that the error is within 2 or 3 per cent. The curve here given will suffice to illustrate the idea. In this curve the abscissæ read kilovolts (kilo means 1,000, hence thousands of volts) and the ordinates read inches, length of the spark gap as measured in the open air. It will be remembered that the resistance of the gap will increase with the pressure of the gas, and in ignition service on this account allowance must be made for the increased resistance due to the gas in the cylinder. The curve here shown indicates that it takes 20,000 volts to jump a gap substantially 1 inch long. In other experiments it has been found that a spark that will jump a 1-2 inch gap in the open air will barely suffice for a 1-32 inch gap in a spark plug under pressure in the cylinder. It would seem that a 1-2 inch gap in the open air will be broken down under an electromotive force somewhat below 9,000 volts.

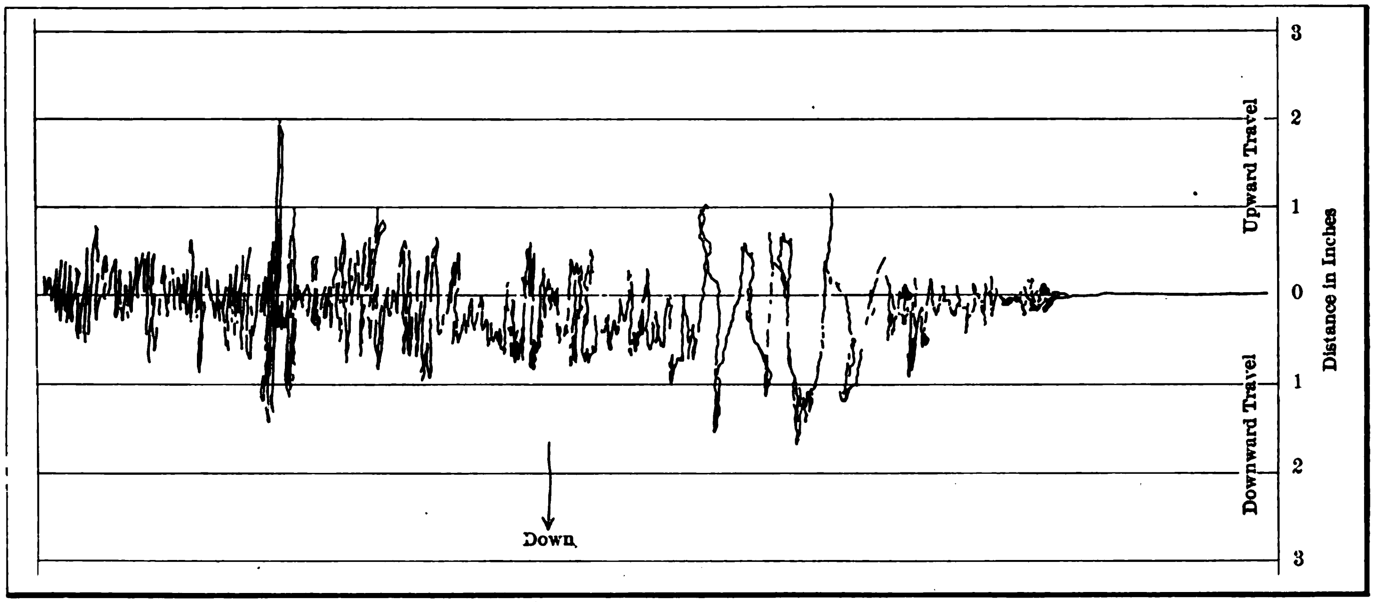


Photograph of spark from a Bosch magneto used to illustrate the text descriptive of what is designated as the "flaming arc"

[207]—What is the meaning of the designation "flaming arc" as applied to a magneto?

When an ordinary spark coil is used, the energy dissipated in the spark-plug gap is limited to that which is represented by the voltage at the instant of breakdown multiplied by the current in amperes. The spark coil is a transformer of electrical energy rather than a generator thereof. In view of this fact no energy can be expected from the spark coil, excepting that which is represented at the instant of breakdown. The so-called "flaming arc" is present when the energy is delivered by a high-tension winding in connection with the armature winding on the armature of a magneto. The high-tension winding does all that a spark coil can do in that the electromotive force impressed thereon is sufficient to disrupt the gap in the spark plug, but since the magneto is a generator as well as serving in the capacity of a transformer there is a follow-up current supporting the initial discharge, which produced the so-called "flaming arc." The situation is adequately depicted in the illustration here afforded, which was made by photographic methods, utilizing a Bosch high-tension magneto in the process.

[208]—Is it not true that a great many spring breakages occur in even the better class of automobiles, and does this not indicate that there is a lack of appreciation of



Record taken from an Ellsworth bumpometer showing the vertical bounce of a 50-horsepower Bollée car on ordinary New Jersey roads representing an average condition

the desired qualities in springs for this service? Does the fault lie in poor material, or are the methods of design so complex that spring makers are incapable of putting them into practice?

There is a fundamental reason why the best obtainable material for spring suspensions is worked to the limit of its ability, and is likely to fail in service in the course of time, although the evil day should be deferred. Take the half-elliptic type of spring suspension, for illustration; the best result comes if the span of the spring in each case is long, but the extreme fiber strain must be a near approach to the elastic limit of the material. No spring of this type will give the desired easy riding qualities unless the material is worked at a high stress. If there is too much material in the spring and the extreme fiber strain is low, the action will be soft, and the spring will fail to respond to the induced oscillations due to road inequalities. There are two points of view for the designer, one of which is independent of the formulæ as here given, i. e., the life of the spring will be long or short depending upon the quality of material used in the spring, independent of the quantity required as indicated by the formulæ. In other words, the foot-pounds of work that should be put upon the material on a basis of safety must be limited. It is very likely that a safe basis is inside of five foot-pounds per pound of material used. The formula as follows is in the simplified form, and will suffice for a spring maker of competence. It will be of small value, however, to a novice.

In the designing of semi-elliptic springs, while it is true that there must be a certain mass of material to properly do the work no matter what the conclusion may be from the formula point of view, the fact remains that an approximation of the true size will help in the process, such as the following: Let,

S = span or distance in inches between the eyes at the extremities of the spring;

B = breadth of the spring-plates in inches;

t = thickness of the plates in 1-16 inch units;

N = number of the plates in the make-up of the spring;

W = load in tons of 2,000 pounds on the spring;

k = a constant depending upon the character of material used. When,

$$N = \frac{WSk}{Bt^2}$$

The value of k is 11 for ordinary work; it should be lowered somewhat if the springs are to be more perfect; it may be increased a little if the character of the material used in the spring-plates is on a high plane; care should be exercised in any process which adds to the burden of the material.

It is frequently desired to check back with a view to determining the deflection in inches, per ton of load, considering a given spring. A formula that is regarded as comprehensive for this purpose is written as follows: Let,

D = Deflection in inches per ton of load, S, B, t, N, represent values as before

When,

$$D = \frac{S^3}{k\,B\,t^3\,N}$$

The employment of a capable formula is really a small detail in the manufacture of springs. The question of material is of the utmost importance. The better the material the more quickly it will be spoiled in a poorly equipped plant, or if it is manipulated unscientifically. The best results come if the methods for heat treatment are adequate for the needs, assuming that a pyrometer takes the place of "rule-of-thumb" methods which formerly obtained in the manufacture of carriage springs. But a pyrometer may be the source of much trouble if it is not handled in accord with its characteristics. The readings taken from a pyrometer will be absolutely wrong if the cold end is not maintained at a constant temperature; preferably the temperature should be 0 degree centigrade, unless the pyrometer is calibrated at some other fixed temperature that can be maintained more readily.

[209].—Why were motors formerly built with automatic valves instead of valves with a positive action?

In the early days of motor building, due to mechanical imperfections, the speed was relatively low, and automatic inlet valves work best at low speeds. When it was found desirable to operate motors at higher speeds, trouble was experienced with automatic valves, and with the perfection of positive valve motions, more power was realized, and the uncertainties which always attended automatic valves, together with the fact that they stood in the way of more power, led to their final abandonment.

[210].—What is the advantage of a stub tooth gear?

The tooth of a gear is related to a cantilever beam so that the longer it is the greater will be the fiber strain at the fixed end of the beam. Since the ability of a gear depends upon the strength of the material up to its limit, and limiting fiber strain for the rest, it is safe to conclude that a short tooth will offer the greatest resistance and is desirable from that point of view. As a general rule, the Brown & Sharpe shape of involute tooth offers so many attractions that it is accepted as satisfactory, and there is a certain advantage present in maintaining a standard unless some serious objection is brought against the same.

The Pyrometer

ITS DEVELOPMENT AND USE. BEING THE THIRD INSTALLMENT OF AN ARTICLE BY WM. H. BRISTOL READ BEFORE THE SOCIETY OF AUTOMOBILE ENGINEERS AT ITS SUMMER MEETING

In Fig. 10 a complete portable outfit is illustrated with the fire end, leads and portable instrument.

In Fig. 11 an indicating instrument is illustrated with an extra compartment containing a rotary switch. Several sets of leads and fire ends may be connected to the different points of the switch so that by turning the handle the operator can throw into circuit the fire end of any of the different furnaces, and instantly the instrument will respond, giving an indication of the temperature in the furnace to which it is connected.

The diagram Fig. 12 shows a recording instrument arranged in combination with three independent indicating instruments, each connected to its own independent fire end for three different furnaces. The indicating instruments can be located at convenient points for the observation of the operator, while the recorder may be located in the superintendent's office at a distance, and by means of switches he can connect the recorder to any one of the different furnaces, the operator having no knowledge of which furnace is switched on to the recorder. The moral influence upon the operator of the furnaces with a single recorder is in some cases almost as valuable as if there were three recorders.

The electromotive force developed by the base metal thermocouple, even though it is a great deal more powerful than that produced by the platinum-rhodium couple, is insufficient to operate the recording arm resting continuously on a moving chart. Several different designs for overcoming the friction between the moving arm of the galvanometer and the chart upon which the record is traced have been devised. The methods most commonly used in these recorders consist in either pressing the arm periodically against the chart, or vibrating the chart against the arm. The method of vibrating the chart so as to bring it into contact with the arm periodically and leaving it free to move under the influence of the comparatively feeble current between the intervals of vibration has proved very satisfactory.

By semi-transparently smoking the charts it is only necessary to vibrate the chart periodically into contact with the tip of the indicating arm, thus removing a small particle of the lampblack from the chart. The series of marks made by the periodic contact of the recording arm where the carbon is removed from the chart forms a continuous curve.

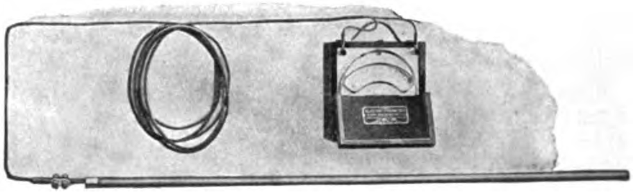


Fig. 10—Complete portable pyrometer outfit

A reduced photographic reproduction of a smoked chart record is shown in Fig. 13, the curves of this chart being made in determining the absorption and recalescent points of different metals.

The smoked surface of the charts is extremely sensitive to the recording arm, and after the record is completed the chart may be removed from the instrument and "fixed" by immersion in a fixative solution. After fixing, the records are permanent and can be filed for further use.

In illustration Fig. 14 an ink type of recording pyrometer is shown. In this instrument an inking pad is located in front of the chart over the arc traversed by the end of the recorder arm. A tiny capillary gold tube open at both ends is carried at the end of the recorder arm. When the chart is periodically vibrated it is pressed against one end of the tube and at the same time the other end of the tube is pressed against the inking pad. A dot of ink is left on the chart and a further supply is simultaneously taken up by the tube from the pad. Between the vibrations of the chart the pen arm is free to move without friction. The periodic vibration results in a continuous record, as the series of dots will form a curve corresponding to the changes of temperatures.

For very open scales the indicating or recording instruments are made with an initial tension upon the indicating or recording arm so that they do not begin to indicate until the working range of the scale is reached. For illustration, a scale can be readily made beginning with 800 deg. Fahr. and ending with 1800 deg. Fahr., and if a large size instrument is used the gradua-

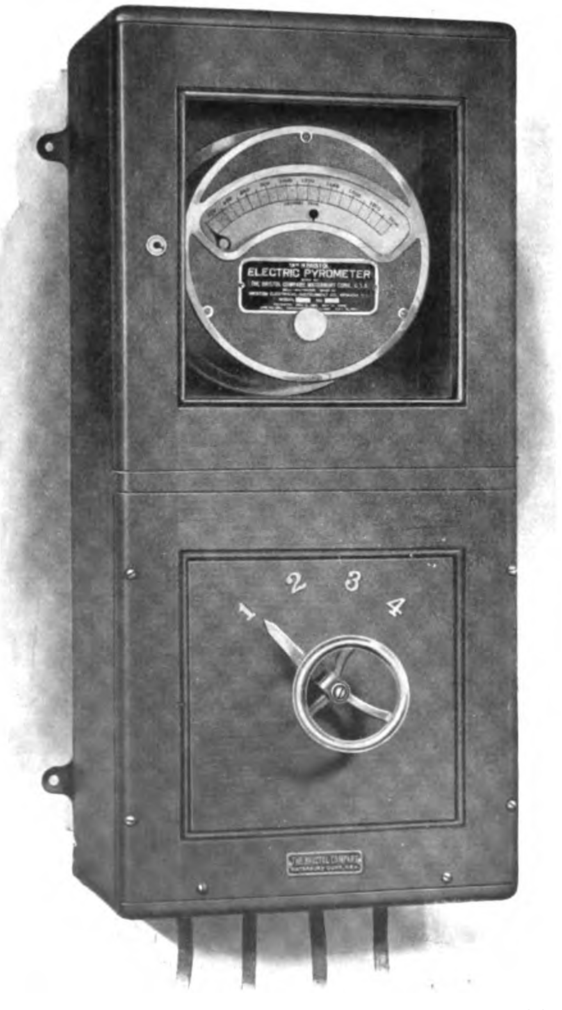


Fig. 11—Indicating instrument for electric pyrometer, with extra compartment containing rotary switch

Fig. 14—Ink type of recording pyrometer

tions may be made for 5 deg. each, making it possible to easily estimate to a fraction of these 5 deg. divisions.

Automatic Compensators

For many operations it is important that the temperatures be maintained very constant or that they be known very accurately, and it becomes necessary to take further precautions regarding the temperatures at the cold ends of the thermo-couples than shown above by the descriptions and illustrations of the extended couples. For such refined measurements, which are becoming more and more necessary, allowance must be made for changes of temperatures at the cold ends of the couple or means must be provided to maintain them at a constant temperature. A constant temperature at the cold ends is sometimes artificially produced by immersion in ice water or by having a waterjacket around the ends, through which water is made to flow. Except for laboratory and test purposes these artificial methods of taking care of the cold ends by maintaining them at constant temperature are as troublesome as they are expensive.

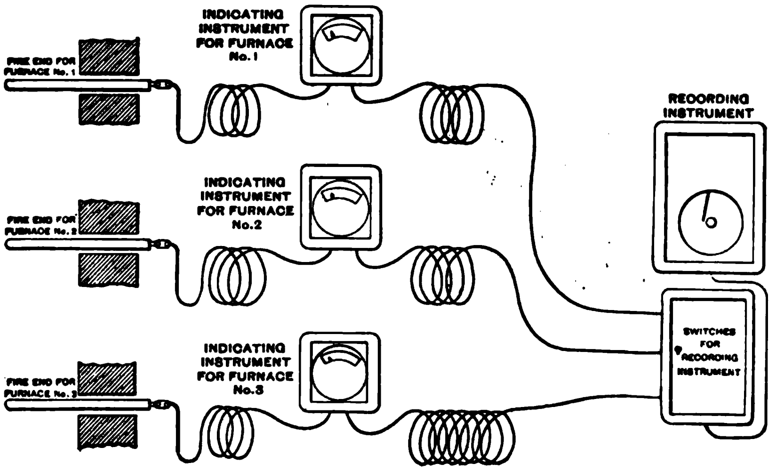


Fig. 12—Diagram of recording instrument in combination with three independent indicating instruments

In a low resistance thermo-electric system comparatively small changes in the actual resistance of the circuit, including the couple, leads and instrument, will produce sufficient effect to correct for the average changes at the cold ends of the thermocouple. A compensating device to automatically correct for changes of the temperatures at the cold end of a thermo-electric couple has been devised, which makes it possible to eliminate the need of any corrections for changes of temperature at the cold ends of the thermo-couples and to dispense with artificial means of maintaining the cold ends at constant temperatures.

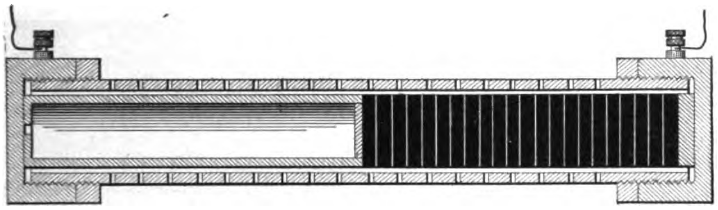


Fig. 16—Cross section of a new model of unbreakable compensator

An especially useful device, which is illustrated in Fig. 15, consists of a glass bulb with a short stem similar to an ordinary mercurial thermometer. Two platinum wires are fused into same near its tip. These are connected within the flattened bore by a loop of platinum wire, thus completing the circuit as indicated in the diagram. The size of the bulb, the cross-section of the bore, and the cross-section of the platinum wire are proportioned to suit the particular instrument and its range.

This compensator will perfectly compensate for any particular point on the scale for which it may be constructed, as for instance at the working point where it is desired that the temperature shall be absolutely independent of the changes in temperature at the cold ends of the thermo-couple when the compensator is connected in series at the cold end of couple. It is evident that if the temperature rises at the cold end of the couple the mercury rising in the stem will short-circuit a portion of the platinum loop, thus reducing the resistance of the entire circuit by the necessary amount, so that the diminished electromotive force of the thermo-electric couple, due to the rise of temperature at the cold end, will cause the same amount of current to flow through the instrument, and give the same reading, as if there had been no change of the temperature at the cold end of the couple.

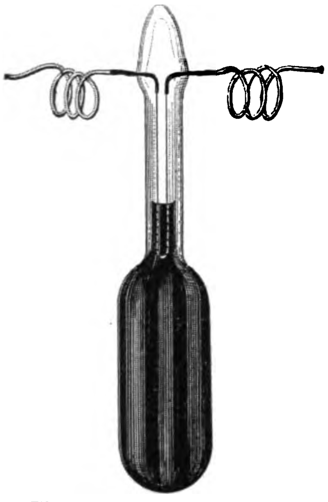


Fig. 15—Compensating device used in automatically correcting temperature changes

The compensator acts on the same principle but in a reverse manner when the temperature falls at the cold end, the resistance of the mercury being increased as the column of mercury falls. The increase of resistance in the circuit prevents an increase in the electromotive force of the couple due to the fall of the temperature at the cold end from increasing the current through the instrument, and, therefore, the reading remains unchanged. It will be seen that the same type of compensator may also be employed within the indicating instrument to compensate for changes of temperature at the instrument which would have a tendency to affect its reading.

The automatic compensator described above has been used quite extensively and successfully. In adapting these compensators for commercial service extra care has to be taken in their manipulation. Being made of glass they are fragile and when turned upside down, as sometimes occurs during transportation, the column of mercury is liable to separate in the stem.

To meet the demand for an automatic compensator which would overcome the difficulties mentioned, one has been devised which is illustrated in Fig. 16. The operation of this new model depends upon the differential expansion of a piece of metal and the tube encasing it. The tube is made of an insulating clay material, which has a very low coefficient of expansion. A tube

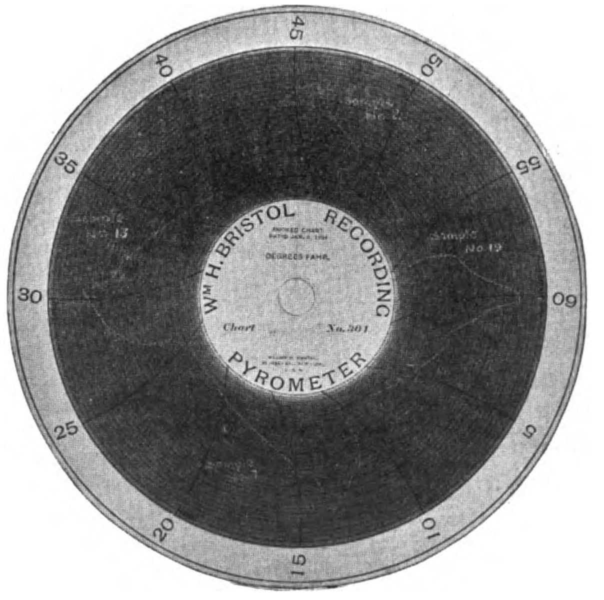


Fig. 13—Reproduction of a smoked-chart record made in determining absorption and recalescent points of metals

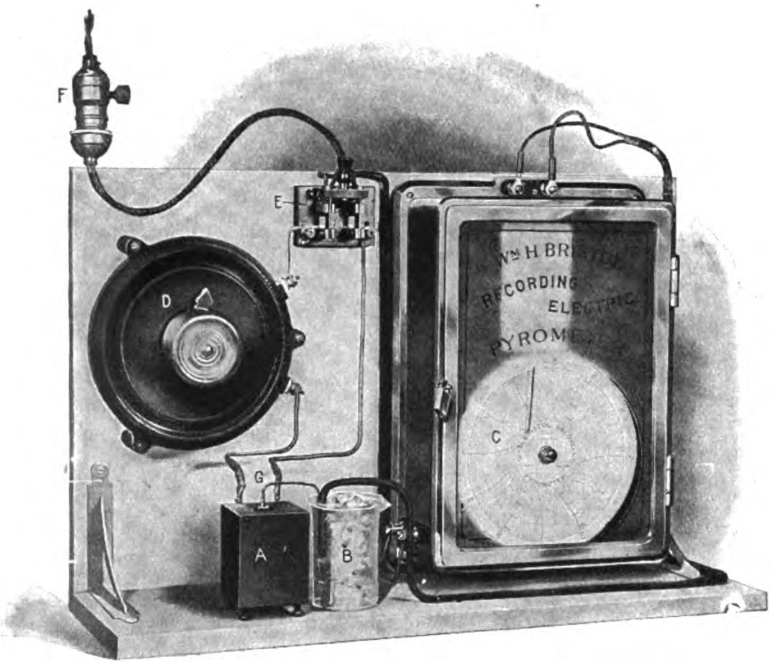


Fig. 17—Recording pyrometer, electric furnace, rheostat and connecting plug

of zinc is placed inside of the clay tube, which about half fills its length, the balance of the space being filled with discs of pure graphite. The ends of the tube are covered with metallic caps provided with screw threads and lock nuts. Electric connections are made to the caps at the ends of the tube, and the compensator is placed in series with the leads to the instrument close by the cold end of the thermo-electric couple. In Fig. 16 a cross-section of the compensator is shown, and if connected in series at the cold end of the couple its operation is as follows: When the temperature at the cold end rises the zinc tube expands more than the clay tube, and a pressure is brought to bear upon the graphite discs which reduces the resistance through the circuit from the cap at one end to that at the other where the connections are made. If the temperature at the cold end of the thermo-couple falls the zinc tube will contract, reducing the pressure and correspondingly increasing the resistance through the graphite discs.

By initially adjusting the resistance, by means of the screw caps and lock nuts, it is a simple matter to make the initial resistance such that if the temperature rises or lowers at the cold end of the thermo-couple the resistance of the compensator will be diminished or increased by the proper amount, so that the reading on the instrument will not be affected by the change of temperature at the cold end.

This compensator has not been tested out in practice, but as it will stand rough handling without any change in the resistance it is hoped that it will prove valuable in meeting the great demand for a practical automatic compensator for commercial use in connection with the thermo-electric couples.

In hardening, tempering and annealing, and other heat treatment of steels for the various parts of automobiles, since various grades of steels are used in these parts, it is an important matter to have pyrometers which can be depended upon to accurately indicate and record the temperatures during the processes and treatment of such steels.

It is a comparatively easy matter to injure steel by overheating, but by the proper use of an accurate pyrometer such mistakes are absolutely unnecessary.

As is well known, it is impossible to harden steel unless it is heated beyond the absorption point; therefore, one of the important applications of a pyrometer in this connection is to determine the absorption point. This can be done by using the apparatus shown in Fig. 17, consisting of a recording pyrometer, a small quartz-lined electric furnace, with a rheostat for regulating temperature and plug connection for attaching to lamp socket. *(To be continued)*

Digest

BRIEF RÉSUMÉ FROM 50 FOREIGN PAPERS: WORK OF A TESTING STATION—METHOD FOR REDUCING THE HEATING OF LUBRICANTS—DIFFERENCE BETWEEN TIRES—THE E. N. V. MOTOR—PHOTOGRAPHS OF EDDIES—BRAKING BY MOTOR—HINTS FOR EXPORT

Among the tests which have been demanded of the Section for Metals in the *Laboratoire d'Essais du Conservatoire des Arts et Métiers* (Testing Department of the National Conservatory of Arts and Trades), Prof. L. Guillet of this institution mentions the following in the report for 1909 just published: Mechanical and micrographic tests on a rail broken by the passage of a train, on tubes and sheets from boilers which had bursted, on chains and cables broken in service. A series of tests was made with lubricating oils and with various anti-friction metals to determine the coefficient of friction and the consumption of oil in terms of speeds and pressures. Micrography has been used right along, and has revealed particularly cases of *écrouissage* in metallic pieces only a short time in service (*écrouissage* is a deterioration of the fibre of metals, akin to fatigue but ascribed especially to the processes of cold drawing and rolling). Construction pieces and materials used in aviation, especially cables, shafts, propellers, cords and cloths, have occasioned more and more numerous tests. In the section for machines tests have been made of steam engines, internal combustion engines, gas producers, hydraulic machines, autmobiles, ventilators, etc., also tests of aerial propellers of various designs and of aviation motors. In the chemical section many of the examinations and reports have been supplementary to those in the mechanical sections, such as with reference to lubricants, rubber, fuels, metals and other construction materials. —*Le Génie Civil*, July 16.

For testing oils and bearing metals the Conservatory of Arts and Trades has two Martens machines which measure the coefficient of friction at pressures up to 100 kilos per square centimetre at speeds up to 6 meters per second, and up to a temperature of 80° C. In order to study oil heated up to 200° the laboratory makes use of a Kappf machine, consisting of a tub, or churn, in which a stem is turned by an electric motor, the stem being charged with variable weights and rotated at variable speeds. By means of the Martens machine it has been possible to show how an oil acts with regard to heating and consumption when the load and speed are varied. To this end the machine is operated at constant speed and pressure and the increase of temperature as well as the oil consumption are measured. This is repeated with the required changes of speed and pressure, one or both of these factors being kept constant throughout each test. One arrives by this method at a remarkable differentiation between oils and is able to establish the two characteristics which are of especial interest to the consumer. For the same oil it has been determined that: (1), at constant speed the coefficient of friction diminishes rapidly when the pressure increases, passes through a minimum and then rises at pressures varying generally from 60 to 80 kilos per square centimeter; (2), at constant pressure the coefficient of friction increases with the speed at low pressures, thereafter passes through a stage where it is reduced with the speed and finally increases with the speed at high pressures. The question is throughout of the friction coefficients at equal temperatures. At constant speed the time required for reaching a given temperature diminishes with the increasing pressure according to a law which appears complicated, but which the operators of the Conservatory expect to be able to formulate before long. "The Martens machine," says the report, "has permitted us to place in evidence by special tests a certain favorable influence on the friction obtained with an oil, which may be secured by introducing in this oil a somewhat volatile lubricating product which will vaporize slightly when the oil begins to get warm and by grace of the latent heat absorbed in vaporization will retard this heating of the oil. By this method it has been possible to lubricate with superheat oil, thick and viscous as a syrup, and which was injected in the machine by means of compressed air at a pressure of 8 kilos per square centimeter.

"The metals which are studied by the aid of this machine are formed as small bushings, and it is possible to determine on these bushings, besides the factors mentioned, also the amount of metal removed by friction. In this respect the metals vary considerably from each other. Some of them show a loss which is negligible, while others, especially the phosphor bronzes, lose too much of their substance by detrition, though their friction coefficient is low."—*La Technique Automobile et Aérienne.*

With reference to the wearing qualities of rubber tires P. Breuil states in the annual report of the Conservatory for Arts and Trades that the tests conducted at this institution show that some of the rubber mixtures used in tires wear ten times as long as others under the same operative conditions, so that there is plenty of room left for continued experimentation and testing, even though rubber may properly be classified as "an organic material which has strayed into mechanics."

A cursory description is offered of the E. N. V. motor, which shares with the *Gnôme* the preference of the most successful French aviators. The 8 cylinders form a right-angled V with four in each branch. The shaft has four crank pins disposed in pairs 180° apart, six ball bearings and a ball end-thrust bearing to receive the pull or thrust of the propeller. The cams are integral with the hollow camshaft which serves all eight cylinders, the admission and exhaust valves being placed side by side in individual valve chambers for each cylinder, these valve chambers extending L-wise and inward from the top of the V. The axes of the admission valves are inclined with relation to the axes of the cylinders, by which provision dead space is reduced. The crank pins and crankarms are bored to carry lubricant by force feed to all shaft and connection rod bearings, and from the pins the oil is sent through the hollow connecting rod to the hollow piston pin, and thence to the piston, but a special provision prevents exit of the oil to the bearing surface of the piston until the latter is at the end of the power stroke. (So says the description, but gives no details explaining how an emission of the oil at the end of the suction stroke is prevented. The provision carries into effect the old demand that the main oiling of the cylinder should take place at a definite point in the cycle of movements, so that the relation of the lubricant to the heat generation may be constant and subject to rational regulation. Possibly the cylinder lubrication is limited to the period at the end of the power stroke by synchronizing the strokes of the oil pump with the cycle of the motor).

The walls constituting the water jackets for each cylinder are formed of copper precipitated by electroplating process, and internal partitions are provided in the jackets to regulate and retard the cooling. The water circulation is forced by a small turbine wheel, and the radiator is placed underneath the crank-chamber in the direct current of air produced by the forward movement of the aeroplane. The ignition is by magneto and storage battery, each system having its own plugs. The distributor for the battery ignition is operated from the end of the camshaft.—*Le Génie Civil,* July 16.

Photographs of the eddies produced by an atmospheric propeller have been taken by novel means by A. Tanakadate. He sends a stream of hot air into the cold air and thereby produces certain variations in the refraction of the light and these become visible to the camera by a quick and strong flash-light. While the hot air has a movement of its own, determined by its variation in temperature from the rest of the air which is agitated by the screw propeller, this is negligible in comparison with the much more violent movements caused by the latter.—*Comptes Rendus de L'Académie des Sciences,* July 18.

For mountaineering by automobile it is recommended to arrange a special air intake on the induction tube between the carbureter and the cylinders, and to provide means for opening this intake when desired, so that the driver, when descending long inclines, may admit fresh air to the cylinders under full compression and get the brake effect thereof, rather than cutting off both gas and air, as is more commonly done. In the latter case a vacuum is produced above the piston, and lubricating oil in considerable quantity is forced past the piston rings into the combustion chamber, where it will foul the spark plugs.—*La Pratique Automobile,* July 25.

Hints for export, in some instances relating to construction, have been compiled by a German engineer from various reliable sources. None of the data are older than the end of 1908. They are, in abbreviated substance, as follows: Imports to Russia in 1908 amounted to 3.1 million rubles, of which sum 2.8 million was for trucks or touring cars with at least four seats, and only 0.3 million for runabouts. Most of the motor trucks and omnibuses came from Germany, and most of the pleasure cars from France. In Holland the best market has been for very light vehicles at 2,000 to 3,000 francs ($400 to $600). In Egypt the demand has so far been for closed carriages of small power. Larger automobiles have been bought somewhat extensively by the ministry of finance for use by the road and street departments and by the gendarmery. The imports to the Cape Colony have reached 60,000 pound sterling annually since duties were lowered in 1906. The cars must be high and stout for rough use over the veldt. They are indispensable for communication between the cities and the mining districts, and are used in preference to the railway for one hundred mile trips by engineers and inspectors. British India, in 1908, took automobiles to the value of 6,344,300 rupees, of which the shipping trade of England received 5,294,400; Belgium, 609,700. The market is now depressed by over-imports. American cars at 3,500 to 4,000 rupees have lost ground in Bombay, where the demand is mostly for large, expensive cars, up to $16,000 apiece, for the rich rajahs, merchants and government officials, who use them for lengthy trips to the inland. The gasoline and oil tanks must be large, spare parts amply provided, and there must be provisions for strapping considerable baggage to the vehicle. For city use, to take the business men from the remote residence sections to their offices, a consular report says that cars of 16 to 30 horsepower are preferred, and that the carriage work should be conspicuous in design and color to meet the native taste, red leather being much liked, and the vehicle should be low, easy of entrance and noiseless. Single-cylinder De Dion cars of up to 8 horsepower, and with four seats, phaeton style, are sold in considerable number at 4,500 rupees. The French firm, Chenard-Walcker, has sold many chassis to which are fitted Indian-made bodies constructed from woods suitable for the climate. In Siam the demand is mostly for small automobiles of 12 to 16 horsepower and with closed or semi-closed bodies. Argentina has few roads. American high-wheelers from Chicago have been sold there to some extent. In the cities nearly all cars are French or Italian. The market in Brazil is limited to the city of Rio Janeiro, where 350 automobiles are in use, many of them bought in Paris by their owners on the occasion of European trips, and in the central State of Sao Paulo, where the country is flat and rich. The Australian yearly import trade in automobiles is represented, according to recent reports, in the sum of 262,000 pound sterling, of which the United States received 14,300 and England nominally 166,000.—*Zeitschrift des Mitteleuropaeischen Motorwagen Vereins, medio* July.

Don't

ANOTHER INSTALLMENT OF SHORT-METER ADVICE TO THE TYRO—AND THE EXPERT—THE FOLLOWING OF WHICH MAY SAVE THE MOTORIST HEAPS OF TROUBLE, PERHAPS SOME MONEY, AND PROBABLY A LAWSUIT OR TWO

Don't run the motor on a retarded spark; it is damaging to the motor; excess heat is the first manifestation; leaky valves follow; weak performance is the further expectation.

Don't let calcium carbide ash remain in the generator after it has rendered a good night's service; the residuum (ash) is a biting mass that will ruin the generator and compel the purchase of a new one; it takes but a moment to clean out the generator.

Don't expect a raw patch to stay on a tube; it is like a scab; it will fester and peel off.

Don't think that it is an extravagance to purchase a vulcanizer.

Don't have a vulcanizer and not use it; tire-life depends upon care; the latter without a vulcanizer is impossible.

Don't have lubricating oil in such quantity that you can afford to let it drip on the garage floor; it ruins tires. If, through some inadvertence, oil gets on the floor, clean it up before the car is rolled in; one daub of lubricating oil on a tire and it will depreciate perhaps 50 per cent.

Don't fail to place an adequate supply of lubricant in the case with the inner tube in putting a tire on. What is lubricant for tubes? Talcum!

Don't be careless when putting tires on; the inner tube should be carefully inserted; laps are sure to do damage; just take the extra moment to examine the inner tube and see if it is properly in place.

Don't stand in your own light; cheap lubricating oil is the most efficacious means for a high cost of maintenance.

Don't labor under the impression that quantity will suffice for quality when it comes to lubricating oil; make it quality first, last, and all the time.

Don't get the impression that a gallon of good lubricating oil in the "sump" in the lower half of the crankcase will be of any value in keeping a main bearing from freezing; better results will come from a drop of oil on the bearing surface—look after the circulation.

Don't be fooled by the chauffeur who keeps the brass work polished; you can get that work done for a nickel by a bootblack; see that the "man" cleans out the gearcase, crankcase, and other lodging houses for stale lubricant.

Don't handle a squirt-can as if you are trying to put out a fire; clean out the oil-hole and then properly insert the spout of the can in place and make sure that a few drops of the lubricant will reach the surfaces to be lubricated.

Don't forget that lubricating oil wears out just as shoes and other things depreciate in service. Clean out the old oil before putting in new—what's the use of spoiling the new supply and defeating the aim.

Don't forget to take the jack along.

Don't high-gear it to a mud hole in the road; you cannot be sure of the depth of the hole; go slow; use the low gear; that is what it is for.

Don't race down every hill you come to just to get up the impetus necessary to make the facing grade on high gear; what is the matter with using a lower gear on the hill?

Don't forget that trouble hates a systematic man.

Don't persuade a lazy chauffeur to use the seat in your car as a bed to sleep in.

Don't expect to procure all the Cardinal Virtues for $15 per week; a good chauffeur is worth a price.

Don't forget, it is not what a man knows, but what he does, that is worth money. Get a chauffeur that knows less if necessary.

Don't fail to strap the top down to prevent breaking the bows.

Don't lose hub-caps off a wheel and then run the car for a thousand miles without them; caps are placed to keep dust out of the bearings.

Don't ignore a squeaking sound for a moment; it means that some bearing is crying for lubricating oil; it knows what it wants; be accommodating.

Don't let your "profound" knowledge interfere with your success; an absent-minded moment may cost you a crankshaft; there is danger in racing the motor.

Don't run your car week after week without cleaning out the gasoline tank and piping, even down to the carbureter; water accumulates and leads to trouble on the road.

Don't allow yourself to be persuaded that a screen or a chamois skin will abort water trouble; they may be the cause of it.

Don't imagine that the carburetion is perfect just because there is no frost on the intake manifold; poor gasoline may be in use. If so, it will not evaporate until it contacts with the heated cylinder walls, and in this fact may lie the reason for the absence of frost on the surfaces of the intake manifold, and carbon trouble with the motor.

Don't understand that it is desirable to have a frost accumulation on the surface of the intake manifold; far from it, but heat must be supplied to the liquid gasoline in order to vaporize it; this heat should be supplied to the same before it enters the cylinders.

Don't jump to the conclusion that the chauffeur is incompetent just because you have indigestion—his stomach may be in good working order.

Don't be a road hog; you are only one in 90,000,000. If you want a whole road for yourself, build one in your own back yard.

Don't give the repairman *carte blanche* if you only want him to generate a $10 repair bill.

Don't assume too much; the repairman is working for number one; to him, you are number two.

Don't go to a repair shop without having a schedule made of the work to be done; make it clear that you know what you want; stick to the schedule; insist upon getting what you pay for and pay for what you get.

Don't let the repair man mumble the price; there may be a lurking difference; have it put down in black and white.

Don't think that all repair men are robbers; some of them are so honest that they scarcely make both ends meet; it is too bad to have a good repair man go out of business because he does not know how to charge; if you are in the sugar business and sell 15 ounces to the pound, you can afford to treat him liberally, but if you give full measure you will understand his motive.

Don't be surprised if the spare tire that you left exposed to sun and weather for six months proves to be short-lived; tires depreciate when exposed to light as well as to weather; why not purchase a cover and use it?

Don't think that a 25-cent pump will do good work; a large tire pump is a paying investment.

Don't come off the road with your car all splashed up with mud and let it remain on until it forms a dry crust. It will come off, of course, but the varnish will adhere to the mud instead of the car.

Don't start rubbing down the varnished surfaces of the car before the sand is all removed; grindstones are made of sand; you might just as well use a grindstone.

Touching Up and Varnishing

DIRECTIONS FOR THIS WORK BY M. C. HILLICK. SKILLED HANDLING AND PROPER EQUIPMENT ARE REQUIRED

THE car that comes to the paint shop in a slightly soiled and worn condition to be simply touched up and varnished, or to be lightly painted and varnished, as the condition of the surface, upon examination, may suggest, invites careful handling and the best sort of skill to put it in proper shape again at minimum cost.

The first requirement to handle the automobile work economically is a good, light, well-ventilated working space equipped with either a floor pit over which to locate the car, or a couple of strong wooden horses securely bolted to the floor and reached by an inclined runway up which the car can easily be pushed or pulled.

At this elevation anyone can work under the car without much inconvenience. Having located the car so that the parts may be cleaned handily take narrow strips of burlap, say 3 inches, and saturating a small bunch of waste with turpentine proceed to wet up the old crusty accumulations, after which rub smartly with the strips of burlap. Some parts naturally will need, and in fact, must have, more or less scraping with either the putty knife or steel hook scraper in order to start loose and clean off the unusually hard, crusty substances. After the mechanism has been scraped and rubbed clean of the grease and dirt, wash the parts off, as a final cleaning process, with turpentine, and dry off, after a few minutes, with clean strips of burlap. In case a car is received with the parts so unusually crusted over with grease that it cannot be moved with the ordinary medium, start the accumulations with the scraper, and then apply soft soap carrying a small quantity of sal-soda, and use a handful of coarse hair to scour the surface with. The main thing is to get the surface clean before going forward with other operations.

Rub the body surface with pumice stone flour to eliminate dirt specks in the former coats of varnish; also, to flatten out and make the old surface of varnish fit to receive the new supply of paint and varnish.

If the surface discloses a condition which a single coat of varnish will amply renew, and furnish a body of sufficient brilliancy, proceed at once to match some color to the old color, to accomplish which use enough rubbing varnish in the match color to cause it, when applied to the surface, to dry with enough gloss to counteract the natural light-absorbing properties of the new color.

Where the color dries "dead," or without gloss, it invariably absorbs more light than it reflects, with the result that the match is almost certain to be of a different shade—possibly several shades—from the old color. With enough varnish in the match color it undergoes practically no change in drying out, and if mixed to match precisely, or nearly so, the old color, it stays so throughout the drying process. However, at best it is almost next to the impossible to make all colors match up exactly, and the necessity, therefore, of touching as few places as possible, and those places made of a size just sufficient to cover the surface defect, is at once apparent. Assign this work to one of the most skilled as well as one of the most painstaking painters. Moreover, touch only the actual defects. This applies to all parts of the car, body and chassis. In touching up use a small pencil brush, preferably. Give the match color plenty of time in which to dry before varnishing, otherwise not a few colors will be found to show anywhere from two to four, or more, different shades of the same color. Having deftly touched the parts requiring such work, and the touch up spots having dried thoroughly, wash the surface throughout very carefully using a water tool or brush to work about all moldings and carvings, etc., thus removing pulverized pumice stone accumulations, and any other adhesive particles, in fact. With special dusters, dust off all the surface perfectly, after which flow the surface—the body surface first—with a rich, full coat of some wholly trustworthy elastic finishing varnish. Handle the chassis similarly, coating up with all the varnish the surface will safely take care of.

The automobile that shows the surface bitten with minute missiles, with worn patches, and possibly some parts faded and perished quite beyond touching up properly, but which the owner is anxious to have put into presentable appearance at a minimum cost, may be treated about this way: Wash and clean up body and chassis as described in the preceding case. Detach as many of the parts as may be necessary to facilitate operations.

Then with pulverized pumice stone, flour and water rub the surface of the car down uniformly throughout body and chassis, washing thoroughly. Then make choice of some good, opaque, one-coat color, approximating the old color sufficiently to render such color a fit supporting ground for the new, and mixing it with raw linseed oil and turpentine in the proportion of one part oil to eight parts turpentine, apply to the surface using a camel's hair brush for the work.

However, should the surface be fractured and chopped up some with nicks and gouges, before applying the coat of color it should be touched over such surface defects with a bit of lead and color, or with color alone, either pigment containing a dash of raw linseed oil as a binder. The following day putty the cavities and fractures with a hard drying lead putty, made, say, of three parts dry white lead and one part potted whiting worked to the proper consistency in equal parts of brown coach japan and quick drying rubbing varnish. Let this putty stand 24 hours and then level down to the main surface with a block of rubbing brick or stone and water. This brings the surface to a level and uniformly intact condition throughout, and after twelve hours for drying out the color, as already detailed, may be laid on.

On this flat color apply whatever lines of striping the car owner may choose, or delegate you to choose, after which, as quickly as the lines are safely dry, flow on a full, generous coat of heavy body finishing varnish. Brighten up the polished fixtures, renovate the top, if any, and report the job finished.

Should the surface be parched and poverty stricken in the body of varnish, and lacking in capacity to hold out with adequate brilliancy the proposed new coat, it may be necessary to apply a coat of rubbing varnish directly upon the new coat of color, in which case the rubbing varnish should carry a stain of the new color in order to counteract the discoloring property of the varnish.

In due time—this time, of course, depending materially upon the drying conditions of the shop—rub down nicely with pumice stone flour and water, wash perfectly, and finish with the varnish recommended for the one coat varnish method. When the rubbing coat of varnish is used with color in the varnish, apply the striping on the rubbing coat after it has been surfaced with water and pumice stone. If the rubbing varnish is used clear, stripe upon the flat color, thus giving the lines the protection of an extra coat of varnish.

Should any material be applied to the automobile top use it sparingly—the least used, in fact, the better.

Contests on Highways

LEGALITY OF PRE-EMPTING THE HIGHWAY FOR CONTESTS.
BY XENOPHON P. HUDDY, LL.B. INCLUDING A DISCUSSION
OF OTHER PHASES OF THE MATTER

FOR a number of years automobile speed contests have been held on public highways and also on private courses. Experience has taught that there exists more or less danger connected with automobile racing. It is fitting to inquire if these races are legal. Automobile races tend to show the qualities of the cars participating. These speed contests also afford means of advertising good cars. They constitute what mignt perhaps be termed an excellent sporting event. They also bring business to the community and to the railroads. In considering the advisability of continuing racing of this character the fact that the contestants may be gambled over is not a good argument for abolishing them, since it is possible to gamble concerning anything.

The most serious element entering into automobile racing consists of the danger to life. Are the advantages derived from automobile speed contests on public and private ways greater than the disadvantages? We must concede that in almost every line of human activity and progress the sacrifice of life is inevitable. Our railroads could not be operated without at least a certain number of persons being injured or killed each year. The fact that persons may be injured or killed is no legitimate argument to be advanced for the purpose of discontinuing any particular line of necessary commercial or other activity of great benefit to the public, but in automobile racing are there not features which present very serious consideration in determining whether it should be allowed to exist?

What may the government if it wishes do about automobile racing? The State does not possess authority to prohibit anything it pleases. There exists, especially in the United States, a guarantee of individual freedom and liberty which permits a person to do about as he pleases, if he does not injure either the person or property of another, and if he does not commit any wrong against the public. Prohibitory legislation without reason is illegal, therefore the government cannot arbitrarily command that a particular act must not be done.

The vital legal question concerned in holding automobile speed contests on the public ways consists of two propositions: first, whether a public way can be closed for any length of time for the purpose of holding a speed contest on it and, second, whether such a speed contest does not constitute a public nuisance even though the authorities close the highway under color of authority. We will consider racing on private ways later.

The public avenues of travel were established for certain uses. These uses cover the passing of vehicles, animals, and pedestrians, also they consist of affording a thoroughfare for the placing of telephone and telegraph poles and wires. All these constitute legitimate uses of the public highways, since they are all connected with or in aid of travel, intercourse and communication.

Now, what legal grounds exist for closing the public highways? Manifestly necessary and proper improvements may close a road or street, such as excavations, laying of sewer or water pipes and railroad tracks. So too, a house may be moved through a street and the thoroughfare temporarily may be closed for that purpose, but no longer time than is absolutely necessary to move the house can be taken. The nearest thing which approaches an automobile race, perhaps, is that of a parade, but because parades are educational and inspire patriotism they have been held to be legitimate causes for temporarily closing public avenues of travel.

An automobile speed contest held on the public highways stands in a different position from any of the foregoing. It is not a public necessity, nor is it a public utility. The fundamental theory that a public way may be closed for a public purpose using the same reason that private property may be taken for a public purpose does not apply to automobile racing. An automobile race is not held for a public purpose. It may be said that automobile racing has a tendency to develop and perfect the automobile. If this were the only result such speed contests would be legitimate. The danger, however, which is connected with holding these races, and the closing of the public highways, are sufficient to stamp them as illegal it may be argued. Suppose that one desired to hold a funeral, or suppose a house caught on fire, could the funeral or fire engines be stopped because an automobile race was being held?

The common law on the subject is as follows:

"To operate a vehicle along a public road or street, greatly to the danger and inconvenience of all persons traveling along said highway, is such a wrong as injuriously affects the rights of the public, who are entitled to travel along such public thoroughfare, laid out and kept up by the public for their convenience and accommodation, without exposure to such danger and inconvenience. While any person may drive his vehicle at such speed as he may please, yet, in enjoying the privilege of free use of his property, he has no right to expose others to injury or to infringe upon the rights of the general public. Running and racing a vehicle along a public road, no necessity being shown for such speed, is not the ordinary and proper mode in which such roads are used by prudent men. They were not intended, by the very purpose for which they are opened and kept up, for any such use, but for the ordinary and usual travel of the public.

"To run a race on a public highway or to excessively speed a vehicle, to the danger and inconvenience of people, is a common law misdemeanor. It is to add, that there may be necessity for riding at high speed along even the public road, as in cases of sickness, or to give a neighbor notice of great personal danger to his property. Such necessity is a matter of defense."

Considering the holding of automobile races on private tracks there are difficulties standing in the way of controlling these races by legislation.

Prize-fighting is conducted on private property, but the government has the power to legislate against it, or to control it to a considerable extent. Duelling also which may take place on private property can be prohibited and is prohibited throughout the civilized world excepting one or two places. In fact, any conduct, whether it takes place on private or public property, may be regulated or prohibited if it has a tendency to destroy human life, because it is considered that dangerous acts constitute a wrong against the community and that the people are sufficiently interested in dangerous conduct to prohibit it. It might be argued, what business is it for the people or the government to prohibit a chauffeur from driving a high-powered machine in a speed contest on private property. May I not do as I please with my life and limb? The answer to this question is, no. Self-inflicted injury is illegal. Suicide has always been considered a felony. An attempt to commit suicide is punishable. Of course, for one to knowingly and intentionally engage in a highly dangerous act cannot be placed in the same category as suicide, but where the act has no direct public benefit it can be controlled more or less by legislative action.

In some of the States automobile laws prohibit the holding of speed contests on public highways. No statute has as yet made an attempt to declare it unlawful to race on private ways.

Motor Valves

ABSTRACTS FROM THE THIRD INSTALLMENT OF PAPER BY EUGENE P. BATZELL READ AT SUMMER MEETING OF SOCIETY OF AUTOMOBILE ENGINEERS DEALING WITH SLIDE, ROTARY AND PISTON VS. POPPET VALVES

STILL another type of valve is shown in Fig. 12, designated by the author as a "simple barrel type of rotary valve." In relation to barrel types of rotary valves the author goes on to say: "Cylinder or barrel types of rotary valves also give triangular opening diagrams. The simplest of these is represented in Fig. 12. Here a valve *a* is formed with a straight central passage *b* through which the inlet and exhaust passages communicate with the interior of the cylinder at the proper moment. This valve rotates at 1-4 crankshaft speed. With an inlet of 210 duration the valve channel can occupy at each end an arc of 26 1-4 degrees, if the greatest possible inlet opening is desired. In such a case the inlet port of the cylinder head will also extend over 26 1-4 degrees, and the exhaust port for 225 degrees duration over 30 degrees. For a cylinder of 5-inch bore, the valve could be made about 3 inches in diameter with a channel 4 inches long." The author gives the maximum inlet area as equal to that of the channel passage, or 2.75 square inches. He estimates that this opening will be 25 per cent. larger than that with poppet valves.

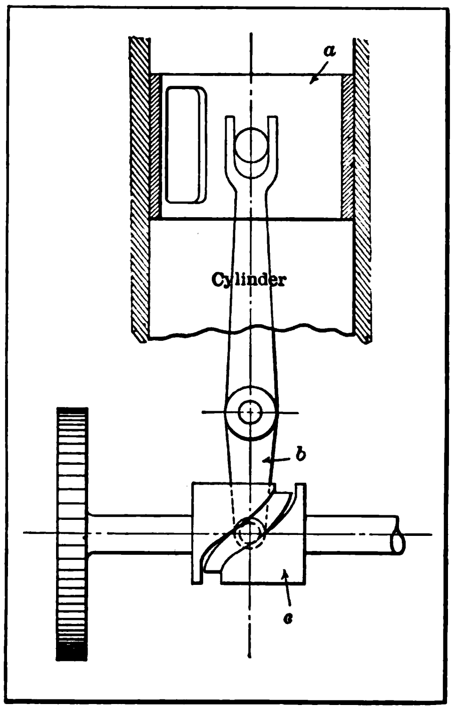


Fig. 13—Cam-operated oscillating valve

Besides a variety of other phases of the valve problem, the author touched upon the question of reversing and throttling motors by means of valves, which represents a phase of the motor building situation that is at present quite foreign to automobile practice. It is nevertheless an interesting angle, and nearly every autoist, at some time or other, has compared the automobile type of internal-combustion motor with steam engines, and regretted that the automobile motor seemed to fall short of the facility offered by steam engines from this point of view. The one redeeming feature lies in the fact that automobile motors do not have to be reversed. The sliding gear transmission system permits of reversing the direction of travel of the car without reversing the motor. In relation to reversing and throttling motors, the author goes on to say: "The motor of a rotary valve system generally can easily be made reversible by reversing the direction of valve rotation, or by changing the moment of the inlet relative to the exhaust, which can be accomplished by an auxiliary valve. An auxiliary valve can be used conveniently also for a throttling means for the motor. Such a valve can be placed between the inlet valve and the cylinder port, so as to alter the size of the opening, or simultanously its size and duration. The inside member of the inlet valve in Fig. 12A serves the last purpose; it does not rotate but can be turned more or less, whereby its channel changes the direction, altering the inlet, timing and opening. However, neither reversibility nor throttling by the valves is to be considered as a feature of rotary-valve systems exclusively. With poppet and other valve systems, these objects can be obtained with as little complication, though in different ways.

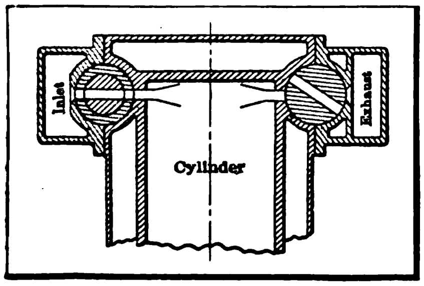


Fig. 12A—Double inlet valve

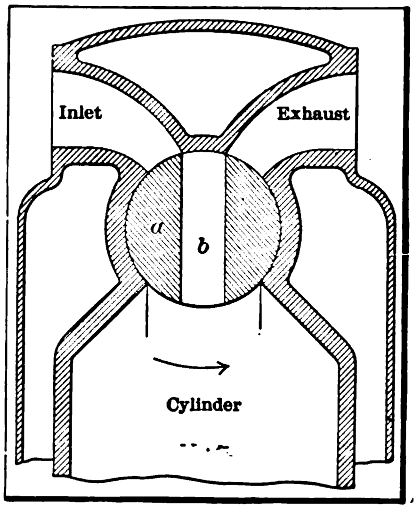


Fig. 12—Simple barrel type of rotary valve

"Referring to oscillating valves, similar to those just described as rotary systems, they can also be made with an oscillating motion. With the single valve of this type, proper engine timing will be obtainable only if the valve has an irregular motion, for instance, produced from a cam, etc. This is necessary because the time from the inlet closing to the exhaust opening is much longer than the time from the exhaust closing to the inlet opening. Double oscillating valves registering with each other similar to double sliding valve systems can have a continuous movement from eccentrics, or otherwise. In Fig. 13 a scheme is given of a cam operated oscillating valve. The groove cam *c* transfers motion to the valve *a* through a lever *b*. The valve can have a greater or smaller swing according to the cam size, the leverage, and other things. If it is assumed that the dimensions are such that a 3-4-inch maximum inlet opening is obtained, the diagram of the opening elapsing will depend upon the cam shape. If it is the choice to make the cam so that its developed surface is like the one presented in Fig. 14, the inlet and exhaust periods will be in their proper relation. It will be seen that the valve openings change in size in proportion to the revolving of the cam, but their maximum port openings remain unchanged for a certain period of time. If the valve opening increases and decreases at the same rate, its diagram will be a symmetrical trapezoid as given by curve v_4 in Fig. 4. The maximum port area remains constant for a period of 50 degrees crank motion. The respective theoretical intake gas velocity is

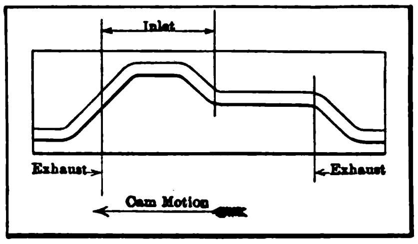


Fig. 14—Diagram of cam for actuating oscillating valves

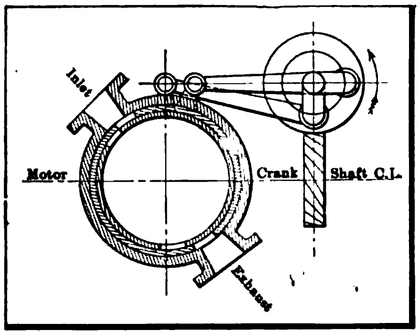


Fig. 15—Horizontal section through motor cylinder, showing oscillating double-valve system

represented in Fig. 4 in curve w_4. This system can be looked upon as being very favorable for motor power, but it still remains to be seen how it can be developed to become of practical value. The comparatively small movement of the valve should also give it some advantages, but, on the other hand, it would probably be difficult to preserve this mechanism from showing backlash, owing to wear in the cam and the pivot. In Fig. 15, which is a horizontal section through the motor cylinder, is shown an oscillating double-valve system with sleeve valves operated by rods from cranks, moving in the horizontal plane. These cranks are rotated from the motor crankshaft by means of a pair of spiral gears. The valve port diagram is obtained in the easiest way graphically. In laying out it is assumed that the radius of the valve crank will be 1 1-2 inches, and that the outer sleeve valve will be actuated from the crank, which revolves 75 degrees ahead of the other one operating the inner sleeve. The maximum inlet port size, counting on the circumference of the inner sleeve, will be found to be 15-16 inch, which gives a total area of 2.625 square inches with a port 2 inches high. The curve resulting from the performance of a motor such as this appears to be practically an equilateral triangle, and as such will result in a theoretical intake gas velocity curve of a shape similar to w_2 in Fig. 4, but of a slightly different scale. The curve v_5 starts and ends more lingeringly than curve v_2 and proves that the generally claimed quick opening of ports by means of a double-valve mechanism operated through eccentrics occurs less quickly than with regularly moving rotary valves. The double oscillating valves of the size assumed here are not noticeably different from the poppet valves in the area enclosed by their diagram curve. The curve v_6 gives a trifle quicker opening start than is obtained with Nos. 1 and 2 (Fig. 1), of the roller cam follower. On the other hand it is less quick than the curve of follower No. 3 (Fig. 1), and besides it is enclosed by all three cam-follower curves during a considerable part of the following crank movement; but it can be concluded that the system after Fig. 15 is more favorable for efficient inlet gas flow than poppet valves having a good shape of inlet port.

"Some other arrangements of oscillating valves are possible besides the one just referred to, for instance, double spherical cap valves are made to fit inside or outside the spherical combustion chamber, the motion for the valves being given through a pair of eccentrics. This system shows the same valve diagram as Fig. 15 and from a theoretical standpoint it is equal.

"Regarding the construction of the valve operating mechanism, hardly any simplification will be noticed in oscillating valves comparatively with poppet valves; gears, shafts with cranks, or eccentrics, rods, bearings, etc., are as well required there. The care required to keep the motor in good shape of course increases with the mechanical complication. If poppet valves are liable to get out of order, the oscillating valves also have peculiarities of construction which will render their correct functions only temporary, nothing being gained in this respect. For instance, places liable to cause trouble in oscillating valves are the cams, the bearings, different joints and pivots, the valve ports themselves, which can burn out, etc. Wear occurring here might result in considerable play of parts, and their correct motion in relation to each other will become changed. In this respect rotary valve systems are different. Their drive through gears and shafts is of a nature where wear is not followed by play or backlash.

(*To be continued.*)

Industrial Aeroplanes

BY MARIUS C. KRARUP. DESIGNS OF AEROPLANES ARE SHOWN EMBODYING IMPROVED MEANS FOR SECURING EQUILIBRIUM AND SEVERAL NEW DETAILS OF CONSTRUCTION

CARPENTRY and dry goods are elements in aeroplanes which fail to inspire full confidence. The woodwork and the textiles absorb moisture from the atmosphere, expand and contract unexpectedly and, in conjunction with guy wires which refuse to stretch, shift strains from here to there without notice or outward indication. The tangled debris which submits itself to inspection afterwards is eloquently silent. The cause may have been a weakened part, the aviator's blunder or the inherent unreliability of woodwork joints.

Though textiles will probably remain indispensable for a long time yet, the mechanical mind looks forward to an aeroplane machine which shall be a reliable product of the machine shop in all its large responsible features—an industrial aeroplane which may be produced in large number and all alike by industrial methods. So far, constructions conceived under some influence from this idea have been frustrated by the weight limit; they were unable to leave the ground, and in this fatal failure their other merits or defects escaped discussion. It was too much to expect that a design which had been evolved experimentally with woodwork as a basis and piano wires as a source of salvation could be transferred bodily to an imitation wrought in tubing and brazed metallic joints.

The transition to the industrial aeroplane which nevertheless is foreordained, unless the most modern transportation machine shall remain an anomaly in the age which created it, must evidently be accompanied with the changes in design which the changes in material involve. If these changes include an increase in weight per square foot of sustaining areas, as they are likely to do at first, the sustaining capacity of the areas per square foot must somehow be raised. If they include an increase in cost of production, it is reasonable that great care should be employed to develop those possibilities for a ready and instinctive preservation of equilibrium which are known to exist, since they are developed in Nature's fliers, and which constitute the only safeguard against having a considerable value destroyed by a trifling accident.

Even from a purely economical viewpoint, improved means for securing equilibrium must be a prominent feature of the aeroplane which shall be more than a dangerous and fascinating toy. And the sportsman who insists that the dangers of the sport should be reducible in proportion to the skill he employs, can readily concur in this view.

An aeroplane which offers opportunities for an industrial development, one which places the preservation of equilibrium in the hands of the aviator even in severe weather and without too exacting demands for special skill and one whose leading features may be tried out without too sudden or too radical departures from existing design and materials, seems to be one of the necessities of the moment. With these leading and other more or less subordinate considerations in mind, the writer has

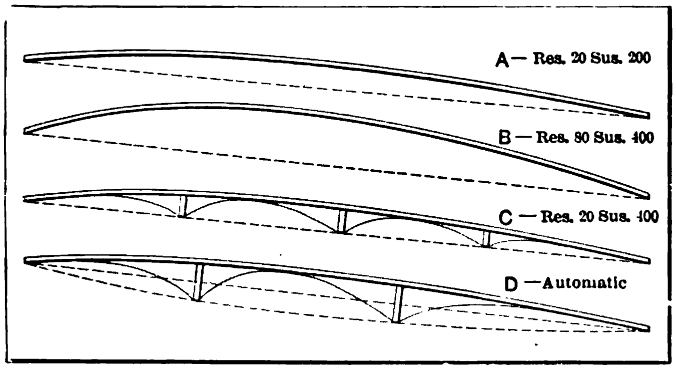


Fig. 1—Diagrammatic sections of aeroplanes illustrating the principle of placing curvature "in series"

developed a design for aeroplanes which, if it does not afford a starting point for a fresh development, should at least suggest some of the possibilities which must be materialized sooner or later. The accompanying drawings show an outline of the main features, and more detailed illustrations of the elements will be shown subsequently.

Certain peculiarities of the planes which may not easily be shown in drawings on a small scale are indicated diagrammatically in Fig. 1. It is known that a plane shaped in section somewhat as Fig. 1A meets with a resistance against propulsion which, at a given tilt and speed, may be denoted by the numerical value of 20, when the value of the sustentation which it affords at the same tilt and speed is denoted by 200. Another plane shaped, in section, somewhat as Fig. 1B meets, at the same tilt and otherwise similar circumstances, with resistance 80 and affords a sustentation of 400. The dimensions of the planes do not influence these relations much, excepting that the fore-and-aft extension should not be much more than one-fifth of the length of the front edge under penalty of excessive irregularity in the pressures created. The relations are in the main decided by the degree of the curvature. Such is, with only the inaccuracy of an extreme brevity, the upshot of the experimental research which has been carried on at various aerodynamic testing stations. The most desirable relation to establish in an aeroplane would of course be the combination of the resistance of A with the sustentation of B, provided the resistance of A is the minimum obtainable and the sustentation of B is the maximum obtainable. This combination may, in accordance with the established data, be effected in a considerable measure by placing the curvature of B "in series" under the general contours of A, as in Fig. 1C. Each of the subdivisions of plane C is thereby made to afford sustentation at the rate of 400, while the resistance, which depends very largely upon the shape of the top surface of the plane, remains essentially at the figure of 20. An uncertain element creeps in, because the air, in passing from under the foremost curvature in the series to the next one and from the second one to the third, is not in the same condition as the air of the atmosphere meeting a single hollow plane of larger fore-and-aft dimensions, and some experimenting is therefore necessary in order to determine what particular succession of curvatures in the series produces the best results. On the other hand, the pressures under, and over, a large plane of single curvature shift, with changes of tilt or wind, from the middle of the plane to an axis of pressures much nearer the front edge, and at very small tilts, below 5 degrees, as well as at tilts exceeding twenty degrees the shifting is sometimes rather violent and unaccountable. By placing the curvature in series the shifting of pressures should be distributed under the sub-curvatures and should be reduced in linear extension in proportion to the number of elements in the series. The arrangement indicated in Fig. 1C should therefore serve to increase the fore-and-aft stability as well as the sustentation for a given propulsive thrust. Finally, the formation indicated in Fig. 1D, in which the chords of the arcs of curvature themselves form a convex pressure surface for the plane in its entirety, should have distinctly self-righting qualities, since any tendency to tip forward or backward will be immediately antagonized by stronger or weaker action of the rear portions of the plane.

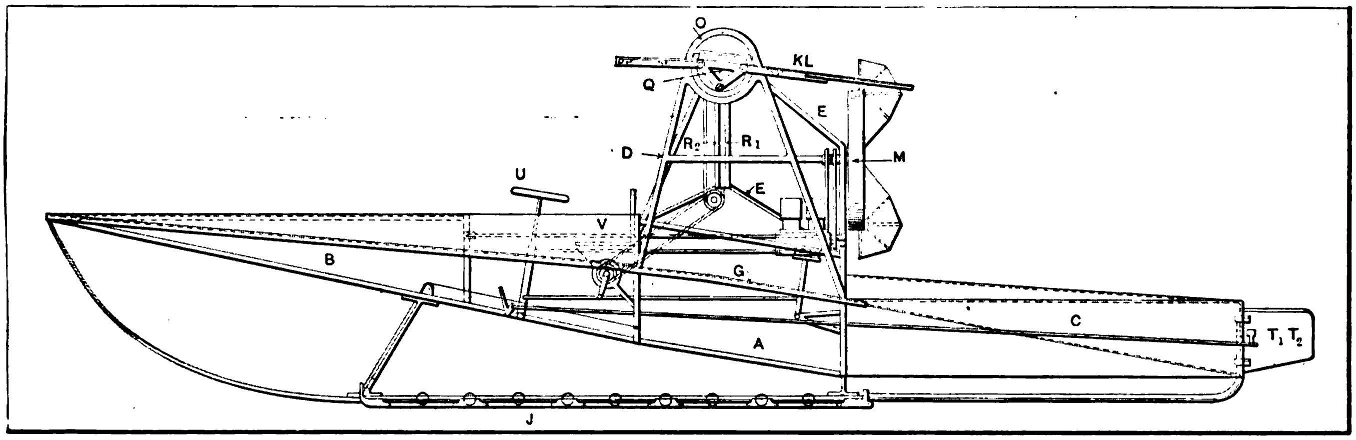


Fig. 2—Side view of machine with large upper adjustable wings and smaller fixed lower wings. A, body; B, prow; C, tail; D, left wing support; E, central control base; F, right wing support; GH, lower wings; J, skid; KL, upper wings; M, propeller; N_1 N_2, control levers; O_1 O_2, guard over trunnioned bearing ring; P_1 P_2, stays; Q, triangulated axis of wings; R_1 R_2, central slides; S_1 S_2, motors; T_1 T_2, oblique rudders; U, steering post; V, seat

In applying the design of Fig. 1C to practice it is found expedient to use the two upper spars in the triangulated axis, Q, of the wings KL, Fig. 2, as means for dividing the surface under the wings into curved sections or shallow air pockets.

In the aeroplanes outlined in the drawings, Figs. 2 to 5, the main upper wings *K* and *L* are designed on the plan of Fig. 1C with flexible and highly resilient sectional rear extensions intended to act as the springs on an automobile in permitting the structure to ride over humps in the road, *alias* sudden gusts, without deflection from its course, the flexible extensions allowing the gusts to pass while their resiliency determines the value of the extensions for sustentation in normal flight. The lower wings *G* and *H* are also designed on this plan but may approach the plan of Fig. 1D and may be without flexible extensions.

In accordance with the conditions for ability to preserve equilibrium, whether the machine is speeding along or the motor is stalled and gravitation is the only force available for propulsion, as these conditions have been analyzed in previous articles, the control is secured through the mobility of the main planes *K* and *L*, and the small oblique rudders T_1 and T_2 at the rear end of the tail surfaces are intended only as a handy means for control in fair weather and an auxiliary for difficult steering and alighting. In order to secure mobility of the planes without an impracticable employment of power, these have been suspended near their middles, where they are mounted in a trunnioned bearing ring admitting of their rotation around their rigid axes

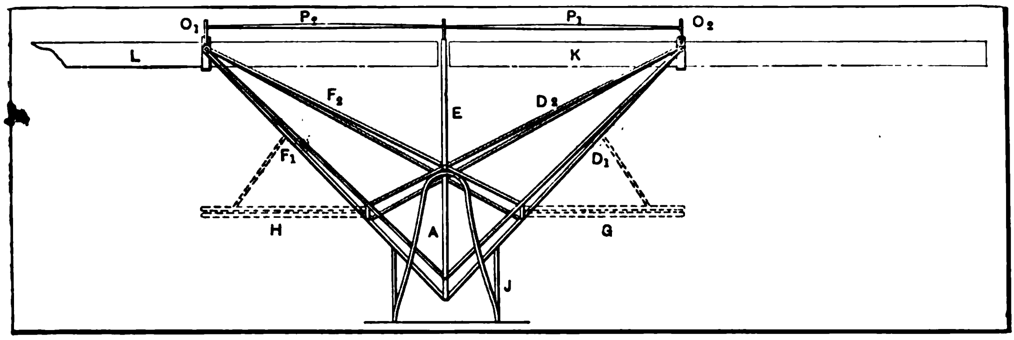


Fig. 4—Diagrammatic front view of construction applied to a monoplane or intermediate type

(formed of three trussed spars, shown as tubes) and also of raising their outer ends while lowering the inner ends, at which the control elements operate. One wing may be turned to a higher tilt while the other is at the same time and by the same control movement turned to a correspondingly lower tilt, or both wings may be tilted higher or lower in one movement. These movements may be accomplished whether the outer ends of one or both of the wings is raised or not.

The control devices serving these purposes consist briefly in two central slides R_1 R_2 in which the inner ends of the wings may slide up and down by means of sliding blocks and universal joints, the blocks being actuated through sprocket chains or equivalent means reaching lock-handles at the right and left sides of the aviator's seat. Two levers N_1 N_2 secured to the universal joints control the tilt of the planes. Their lower ends are held or moved forward or backward between rollers in a cable, one end of which winds on when the other winds off the steering post U, and, when the steering post is tipped forward or backward, both levers are turned correspondingly, thereby turning the planes. The two rear rudders T_1 T_2 placed at a V are actuated through pedals, and their action is accentuated by their position in continuation of the sharp rear edges of the covered tail portion of the structure, where the air displaced by the machine conflues.

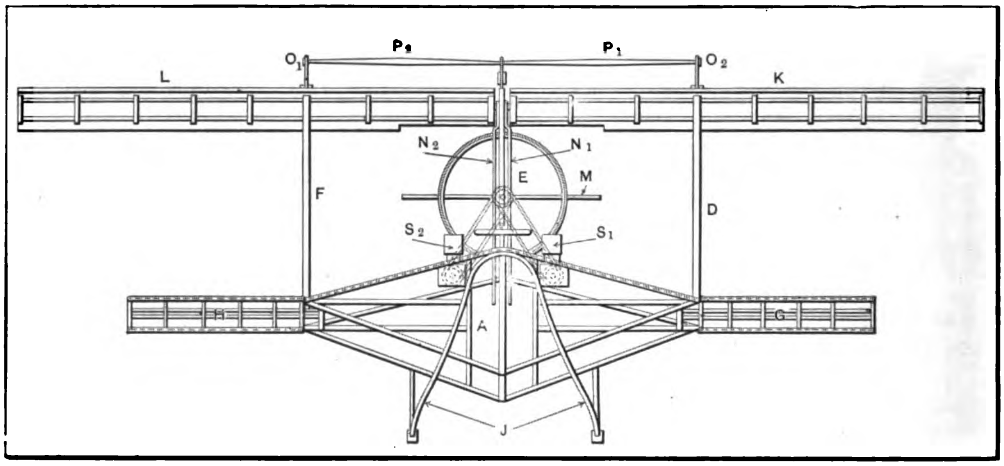


Fig. 3—Front view; reference letters denote the same parts as in Fig. 2

In order to support the planes under their middles, as well as their inner ends, it is necessary to have a rigid central body *A* and the uprights or standards *D*, *E* and *F*, and in order to reduce air resistance against this body, while also utilizing the resistance for sustentation and, withal, having this lower portion of the machine so shaped as to assist in securing a considerable measure of automatic stability, it is necessary to have a prow *B* and a tail *C*. Both prow and tail are covered, and the prow is formed of converging spars of which the upper one is normally horizontal, while the lower ones form supporting triangles with a forward tilt of about fifteen degrees and lateral tilts of about twenty to thirty degrees. The air waves created by the forward movement of the prow are caught under the fixed lower wings *G* and *H*, increasing the sustentation afforded by the latter. The lateral tilts of twenty to thirty degrees represent the range of angles at which a disturbing sidewind or irregular gust has its maximum effect to raise one side of the machine and disturb the balance. An attack upon the equilibrium therefore spends itself in turning the machine into a new position against which the attack has less effect than at first, and a limit for the disturbance is quickly found, so far as lateral disturbances are concerned. The tail *C* is formed in two parts which may be joined at the bottom or split apart (the latter giving easier access to the motors or motor). Each of the parts is bounded by triangular surfaces coming together in an oblique sharp edge at the rear, and between them at the top is formed an air trough facilitating the confluence of displaced air at the rear. The under-surfaces of the tail are about horizontal, in the fore-and-aft direction, so that they do not contribute to sustentation unless the machine is tipped backward. In other words, the prow, body and tail are, in conjunction, of a self-righting formation and contribute much to support when the machine is moving forward either by motor power or gravitation, but their susceptibility to disturbance is much smaller than that of an equal area of wing surface, owing to the lateral tilt and the planity of the surfaces. Much of the faulty equilibrium of biplanes, which is due to the high susceptibility to disturbance of the lower plane and of the rudder elements placed far in front and to the rear of the machine, is therefore remedied without much, if any, sacrifice of sustentation per square foot of surface.

The monoplane type of this design is indicated in outline in Figs. 4 and 5. Here the difficulties in obtaining sufficient surface for the weight to be carried are mechanically greater than in the type shown in Figs. 1 and 2, but on the other hand the stability and equilibrium should be improved. The sketches show the bottom angle of the body sharper than it should be in practice and the body too far removed from the plane of the wings. The control system as well as the formation of prow and tail and wings are the same as in the other type. An intermediate type is indicated in dotted lines, representing lower fixed wings of small area and possibly secured by stays. The propeller and the skids are the leading features which remain to be described.

(*To be continued.*)

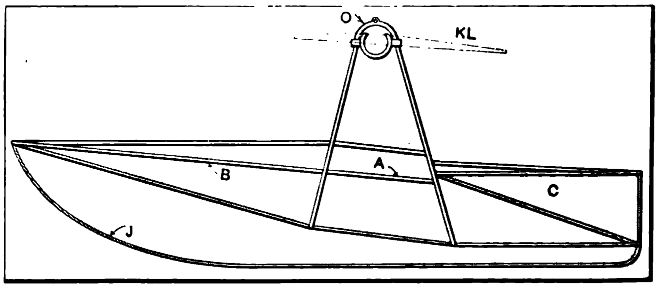


Fig. 5—Diagrammatic side view of monoplane type; all construction deta'ls omitted

Touring in Switzerland

THAT COUNTRY IS RAPIDLY BECOMING THE MOTORIST'S PARADISE. SOME OF THE BEAUTY SPOTS VISITED AT THE ANNUAL MEETING OF THE SWISS CLUB

THERE are more motor parties in Switzerland this season than ever before. Automobile tourists from the United States, England, France, Germany and Austria are numerous in the picturesque fastnesses of the Swiss Alps and in contradistinction to other years, there are few complaints of harsh official action or of bad treatment by the populace.

The Government of Switzerland has secured the endorsement of a uniform road code in twenty-one out of the twenty-two cantons and the agreement of the single outside division is looked for in the near future. The result of the active work of President Empeyta, of the Swiss Automobile Club, and his associates is to be seen in the fact that the high road to the Engadine is now open as far as the village of Chur, while formerly motors were halted at Ragaz.

The Swiss mountain roads have a world-wide reputation, not only for their excellence of construction, but even more largely on account of the superb quality and quantity of the mountain scenery.

Automobile parties may start from half a dozen places in France, Italy and Germany and reach the foot hills of the Alps in a day's journey. Favorite starting points are at Nice, Venice, Lyons and Toulon. From Lucerne, nestling close to the rippling bosom of the mountain lake of the same name, the tourists are within striking distance of the grandest of all European natural scenery.


Lucerne, where Swiss Automobile Club held its meeting (railroad station at left, Mount Pilatus in background)

As is shown in the accompanying illustrations, the lordly peaks of Pilatus rise almost from the edge of the waters, towering into the blue in unspeakable majesty.

There is something unreal and fairylike about the Alpine scenery and an impression of the atmosphere may be gained from these remarkable pictures. At a recent meeting of the Swiss Automobile Club, Lucerne was the starting point from which the club members began their tour of the Burgenstock and Engelburg.

Rivaling the Canadian Selkirks in its precipitous grandeur, the Bergenstock and its surrounding country is so accessible that touring automobilists are able to enjoy its wonders with much facility and lately they have been taking advantage of their opportunities.

The Engelberg, another peak that bears a striking resemblance to Mount Hood in Oregon, save for the fact that Hood stands practically alone, while the Engelberg is surrounded with sister mountains, was one of the points made on the itinerary of the S. A. C. in its recent tour.

There are dozens of other magnificent short trips to be made in the Swiss Alps and at the rate that section is growing in favor with foreign motorists, the time is at hand when with a uniform road code applying to all the cantons, thousands of automobile parties will be attracted.

The more liberal touring laws in Switzerland have served to turn attention strongly toward that section and as a result the Republic has not been the only gainer. The facility with which the tourist may now proceed in that country has given an impulse to traveling by automobile in contiguous territory, particularly as it applies to Americans.

A number of French tours have proved exceedingly attractive as a foretaste to the scenic grandeur and solid enjoyment of culminating pleasure to be found among the Swiss mountains.

Several of these tours, through the wilder and more mountainous portions of that country have been made by Americans in conjunction with more extended travel.


The Bergenstock, on the Lake of Lucerne, showing the Palace Hotel, which the Swiss Automobile Club visited


Engelberg, in the Valley of the Aar, one of the points on the Swiss Automobile Club's annual tour

Automobile Club of Winnipeg

STURDY YOUNG ORGANIZATION OF MANITOBA WHICH HAS DONE MUCH TO POPULARIZE THE AUTOMOBILE THERE

WINNIPEG, MAN., Aug. 15—Away up in western-central Canada, where motor vehicles traverse the streets for four months of the year in snow, there is an automobile club with a membership of more than 200, and a policy of progressiveness which might be emulated to advantage in more populous centers. This club flourishes in Winnipeg, Manitoba, the gateway city to the Canadian Northwest.


W. E. Wright
Sec.-Treas.


D. B. Sprague
1st V. Pres.


C. E. Newton
Pres.


R. M. McLeod
Hon. Pres.


Sir D. H. McMillan


Country Home of Automobile Club of Winnipeg


W. A. Travers


F. E. H. Luke


H. M. Belcher


A. A. Gilroy


W. R. Bawlf

The thought of motoring in comfort, with a temperature far below zero, to a southern tourist is hardly palatable, but up in Winnipeg they revel in the frosty elements and are as ardent auto enthusiasts as can be found on the continent.

Seven years ago there were but twenty power-propelled vehicles coursing the streets of the Northwestern metropolis and most of these were owned by dealers. A few, however, were held by adventurous business men who joined with the dealers in the formation of an automobile club. The object was to centralize the interests of motorists and to inspire confidence in the conveyance which was afterward to supersede the horse.

Social interests rapidly gained a portion of the club's existence and so rapidly did the automobile business grow that inside of two years special legislation for regulating motor traffic was necessary and the club was active in drawing up this legislation.

From a precarious infancy the club grew rapidly under the management of some of the most capable men of the city, until now, in the strength of its youth, it is accounted one of the best organizations of the kind on the continent and certainly the foremost of Canada. Every question pertaining to the interests of club members is carefully handled by the compact body and at present, although touring and race meetings are occupying a good deal of time, the club is preparing an effort to secure equitable legislation for horse and power vehicles at the next session of the legislature.

It is in the matter of good roads that the club is now most deeply interested. As a factor in building up the highways of the province it has carried the greatest weight. Miles and miles of impassable highways have been turned into good roads by the co-operation of the club with the government and the municipalities. Sign boards giving notice of approaching road difficulties have been erected over many leagues of prairie trail and in some districts the club has at its own expense replaced old wooden road culverts with modern appliances, which do away with many dangerous crossings and make touring more pleasant, not only to motor owners, but all travelers.

The club last year secured and remodeled a club house, 28 miles from the city, to the northwest. A handsome brick building is now equipped with an excellent garage at the rear and has been entirely refitted to meet the requirements of modern motoring. Week end tours to the club are an established feature of the summer season and its patronage during the present month has been so large that extensions are being considered for accommodation. The roads between the city and the club have been particularly well looked after and now less than an hour's spin from the heart of the city will land any ordinary car in the garage at the other end.

The annual club runs have become so popular that it is now proposed to make them semi-annual occurrences. One closed July 5, in which more than 80 autoists participated in a five day run of 507 miles. The distance traversed was not great, but the inspection of the country and the hospitality of the outside points forced the tourists to cut down the distance programme and to return after the tour had been about half completed. It is to complete this run that the members of the club are now proposing to hold a fall tour.

The whole of the west is enthusiastic about the automobile. This year more than 1,000 cars have been disposed of through Winnipeg agencies alone, and of all Western auto centers Winnipeg leads, and the Winnipeg Automobile Club is the parent body of motor owners.

During the past winter almost every car owned in the city was used right through every kind of weather. It was the first winter when motor cars were generally operated. Coupés, limousines and general touring cars with top equipments were run through everything. There was little trouble with frost on the mechanical workings and from the confines of the closed car, traveling was as comfortable as in summer. The members of the club were foremost among the demonstrators of winter possibilities of the automobile. Almost every member of the club drove his car all winter and the few which did remain in the various garages for the most part belonged to owners who were sojourning in other climates.

Among the clubs of the west, the Winnipeg Automobile Club has a very high standing. It is comprised of many of the best men of the city and stands for progressive but not speedy motoring. When the club tours, public receptions are always given by outside points visited and when other clubs tour into Winnipeg, they are royally received by the members of the local club.

The officers of the club are: Patron, Sir Daniel McMillan; honorary president, R. McLeod; president, C. H. Newton; first vice-president, B. D. Sprague; second vice-president, W. L. Parrish; secretary-treasurer, W. E. Wright; executive committee; S. P. Belcher, E. C. Ryan, W. C. Power, F. E. H. Luke, W. R. Bawlf, W. A. T. Sweatman and A. A. Gilroy.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL CLIMBS, ETC.

Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11, '11	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill Climbs, Etc.

Aug. 16-27	Munsey Tour.
Aug. 19-20	Brighton Beach, L. I., Twenty-four Hour Race.
Aug. 23	Cheyenne, Wyo., Track Meet.
Aug. 26-27	Elgin, Ill., Road Race, Chicago Motor Club of Chicago, Ill.
Aug. 31	Minnesota State Automobile Association's Reliability Run.
Aug. 31-Sept. 8	Kansas City, Mo., Reliability Run, Auto Club of Kansas City.
Sept. 2-5	Indianapolis, Ind., Speedway Meet.
Sept. 3-5	Run and Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 5	Cheyenne, Wyo., Track Meet.
Sept. 5	Denver, Col., Road Race, Denver Motor Club.
Sept. 5	Los Angeles, Cal., Speedway Meet.
Sept. 5-10	Minneapolis, Minn., Track Meet at State Fair.
Sept. 7-10	Buffalo N. Y., Reliability Run, A. C. of Buffalo.
Sept. 9-10	Providence, R. I., Track Meet.
Sept. 10	Los Angeles, Cal., Mount Baldy Road Race.
Sept. 10	San Francisco, Cal., Golden Gate Park Road Race, Automobile Club of San Francisco.
Sept. 10-12	Seattle, Wash., Race Meet.
Sept. 15	Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Sept. 16-26	Asbury Park, N. J., Aviation Meet, Aero Club of America.
Sept. 17	Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept.	Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.
Oct. 1	Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 3	Louisville, Ky., Reliability Run, Louisville Automobile Club.
Oct. 6-8	Santa Anna, Cal., Track Meet.
Oct. 7-8	Los Angeles, Cal., Speedway Meet.
Oct. 8	Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 15	Long Island Motor Parkway, Grand Prize, Automobile Club of America.
Oct. 15-18	Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.
Oct. 20-22	Atlanta, Ga., Speedway Meet.
Oct. 23	San Francisco, Cal., Road Race, Portola Cup.
Oct. 27-29	Dallas, Tex., Track Meet.
Nov. 5-6	New Orleans, La., Track Meet.
Nov. 6-9-13	San Antonio, Tex., Track Meet.
Nov. 24	Redlands, Cal., Hill Climb.
Nov. 24	Savannah, Ga., Road Race, Savannah Automobile Club.

Foreign Shows and Races

May 1—Oct. 1	Vienna, Austria-Hungary, Automobile and Aviation Exposition.
Aug. 1-Sept. 15	French Industrial Vehicle Trials.
Oct. 15-Nov. 2	Paris, France, Aeronautical Society Show.

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QUALITY, as it is measured in an automobile, is so deep-seated that it escapes the notice of the average purchaser until he finds out after a period of actual service that the repair bill he has to meet is conspicuously below that which is charged up to his neighbor for repairs to a car of another make.

* * *

WHY is it that the average purchaser seems to think that quality is measured by the color of the paint on the body, or the striping of the wheels, or some other exterior "blemish"? Is it not a common statement "Handsome is as handsome does"?

* * *

WHAT is the proper diagnosis of the disease which fastens its fangs upon the man who insists upon "domino" as the brand of sugar for use in his coffee, but who disregards every consideration for quality when he selects an automobile?

* * *

IS is not a fair inference that defects, if there be any, will be covered up by a "swell" appearance? Does a real tailor ever inflict a "swell" suit of clothing upon the attention of a discriminating man?

* * *

JUMPING to the conclusion that an automobile should be measured by the purchase price is a habit that is devoid of a substantial foundation.

THE wonder is that anyone would be so short-sighted as to believe that the rules which govern wise purchasing of every other commodity should be inefficient when applied to the purchase of an automobile.

* * *

PERHAPS it is not too much to say that the quality of an automobile depends upon appropriateness of design in view of the service to be rendered, character of the materials employed in the construction throughout, and skill of the artisans engaged in the work.

* * *

EVERY automobile that will run and continue to do so without a disgruntling cost of upkeep has quality in its makeup to a marked degree, but it may not be the quality that some particular autoist will enjoy.

* * *

CERTAINLY appropriateness must be measured on a gauge based upon the intended service of the car, without disregarding the service expected by the purchaser.

* * *

IF the roads to be traversed indicate that a transmission gear is a necessity, for instance, to disregard the fact and purchase a car not having this facility is to make a grave mistake.

* * *

NEXT to leaving out the sliding gear entirely is the relatively unwise neglect to provide a sliding gear of the character which utilizes a sufficient number of speed changes to properly serve the purpose.

* * *

SINCE everyone knows that an internal combustion motor is not inherently flexible, and its principles demand that it be run more or less on a constant speed basis, what is the use of disregarding the fact that speed changes must be made through the good office of a sliding gear or some other equally efficient auxiliary device?

* * *

LIKEWISE in the several other particulars, the question of quality must be arrived at; but it will be a fallacy to suppose that this quality is abstract in its character and confined to the car. It is not the quality of the car that a buyer should be sure of, but the quality of the service he wants. An automobile that is good for one thing may be useless for another, and yet the quality of the car *per se* may be on a high plane.

* * *

PROGRESS will probably never be made in the attempt to impart useful information of a mechanical character to the non-mechanical mind until the literary surgeon returns to the earth, eliminates superlatives, confines himself to a single subject for a given occasion, and gives clear reasons for his premises. The average writer, desiring to hold an estimable position among his confrères, disdains to tread in the path of simplicity out of fear of ridicule, and misses the target that he aims at, blinded by the smoke of his own lack of clearness. It is a false pride, with nothing of glamor to be gained, but the penalty is sure—the audience snores.

Selden Decree Filed

U. S. CIRCUIT JUDGE HOUGH ENTERS ORDER AGAINST FORD AND PANHARD, REQUIRING THEM TO FILE HEAVY BONDS PENDING FINAL HEARING. PERPETUAL INJUNCTIONS ISSUED

IN accordance with the substantial ideas expressed in the decree submitted to Federal Judge Hough by attorneys for the A. L. A. M., at Narragansett Pier, July 19, the court has signed decrees in the principal suits under the Selden patent. This action was taken rather unexpectedly last Thursday.

The full text of that tentative decree was published in THE AUTOMOBILE at the time and its terms were sweeping and of such breadth as to form a complete basis for future action. The status of the decree is interlocutory and may not be the last word in the litigation. This is all the more probable because the defendants, the Ford Motor Company and the Panhard Company, will undoubtedly take the cause to the Federal Court of Appeals.

The decree holds the Selden patent to be legal and valid and valuable and declares that the rights of the plaintiff under it have been infringed. An injunction is ordered to restrain the manufacture, use and sale of infringing automobiles. But simultaneously with this action, Judge Hough also filed a memorandum opinion covering the contingency of appeal from the order of court. This opinion states that in case the defendant companies decide to perfect their appeal, the injunction shall be raised upon the filing of a bond of $350,000 by the Ford Company and one of $16,000 by the Panhard. The opinion requires that pending a final hearing in the Court of Appeals, the defendants shall file sworn monthly statements of their business.

The only particular in which the foregoing procedure differs from what was outlined at the hearing held at Narragansett Pier is in the amount of the bonds required of the defendants. It was suggested at that time that the bonds be placed at $500,000 for the Ford Company and $50,000 for the other concern.

The original opinion of Judge Hough was filed in the United States Circuit Court last September. The merits of the case were passed upon substantially as they were in the decree of last Thursday, but owing to the fact that the Columbia Motor Car Company, which had succeeded to the rights of the Electric Vehicle Company as lessee under the Selden patent, had not been made party complainant, it was necessary to substitute that company and the process proved to be rather long drawn out.

Following is the memorandum filed by Judge Hough:

UNITED STATES CIRCUIT COURT, SOUTHERN DISTRICT OF NEW YORK.

Columbia Motor Car Company and George B. Selden, Complainants, vs. C. A. Duerr & Co. et al., O. J. Gude Co., John Wanamaker, et al., André Massenet, et al., Henry Neubauer, et al., Defendants.

On settlement of final decree.

MEMORANDUM.

I.—Upon a fair reading of the entire bill in equity it does not seem to me to be true that the sole cause of action set up in the bill is for joint infringement. In the typical case against the Ford Motor Company the bill as a whole shows distinctly that the Ford Company was engaged in selling within the Southern District of New York through Duerr & Company, and that Duerr & Company were in some way the agents of the principal defendant. The allegations of confederation and conspiracy must be read in conjunction with the basic fact of agency.

Infringement has been found by both defendants on an issue deliberately tendered in defendant's answer which denied infringement by the defendants both jointly and severally. The principal defendant having tendered this issue itself does not seem to me to be in a position now to insist on so narrow a view of the pleadings—a view, however, which apart from the answer I am unable to take.

II.—Without an assignment or transfer made in accordance with the requirements of the various patent acts I do not think that the legal title to a patent passes to a receiver. Undoubtedly he has the equitable title, and he may by equitable process compel an assignment; but it does not appear that this was ever done with respect to the patent in suit. In my opinion the action was originally brought in the name of the proper parties.

III.—Under the established practice in this Circuit I do not think that complainants can insist upon terms of suspending the injunction more severe than this: They should have a bond in the sum sufficient to secure the payment of such a recovery as now seems allowable, and they should also have sworn information furnished monthly of the business transactions during the preceding month in machines infringing under the decision filed herein.

The proper amount to be fixed for this bond is a point which might be much discussed; but such discussion could not be had without revealing the affairs of the defendants in a manner which under the practice I have alluded to seems to me improper. Suffice it to say that comparing the information furnished me by defendants' counsel with the impressions of complainants (as stated in argument) there is a much smaller difference than I expected to find. It is to be remembered that a very large part of either the list or selling price of many, if not most, automobiles includes accessories having no relation to Mr. Selden's patent. Upon the whole I think it would be just to require from the Ford Motor Company a bond, in a form to be settled upon notice if not agreed upon, in the sum of $350,000, and from the Panhard Company a similar bond in the sum of $16,000.

The reports of sales are to be filed with the clerk of the Circuit Court, to be by him deposited in a safe place to which the public shall not have access; notification of the time of filing is to be served on complainants, who shall be entitled to examine the same upon the order of a Judge duly authorized to sit in the Circuit Court of the United States for the Southern District of New York. Upon filing the bonds above described an order may be entered suspending injunction in the cases of the Ford Motor Company and the Panhard Company pending appeal, which order will contain the provisions above indicated in relation to the filing of reports. Final decrees in all of the cases above enumerated are signed and placed in the hands of the clerk this day.

August 11, 1910. C. M. HOUGH, D. J.

(Endorsed) U. S. Circuit Court, Southern District New York. Filed August 11, 1910. John A. Shields, Clerk.

Perpetual injunctions restraining John Wanamaker, Thomas B. Wanamaker, L. Rodman Wanamaker, Robert C. Ogden, The O. J. Gude Company, Henry Neubauer and Albert C. Neubauer from infringing upon the Selden Automobile Patent were issued by the United States Circuit Court for the Southern District of New York on Saturday.

Wanamaker formerly handled the Ford car as a dealer, the Gude Company were users of unlicensed cars, while the Neubauers acted as agents for a line of unlicensed imported cars.

The injunctions were issued under Judge Hough's recent decision and under the provision of the decrees in suits brought against these parties, in which he sustained the Selden Patent, granted the injunctions and also accountings of damages and profits.

The injunctions, which were personally served by U. S. Marshal Henkel on John Wanamaker, the firm of John Wanamaker and the O. J. Gude Company, command all of the defendants as well as their associates, officers and agents under penalties, in case of disobedience, to immediately and until the expiration of the Selden Patent,

> "desist from, directly or indirectly, making or causing to be made, using or causing to be used, or offering or advertising for sale or causing to be offered or advertised for sale or importing or causing to be imported, or selling or causing to be sold to others in any manner, or disposing of in any way within the United States any road engines, vehicles, automobiles, devices or apparatus containing or embodying or employing any of the inventions described in said letters patent and claimed in the said first, second and fifth claims thereof, or substantial or material parts thereof, or from infringing said claims of said letters patent in any way whatsoever."

Under the provisions of these injunctions the parties enjoined cannot directly or indirectly make, offer or advertise for sale, sell, use, import or dispose of any gasoline automobiles in infringement of the Selden Patent, without violating the injunction and being liable to punishment as for contempt of court.

Program at Elgin

FOUR RACES TO BE RUN OFF OVER THE NEW COURSE OF THE CHICAGO MOTOR CLUB ON AUGUST 26-27. ENTRY LIST PROMISES TO BE VERY LARGE

CHICAGO, Aug. 15—The program to be run off over the new course laid out just west of the city of Elgin, August 26-27, under the auspices of the Chicago Motor Club, includes four events. All four are for stock cars under the strict interpretation of the rule. The fields in each of the events will be large and representative, according to the entries so far made. While the list will not be closed until August 20, the present indications point to a total entry of about forty cars.

The course has been repaired and improved with painstaking thoroughness, and at present half a dozen of the entered cars are engaged in daily practice upon it.

The first race is limited to Class B, division 2B, cars having a piston displacement of from 161 to 230 cubic inches. The trophy is called the Fox River Valley emblem, and a typical entry list has been received, which will probably be augmented by several additional contestants. The minimum weight of entrants in this class is fixed at 1,400 pounds. The distance will be sixteen times around the course, which is 8 1-2 miles, or about 135 miles. In addition to the trophy, a purse of $300 will also be awarded to the winner. The Fox River trophy becomes the absolute property of the winning entrant.

The second race is for the Kane County trophy and a similar purse. The cars are those of Class B, division 3B, of 231-300 cubic inches piston displacement. Minimum weight is 1,700 pounds, and the distance, twenty laps of the course, or about 170 miles. This trophy becomes the permanent property of the winner.

The third race, and the final one for the first day's sport, is for cars of Class B, division 4B, 301-450 cubic inches displacement, of a minimum weight of 2,000 pounds, and the distance is twenty-four laps, or about 204 miles. The trophy, which will become the property of the winner, is called the Illinois trophy. In addition the winner will receive $400.

On Saturday, August 27, the only contest carded is the race for the Elgin National trophy. This will be the star event of the meeting and is open to stripped chassis in Class B with a piston displacement of under 600 cubic inches and a minimum weight of 2,300 pounds.

The Elgin National trophy does not become the outright property of the winner, but under the terms of the race it will be held by the winner for one year. But along with the cup will go $1,000 to the successful entrant. The second car will be awarded $300 and the third $200.

The lists do not close until next Saturday night, but already 26 cars are entered, while there are hanging fire enough more to bring the grand total up to at least forty.

As matters stand right now the Chicago Motor Club has a most representative field in, which includes most of the best drivers in this country. In Harroun, Dawson, Grant and Mulford they have four drivers who have won their spurs at long distance racing and whose struggles for the $4,500 trophy in the big race should be worth going miles to see. Hearne is another star who will be in; he will officiate at the wheel of a Benz. Oldfield also will be in the galaxy, while nearly every other man is well known in the racing game.

With everything running smoothly in the entry line, the Motor Club is putting forth its best efforts toward having the course in readiness for the struggles. The contractors have not been doing as well as they expected because of the lack of rain, water being a necessity in order to bind the gravel and clay that have been dumped on the soft spots on the south leg of the course. Because of this delay it will not be possible for the training to begin before Monday hardly, although it was expected the drivers and cars could get to going by the middle of the week. When training does start the men will be allowed the freedom of the circuit from 11 a. m. to 2 p. m. each day, while the racing each day will start at 10 o'clock.

Already most of the teams have engaged quarters at the course, and the Marmon, National, Cino, Lozier, Cole and Falcar are now awaiting the chance to begin training.

The Motor Club has secured the Warner timing apparatus to time the races, the first time this has been had for a road race.

With the exception of the Elgin National Trophy race, all the cars are of 1910 design, with four-cylinder engines. In the big event the Lozier and the Matheson are 1911 models, and the Alco harks back to 1909. The Matheson and the Alco are the only six-cylinder cars. Following is a list of the entries:

FOX RIVER TROPHY

Car	Entrant	Bore	Str.	Driver
Ford	Ford Motor Co.	3¾	4¼	Kulick
Cole	Cole M. C. Co	4	4	Endicott
Staver-Chic.	Staver Car. Co.	4	4	Cheney
Staver-Chic.	Staver Car. Co.	4	4	Monkmeier
Benz				Hearne
KANE COUNTY TROPHY				
Marmon	N. & M. Co.	4	4½	Dawson
Marmon	N. & M. Co.	4	4½	Buck
Cino	Haberer & Co.	4⅜	5	Fritz
Overland	Overland Mot. Co.	4¼	4¼	Schillo
Kisselkar	H. P. Branstetter	4¼	4¼	Endicott
Corbin				Matson
ILLINOIS TROPHY				
National	A. W. Greiner	5	5 11/16	Greiner
National	National Auto. Co.	5	5 11/16	Livingstone
Marmon	N. & M. Co.	4½	5	Harroun
Falcar	Fal Motor Co.	4⅛	5¼	Pearce
Falcar	Fal Motor Co.	4⅛	5¼	Geinaw
Kisselkar	H. P. Branstetter	4⅞	4¾	Schoeneck
Midland	Midland M. Co.	4½	5	Ireland
ELGIN NATIONAL TROPHY				
National	A. W. Greiner	5	5 11/16	Greiner
National	National Auto. Co.	5	5 11/16	Livingstone
Marmon	N. & M. Co.	4½	5	Dawson
Marmon	N. & M. Co.	4½	5	Harroun
Lozier	Lozier Motor Co.	4	5⅜	Mulford
Matheson	Matheson Auto. Co.	4½	5	Reynolds
Alco	American Loco. Co.	4⅘	5⅗	Grant
Simplex	L. A. Shadburne	5¾	5¾	Saynor
Kisselkar	H. P. Branstetter	4⅞	4¾	Schoeneck
Black Crow	Black Mfg. Co.	4 5/16	4⅞	Stinson
Knox Six				Oldfield
Jackson				Schieffler
Simplex				Robertson

Norristown Club to Promote a Track Meet

NORRISTOWN, PA., Aug. 15—The Norristown Automobile Club has arranged a comprehensive program of events for its race meet to be held at the Belmont Driving Club's track, Narberth, on September 24. In addition to the big race of the day, a match race between a Simplex and a Fiat, best two out of three 5-mile heats, the following list is announced:

1—Class B, Division 8, 5 miles, open to any gasoline stock chassis with a piston displacement of 161 to 230 cubic inches.
2—Class B, Division 2, 5 miles, open to any gasoline stock chassis, piston displacement 301 to 450 cubic inches.
3—Class B, Division 5, open to any gasoline stock chassis, piston displacement 451 to 600 cubic inches.
4—Class B, Division 2, 10 miles, open to any gasoline stock chassis, piston displacement 161 to 230 cubic inches.
5—Class B, Division 4, 10 miles, open to any gasoline stock chassis, piston displacement 301 to 450 cubic inches.
6—Class B, Division 5, 10 miles, open to any gasoline stock chassis, piston displacement 451 to 600 cubic inches.
7—Free-for-all handicap, 5 miles, open to cars of all types and motive powers. First prize, $100; second, $50.
8—Free-for-all handicap, 10 miles. Prizes same as in No. 7.
9—One-mile record trials. Prize, cup.
10—Amateur handicap, 5 miles. Prizes, cups to first and second cars.

In the first six events the prizes will be: First, $50; second, $25.

In order to assure accuracy in timing to establish records for the course, the times will be clocked automatically.

Detroit Doings

NEWS OF THE WEEK FROM THE AUTOMOBILE MANUFACTURING CAPITAL OF THE COUNTRY—NEW COMPANIES ORGANIZED AND OLD ONES REORGANIZED; NEW FACTORIES GOING UP; TRADE CHANGES, ETC.

DETROIT, MICH., Aug. 15—Since Jan. 1, the records of the Secretary of State show 92 new motor car and parts companies have been organized in Michigan and nearly 75 per cent. of these are located in Detroit. This is at the rate of three new companies per week. To be more explicit, there were 49 motor car companies and 43 parts companies, and of these Detroit contributed 36 and 30 respectively. The capital stock represented is $6,822,500, of which Detroit's share is $4,503.000. These figures do not include corporations organized previous to Jan. 1, 1910, that have increased their capitalization since that date.

The 36 new motor car companies organized in Detroit during this eight-month period have a combined capitalization of $3,432,000, and many of them are actively engaged in turning out cars. The other 13 companies are distributed as follows: Two in Mt. Clemens and one each in Birmingham, Bad Axe, Port Huron, Kalamazoo, Owosso, Ionia, Gaylord, Alpena, Niles, Ann Arbor and Saginaw. The 30 parts manufacturing concerns organized in this city have a combined capital stock of $1,071,000. Of those outside Detroit, Lansing gets three, Jackson two and Battle Creek, Flint, Ludington, Port Huron, Wyandotte, Muskegon, Hastings and Rochester one each. The outside car makers are credited with a total capitalization of $1,589,500 and the parts makers with a $730,000 investment.

Reorganization of the Anhut Motor Car Co. under the name of the Barnes Motor Car Co., which has been in contemplation several weeks, was effected at a meeting of the stockholders last Friday afternoon. The capitalization is $300,000, of which $225,000 is common and $75,000 preferred stock. William M. Walker will continue as president and will take a more active part in the affairs of the company than formerly. Creditors have granted an extension of 18 months and Mr. Walker hopes to have the business on a solid foundation by the end of that period. For the 1911 trade the company will manufacture a six-cylinder car to sell at $2,250 and a four-cylinder car to sell at $1,400. The reorganized concern takes its name from Henry C. Barnes, the factory superintendent. He was formerly with the Overland Co. Charles E. Henkel is secretary and treasurer of the Barnes Co. There is no change in the directorate.

In the readjustment, Senator John N. Anhut, former president of the company, with whom the officers have had some trouble over the disposition of stock, was left out of consideration. He will no longer have any active connection with the company, it is said. Anhut, whose continued absence from the city has given rise to numerous stories and whose whereabouts have been something of a mystery, has finally been located in Europe. In a letter to a friend he explains that he went away for a rest preliminary to his campaign for re-nomination as State Senator from this district and incidentally to meet his sweetheart. He expects to return home about Sept. 1.

Building permits have been taken out for a $14,000 addition to the Warren Motor Car Co.'s plant, extending the length of the main building, which is two stories high and 60 feet wide, from 280 to 600 feet. This addition, together with two new buildings to be erected by the same company on Holden avenue, between Brooklyn and Lincoln avenues, will more than double its present capacity. The estimated cost of the two new structures is about $27,000, according to the permits.

The Hupp industrial group in the Fairview district is beginning to assume stupendous proportions. The "family circle" now comprises the Hupp-Turner Machine Co., the Hupp-James-Halloran Foundry Co. and the Hupp-Johnson Forge Co., all of which are operating in new buildings. They will be joined presently by the Rotary Valve Motor Co., which is building a six-cylinder car with a new and practical engine, and the Hupp Yeats Co., which is soon to put out an electric coupé. Buildings for the accommodation of these last named concerns are nearing completion. It is the intention later on to provide quarters in the same group for the Hupp-Ellis-Rutley Construction Co. and the Hupp-Detloff Pattern Co. Robert C. Hupp, who is prominently identified with all these companies, holds the title to the land which constitutes the site, comprising 53 acres.

News that Judge Hough had handed down his decree in the Selden patent case failed to create even a ripple of excitement among the officers of the Ford Motor Co. here. Henry Ford betook himself to his country home hours before the battery of reporters and correspondents descended on the plant. In his absence, James Couzens, secretary and treasurer of the Ford Co., talked freely.

"It is a decree that should have been rendered 11 months ago," said he, "but it has taken the Columbia Motor Car Co. that length of time to establish its title to the patent. No injunction will be issued restraining us from manufacturing cars. We have already prepared an appeal to the higher court and in place of the $350,000 bond required we are planning to put up the cold cash. The case has been noticed for hearing some time in October and we are in hopes that it can be disposed of before Christmas. In the meantime the Ford Motor Co. will keep right on turning out cars."

The E-M-F Co. announces the appointment of Charles F. Garaghty as assistant to the treasurer of the company. Mr. Garaghty also will take charge of the repair, parts and claims departments and will have special duties to perform in connection with the commercial department. H. A. Mitchell has tendered his resignation as assistant advertising manager of the Abbott Motor Car Co. to accept a position in the engineering department of the Hudson Motor Car Co.

Oct. 1 is the date set for the beginning of manufacturing operations in the Lozier Motor Co.'s mammoth Detroit plant. After that date complete cars will be turned out only in the local factory, it is announced, while the Plattsburg, N. Y., plant will specialize on parts.

Charles E. Baker, Charles H. Gowin and Charles J. Stokes, all of Cheboygan, Mich., have formed the Warren-Detroit Garage & Sales Company and took over the garage and salesroom at 736-740 Woodward avenue, formerly occupied as the local sales branch of the Winton Company. They will be State distributors for the Warren-Detroit "30."

Plans are about completed for the two-story garage and salesroom to be erected for the Michigan Buick Auto Company on Woodward avenue. The building will be of brick and stone.

The Michigan Motor Car Manufacturing Company, at a recent meeting, decided to increase its capital stock to $100,000.

Another new corporation that will soon make its bow is the Detroit Airless Tire & Rubber Company. The organization plans have been under way for several weeks and are now nearing completion. The persons interested have been making airless tires on a small scale in Dayton, O., but the enterprise will be removed to this city as soon as the present plans are perfected.

The newly-organized Lion Motor Sales Company filed articles of association with the Wayne county clerk Wednesday. Fred Postal, proprietor of the Griswold House, holds all but two shares of the capital stock of $10,000, all of which has been paid in. The holders of the other two shares are Robert L. Fee and Harry F. Postal.

Omaha's First Home-Built Car Arrives

Omaha, Neb., Aug. 15—The first Omaha manufactured motor cars were put on the market last week and one or two are already being driven around the streets of this city. They are products of the Rogers Motor Car Company. The new car is designed for business purposes and is in the line of a delivery wagon. Driving on rough country roads has been kept in view by the manufacturers and the employment of a flexible wood frame, a novel type of transmission and scientific adjustment of springs, has produced a vehicle which is wonderfully easy riding and which works remarkably smooth with hard tires. The Rogers Company has a factory with a capacity of 500 cars a year and this will be the output for 1911.

Auto row in Omaha is undergoing a transformation by reason of the recent additions to the ranks of the auto dealers and agencies. Among the recent acquisitions are the handsome new garages of the Van Brunt Automobile Company, the Maxwell-Briscoe branch, the Stanley steamer, the Paxton Mitchell, the Cadillac Company of Omaha and the partially completed building of the Ford branch. The E-M-F which has a branch here is expected to open shortly in its handsome new home.

Syracuse Club Guards Tourists

Syracuse, N. Y., Aug. 15—The Automobile Club of Syracuse has set an example for similar organizations the country over, in safeguarding motor tourists and the general driving public. Upon the West Camillus hill near this city, one of the most dangerous in the State, they have a warning sign for day and night, as it is equipped with a lantern, as shown in the accompanying illustration. The sign is at the foot of the first gradual descent, coming east toward Syracuse, and near the first bad right hand curve. The hill is three-quarters of a mile long and full of twists and turns. An automobilist was killed upon it through his machine being ditched three years ago and there have been many accidents resulting in injuries. The hill is a part of the main highway across the State and is traversed by numberless tourists.

For several years the Syracuse club had the hill boarded, but because of the increased travel of tourists, the officers hit upon this novel scheme. The sign is of cement stone, built by the club, and the light is arranged so as to show a green glare clear from the top of the hill. The headlights of the cars shine directly upon the lettering as the machines come toward it, and if they are not lighted a white light from the lantern serves the purpose.

North of this sign there is another branch of the road running toward Warners, and upon this branch a red light serves to warn tourists of the hill. The club engages a man the year round to care for the sign, replenishing and lighting the lanterns, etc.

Stone warning sign erected on bad hill by Syracuse clubmen

S.A.E. Membership Nearing 400 Mark

The Society of Automobile Engineers membership will soon pass the 400 mark. The following members and associates were elected last week: Thomas W. Warner (Warner Mfg. Co.), Frank H. Trego (Hudson Motor Car Co.), Elliott J. Stoddard, Detroit, Mich., W. Rexford Smith (Warner Mfg. Co.), Charles F. Splitdorf, New York City, Alfred J. Poole, New York City, Matthew B. Morgan (Chalmers Motor Co.), James McIntosh (Hercules Motor Truck & Car Co.), Harry Le Van Horning (Waukesha Motor Co.), F. G. Hughes (Driggs-Seabury Ordinance Corp.), O. C. Friend (Mitchell Lewis Motor Co.), F. C. Frank (General Motors Co.), George Dorris (Dorris Motor Car Co.), John Demmler (Clark Power Wagon Co.), Arthur Dugrey (Holly Bros. Co.), Hugh Chalmers (Chalmers Motor Co.), Eugene P. Batzell (Speedwell Motor Car Co.), Guido G. Behn (Hudson Motor Car Co.), Joseph K. White (French Steel Products Co.), Charles D. Shain, New York City, H. J. Porter (J. S. Bretz Co.), Duncan McConnell (Lovell-McConnell Mfg. Co.), Kenneth B. MacDonald (E. R. Thomas Motor Co.), Charles W. Hatch (Perfection Spring Co.), J. H. Friedenwald, Baltimore, Md., John Craig (Standard Metalwork Co.), Harry G. Baldwin (W. A. Wood Mfg. Co.), Noble C. Banks (Gear Grinding Machine Co.), William M. Barr (Lumen Bearing Co.), R. Frank Bower (Bower Roller Bearing Co.), Benjamin Byron Bachman (The Autocar Co.).

Cannot Exact Inspection Fees for Factory Gasoline

Milwaukee, Wis., Aug. 15—The Thomas B. Jeffery Co. of Kenosha, Wis., maker of the Rambler, has won the case brought by the state inspector of oils of Wisconsin, involving the right of the inspector to inspect the gasoline purchased by the motor car company. The municipal court at Kenosha decided that the State cannot force inspection of oil when it is brought into the State and used for the purposes of a concern like the Jeffery company. The limit of apppeal has now expired, which makes the Jeffery victory complete, as no appeal has been made by the inspector. The Kenosha concern buys large quantities of gasoline annually and refused to permit the inspector to inspect it and charge the usual fee because the gasoline is not placed on sale but reserved for its own use. The inspector brought suit to collect the fees. Several cases involving the constitutionality of the law have been brought in other courts of Wisconsin and all are at variance with each other. The Supreme Court has had no opportunity to rule upon it, the nearest approach being this case at Kenosha, which is now closed by the failure to appeal within the prescribed time.

Cullings from Cleveland Motor Field

Cleveland, Aug. 15—The Consolidated Motor Car Company, of Cleveland, $4,000,000 capital stock, to manufacture automobiles, etc., was incorporated recently by G. A. Howells, L. R. Canfield, Thomas D. Russell, J. L. Bradley and Ralph Blue. The capital stock is in equal shares of common and preferred. The incorporators are Cleveland business men and attorneys. The concern will be one of the largest in the city, it is stated, and it is expected that ground will be broken for the factory building in or near the city at an early date.

The stockholders of the Goodyear Tire & Rubber Company, of Akron, held a special meeting Monday and confirmed the report of the directors to increase the capital stock from $2,000,000 to $6,000,000. The increase will be entirely in the common stock. The directors offer the stockholders for 10 days the right to subscribe for $500,000 preferred stock and $250,000 common, but the stock not taken up at that time will be offered to the public. The directors declared a cash dividend of 12 per cent. and 100 per cent. stock out of the surplus earnings to the common stockholders and to provide for the funds necessary to take care of extensions now being made to the plant so as not to impair working capital.

Jersey Motorists Given a Chance in Bay State

Boston, Mass., Aug. 13—To enable New Jersey motorists who are in the White mountains to cross the Bay State without being arrested, and also to enable those about to cross Massachusetts on the way north to go through all right, the Massachusetts highway commission has authorized the various police chiefs in Springfield, Pittsfield, North Attleboro, Lowell, Newburyport and Greenfield to issue licenses to the visitors and collect the fees so that a trip to Boston may not be necessary. A number of New Jersey motorists have been arrested in Massachusetts for not being registered in the Bay State, and some of them stated that they were on the way to Boston to register their cars and that it was not fair to hold them up. It was decided by the commission that it would be only fair to give the visitors a chance and so the police chiefs will do the work.

San Francisco Dealers Organize

San Francisco, Aug. 10—The effort to organize a Motor Car Dealers' Association in San Francisco appears to be meeting with some success, notwithstanding the discouraging experience of last month. At the meeting held July 21 new officers were elected, as follows: J. A. Marsh, president; Cuyler Lee, vice-president; C. S. Richardson, secretary; and I. J. Morse, treasurer. The board of directors is composed of E. P. Brinegar, H. L. Owesney, J. W. Leavitt, W. L. Hughson and A. E. Hunter. The failure of the former effort was largely due to differences of opinion as to admitting the accessory dealers into the organization. The new association is composed entirely of dealers, agents and factory representatives, the accessory trade being excluded. The second meeting, at which the constitution and by-laws were submitted, was held last Monday noon, when good progress was made toward getting the organization on a permanent basis, and the local dealers feel assured that this time they will be able to accomplish something definite through united action.

Fifty Entries for Omaha "World-Herald" Run

Omaha, Neb., Aug. 15—Fifty entries are assured in the *World-Herald* endurance automobile run which is scheduled for August 24-26 through western Iowa and eastern Nebraska. While the Omaha Motor Club, under whose auspices the run will be made, has not formally affiliated itself with the A. A. A., the run will be given under the sanction of that organization.

Five trophies are to be awarded: The grand prize silver trophy by the Omaha *World-Herald* for the car having the best score; a second prize by the Omaha Motor Club for the second best score and three other trophies in each of the three classes.

The cars are divided into the following classes: First, cars selling for $800 or less; second, cars selling for $801 to $1,600; third, cars selling above $1,600. Cars in the first class will travel at an average rate of speed of sixteen miles an hour; second class, eighteen miles an hour; third class, twenty miles an hour. Otto Nestman is in direct charge of the run.

The first day's run is over into Iowa, lunch at Shenandoah, back through Nebraska City to the night control at Lincoln. The second day's run is from Lincoln to Kearny with the noon control at Hastings. The third day's run is back to Omaha by way of Columbus, noon control, and Fremont, the longest day's run.

Quakers Plan Another "Sociability"

Philadelphia, Aug. 15—F. J. Shoyer, chairman of the Ocean Front Association, Ocean City, N. J., has completed arrangements with the Quaker City Motor Club for the latter's sociability run on September 3 from Philadelphia to Ocean City. The run will leave the Hotel Walton, Philadelphia, and end at the Hotel Normandie, Ocean City. Secretary Harbach, of the Q. C. M. C., will issue entry blanks in a day or two and is confident there will be fully 100 cars in line.

Worcester Club's First Track Meet a Success

Worcester, Mass., Aug. 15—The first track meet conducted by the Worcester Automobile Club was successfully run off last Thursday. A big crowd was present at the Greendale half-mile course. John P. Coghlin, former president of the club, acted as referee. The summaries:

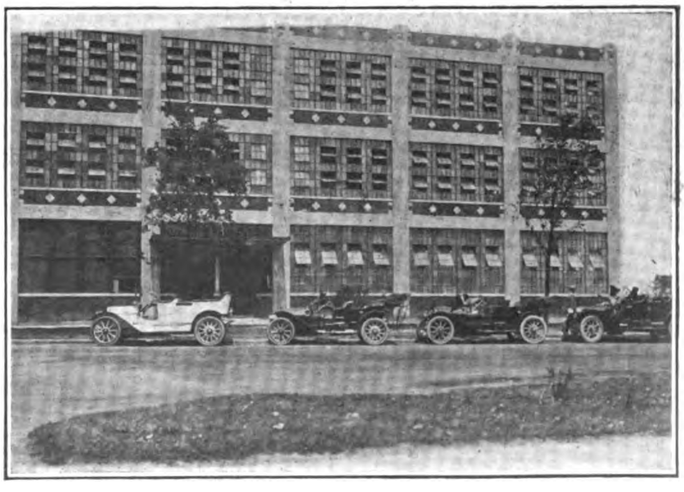
No.	Car	Handicap	Driver	Time
One-Mile Trial Against Time for Half-Mile Track				
1	Benz		Barney Oldfield	1:09 4-5
2	Chalmers 40 (Bluebird)		Louis Strang	1:20 2-5
3	Hupmobile		George Largess	1:56 2-5
Two-Mile Trials Against Time for Half-Mile Track				
1	Darracq		Ben Kerscher	2:25 1-5
Two-Mile Stock Chassis, 161 Cubic Inches and Under				
1	Hupmobile		George Largess	4:09 4-5
2	Hupmobile		Harry Orrendorf	4:11 3-5
Three-Mile Stock Chassis, 301 to 450 Cubic Inches				
1	Chalmers 40		H. C. Grant	4:06 2-5
Five-Mile Stock Chassis, 600 Cubic Inches				
1	Knox "60"		Barney Oldfield	6:52 1-5
2	Chalmers 40 (Bluebird)		Louis Strang	6:53 1-5
3	Chalmers 40		Harry Orrendorf	6:54 3-5
Three-Mile, Free-for-All Handicap				
1	Chalmers 40	17 seconds	Harry Orrendorf	4:11 3-5
2	Knox 60	Scratch	Barney Oldfield	4:11 4-5
3	Chalmers 40	12 seconds	Louis Strang	4:12 1-5
4	Hupmobile	50 seconds	George Largess	5:02
Three-Mile Handicap, Stock Chassis, 600 Cubic Inches				
1	Chalmers 40	40 seconds	Harry Orrendorf	4:50 1-5
2	Chalmers 40 (Bluebird)	35 seconds	Louis Strang	4:50 3-5
3	Knox 60	10 seconds	Barney Oldfield	4:51
4	Hupmobile	70 seconds	George Largess	5:14
5	Darracq*	Scratch	Ben Kerscher	
* Gave up after first mile; engine working badly.				
Special Match Event, 3-mile Pursuit Race				
1	Chalmers 40 (Bluebird)		Louis Strang	4:06 2-5
2	Chalmers 40		Harry Orrendorf	4:26

More Entries for Vanderbilt Cup

According to W. K. Vanderbilt, Jr., president of the Motor Cups Holding Company, there is a strong probability of thirty starters in the Vanderbilt Cup race this year. Among the latest cars to enter are the Roebling-Planche, a new automobile which has four 7-inch cylinders; two Nationals and a Simplex "50."

Wrong Caption Under the Right Picture

In The Automobile of August 4, in the leading article on the annual meeting of the Society of Automobile Engineers at Detroit, there was printed a picture of the new factory of the Gear Grinding Machine Company in that city, but through some error the wrong caption was placed beneath it. We present herewith a partial view of the company's perfectly equipped plant, confident that none of the many who visited it during the convention could have afterward made a mistake as to the identity of the building, despite the misleading caption.



Factory of the Gear Grinding Machine Company, of Detroit

In the Realm of the Makers

E. M. Benford announces that he will enlarge his spark plug factory on Pearl street, Mount Vernon, N. Y., this fall.

The Peck Motor Car Company, 324-26 No. Delaware street, Indianapolis, announces new lines for the season of 1911. They will handle the "Great Western 40" and the Halladay lines.

The De Luxe Motor Vehicle Company, of Cleveland, was incorporated with a capital of $100,000 to manufacture and sell all kinds of motor vehicles. W. G. Moore and others were the incorporators.

A two-story and basement building will be erected for the Fisk Rubber Company at 2210-12 Farnam street, Omaha, the building to cost $15,000. The Fisk Company takes the structure on a long time lease.

The Gaeth Motor Car Company, of Cleveland, has been incorporated with a capital of $400,000 to manufacture and sell motor-propelled vehicles. The incorporators are George S. Patterson, H. A. Stahl, E. J. Thobader, P. C. Carroll and C. P. Gailey.

The Banker Windshield Company, which has been located for years in the Banker Building at Baum and Beatty streets, East End, Pittsburgh, Pa., has moved to the manufacturing plant at Ellsworth avenue and Summerlea street, now occupied by the Pittsburgh Motor Vehicle Company.

The Valve Seating Tool Company has recently been incorporated in Connecticut for the manufacture and sale of a complete line of portable electric drill and hand valve seating tools. Also a combination tool which both oscillates and rotates, so that it can be used for seating valves or drilling, grinding or polishing and as special equipment is fitted with a flexible shaft for valve seating or drilling in inaccessible places.

E. W. Nicholson, formerly with the Midland Motor Company of Moline, Ill., has accepted a position in the sales department of the H. H. Franklin Mfg. Co., Syracuse, N. Y.

The Chamber of Commerce of Akron has taken up the matter of securing the location of the Akron Selle Company, which proposes to erect a large plant for the manufacture of motor trucks and automobile appliances.

Edward C. and Nicholas W. Rassell, of Toledo have organized the E. C. Rassell Company, and will engage in the manufacture of auto trucks in that city. A site has been chosen at Lagrange street on the Michigan Central Belt. The new concern has a capital stock of $25,000.

A new factory for the manufacture of Stroud carbureters has been installed in the building owned by the Electric Vehicle Company, Minneapolis. Work has been started on orders already placed. Mr. Stroud will soon leave for the East for the purpose of demonstrating the merits of the device and to close for distributing rights.

The Toledo Time Test Tire Company has been incorporated by Eugene H. Winkworth, Frank W. Coughlin, Frank B. Miller, Harry W. Eisenberg and Charles Weirich. It has an authorized capital stock of $10,000. The company will manufacture and inflate pneumatic tires, using a patent process, the invention of a Toledo man.

The Stewart & Clark Manufacturing Company has completed its big new addition to the plant, 110 feet front, three story and basement, and 50,000 square feet floor space, which will increase the facilities, and provide for much larger output. The new plant will have a specially equipped department for the manufacture of the Stewart Standards.

The Sheldon Axle Company of Wilkes-Barre, Pa., has opened offices at 68 East 12th street, Chicago. S. B. Russell will be in charge.

George F. Bishop, of the White Company, has bought a half interest in the New Kensington Motor Company of New Kensington, Pa., and will hereafter be its manager.

W. S. Hathaway, district sales manager of the Maxwell-Briscoe Motor Company in the Southwest, has been appointed general supervisor of all branch houses for the Western district of the United States Motor Company.

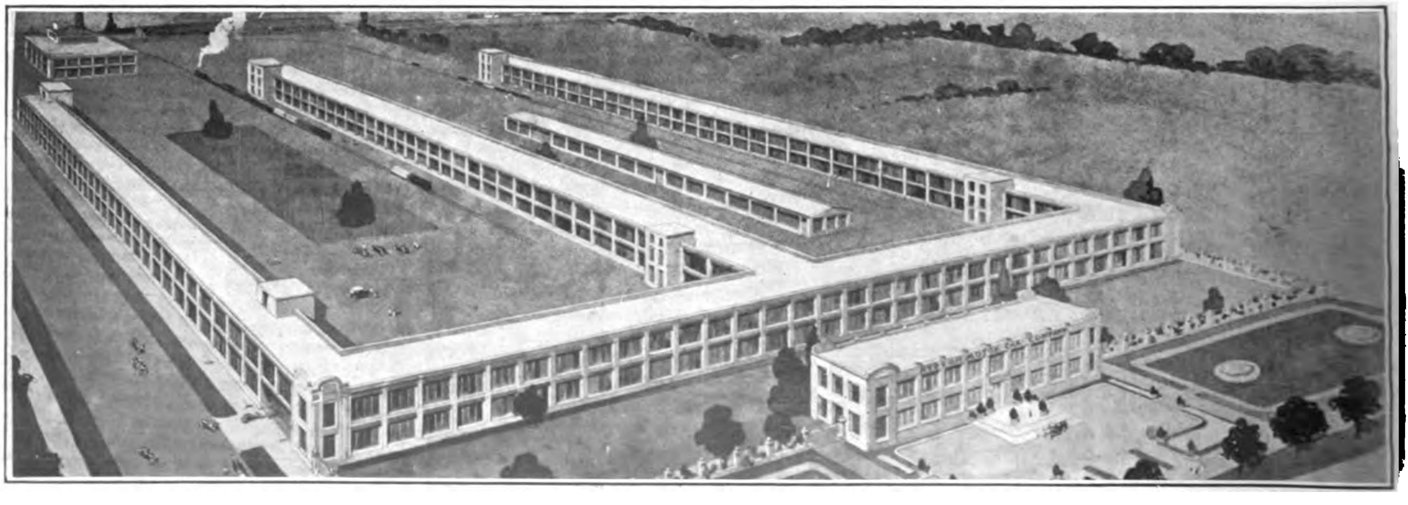
Joseph Tracy, who was appointed on the board of examiners for chauffeurs in the New York City district under the Callan law, has resigned his position. Mr. Tracy said that pressure of other business necessitated this move.

Governor Weeks, of Connecticut, has appointed State Highway Commissioner James H. MacDonald a delegate to the second annual convention of the International Congress of Road Builders at Brussels, Belgium, July 31 to August 10.

Pres. George J. Dunham, of the Royal Tourist Company, and Archie MacLachlan, one of the factory experts, have been visiting the Eastern agencies, spending the greater part of the time in Boston, which was formerly Mr. Dunham's home.

Martin D. Pulcher, purchasing agent and secretary of the Oakland Motor Car Company ever since the company was formed three years ago, has resigned in order to take up the position of general manager of the Bailey Motor Truck Company, in Detroit.

S. H. Humphrey, superintendent of the Brush Runabout Company, has been promoted to factory manager. Mr. Humphrey has been unusually successful in increasing the output of Brush runabouts this year. Before going into the Brush organization he was connected with the Peerless Motor Car Company, of Cleveland.



Bird's-eye view of the new Hudson factory in Detroit, which, including main building, testing building, shipping building, power house and office building, will cost $500,000. It will be completed next month. The buildings are of reinforced concrete and are strictly fire-proof

Agency and Garage News

Charles T. Bowdoin has secured the Pittsburgh agency for the Baker Electric car and is located at the Morewood garage in Centre Avenue.

Joseph A. Henning, who handles the Buick, is having a busy season in his garage and salesrooms, in North Third Avenue, Mount Vernon, N. Y., which he he enlarged this spring.

S. M. Ament, formerly with the Broadway Automobile Company at Seattle, Wash., has joined the force of the M. S. Brigham Motor Car Company in the same city and will sell Cadillac cars.

The ranks of Minneapolis accessory men were increased by one last week when George H. Payne opened offices at 1202 Hennepin Avenue for the distribution of spark plugs and steam vulcanizers. It is his intention to add other lines soon.

The Kissel Kar Company, of Cleveland, was incorporated with an authorized capital of $10,000 to operate a sales agency and repair shop with a garage in Cleveland. The incorporators are E. H. Butt, A. Lezens, E. E. Gott, H. E. Gott and W. B. Davis.

The Automobile and Supply Company, of Akron, was incorporated with a capital of $10,000 by Carl Looker, R. S. Grant, B. Bastian, Amos H. Endeback and J. H. Adams to conduct a general automobile business and to teach people to operate motor cars.

The J. R. Whitney Auto Sales Company of Cleveland was incorporated with an authorized capital of $10,000, to operate a sales agency and garage. The incorporators were J. R. Whitney, W. C. Sell, D. Irene Burke, C. J. Burke and William H. Kemmerling.

N. W. Church, representative of the Stoddard Motor Car Company, reached San Francisco a few days since and will remain there until the Stoddard-Dayton agency change in that territory is settled. He intimates that the company may decide to establish a branch house there.

The Miller Rubber Company of Akron, Ohio, has opened a branch in Detroit, Mich. H. L. Cooper will be in charge.

B. R. Hayden, formerly with the Studebakers at Sacramento, Cal., has accepted a position with the Howard Automobile Company, San Francisco.

G. E. and H. J. Habich Company, Boston, Mass., have been chosen agents for the Hart-Kraft motor trucks and light delivery wagons.

H. E. Smith, proprietor of the Erie Garage at Sheboygan, Wis., has been appointed district agent for the Matheson by Bird-Sykes Co., 1470 Michigan avenue, Chicago, Western representatives.

The Early Motor Car Company of Columbus has taken the Central Ohio agency for the Chase motor truck. The territory covered consists of about 25 counties in the central part of the state.

The Hupp Motor Sales Company, of Cleveland, was incorporated with an authorized capital of $15,000 to conduct a sales agency and repair business. The incorporators are James A. Farrell, William J. Coughlin, Thomas Coughlin, A. C. Ward and W. J. Douley.

J. T. Bill & Co., automobile supply dealers at Los Angeles, who opened a branch store in San Francisco several months ago, are enlarging their stock of accessories, etc., at both stores. The Los Angeles store is now being moved into larger quarters in the same building on Main Street.

John H. Valentine, formerly manager of the Amos-Peirce Automobile Company at Syracuse, has resigned and will enter the automobile business for himself. He has secured the Syracuse agency for the Chalmers cars. He says he will erect a fine garage. For the present he is at 410 West Onondaga Street.

S. G. Chapman reports the arrival of his first shipment of Owen automobiles in San Francisco. Mr. Chapman will look after the interests of the new line in Northern and Central California.

George W. Chandler, of Milwaukee, Wis., has been granted a permit to build a $20,000 garage and stable building at 298-300 Fifth street, Milwaukee. The structure has ground dimensions of 50 by 150 feet and will be three stories high.

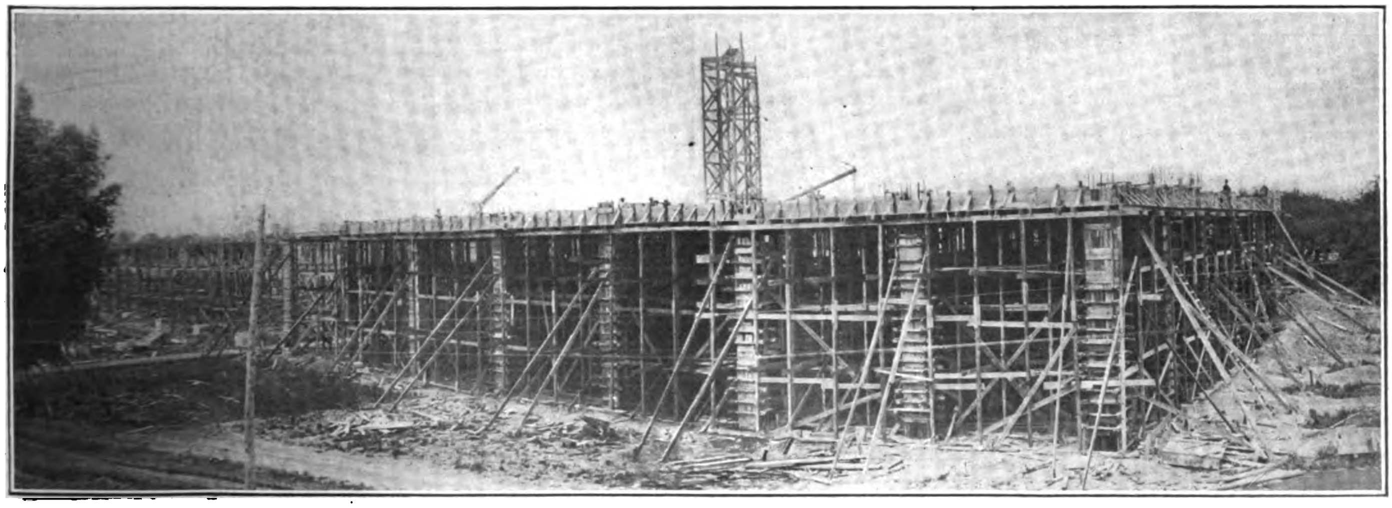
A motor exposition on a small scale, designed to attract the attention of rural visitors, who comprise the bulk of patronage, is to be one of the features of the 1910 Wisconsin State Fair, Sept. 12 to 16.

The Ambridge (Pa.) Auto Company has rented the Jenny Building and opened a first-class garage in that town. The company is composed of John Davie of Ambridge and B. D. McCullough of Tarentum, Pa.

Fire Commissioner Rhinelander Waldo, of New York City, and Commissioner Waldo, First Deputy in Brooklyn, have taken delivery of two 45-horsepower Briarcliff model Lozier cars for use in department work.

The Haines Auto Sales Company, which recently occupied fine new quarters in Los Angeles and which will soon be in its new building in San Francisco, has announced plans for the erection of new buildings at Sacramento and Stockton, Cal., and at Reno, Nevada.

A. G. Williams, who has been associated with the Franklin and C. Arthur Benjamin for several years, has taken a position with the Haynes Automobile Company, of New York, with headquarters in New York, to represent them in New York, New Jersey and New England States, having charge of the wholesale and agency end of the business.

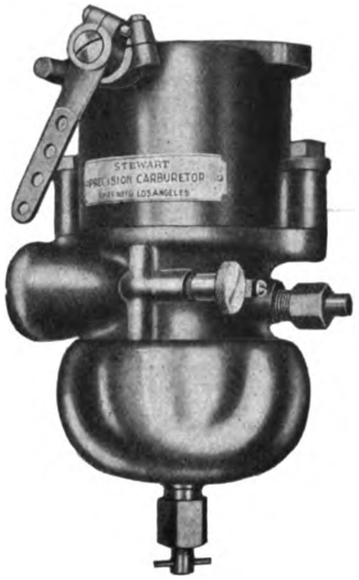


A view of the new reinforced-concrete factory of the Lozier Motor Company in process of erection at Detroit, Mich. Work was commenced on this mammoth plant in May, and it is expected that the factory will be in full operation by October 1st of the present year

Prominent Automobile Accessories

A STURDY CARBURETER

Without springs, and with but one moving part—the air-valve—the Stewart Precision Carbureter, made by the Alfred C. Stewart Machine Works, 1008 Santee street, Los Angeles, Cal., is based on a sound principle—the avoidance of fruitful sources of trouble by a reduction to a minimum of the number of component parts. The proportioning of air and gasoline is accomplished by means of gravity acting on the one moving part. No variation in the gasoline level can change the regulation of the mixture. True proportioning and perfect atomizing of the mixture enable the engine to pull strongly and smoothly, and the vacuum is practically the same at all speeds, being due only to the weight of the spraying valve, which is a constant quantity. The principle upon which this carbureter is operated makes it impossible for it to be affected beyond the minimum by variations of altitude, trips to 7000 feet having been made without adjustment being necessary to produce a well-proportioned mixture.

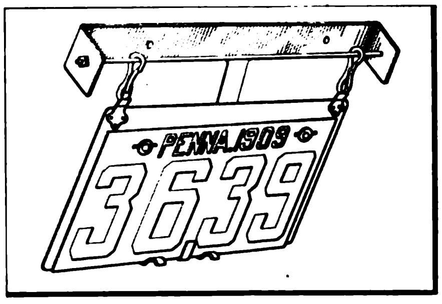


Few parts in this carbureter

MATCH THAT RESEMBLES A GUN

Lighting-up time on a windy night—even if one hasn't forgotten the matches—is a period of much exasperation and no little profanity. Possibly with a view to conserving the future spiritual prospects of its clientéle, but anyhow with an eye open to the positive demands of the present, from the viewpoint of the autoist, the Ronson Specialty Company, 7-15 Mulberry Street, Newark, N. J., has patented and is marketing the Ronson Pist-o-Liter, a device with which it is possible to positively ignite the gas flowing from an acetylene lamp burner, under any and all conditions of wind and weather. It is shaped like a small revolver, and pressure upon the trigger produces an active series of sparks, which will ignite immediately any inflammable gas, which makes the device a handy thing to have around the house as well as in one's car. After discharging, pressure upon the plunger in front of the trigger re-engages the latter for the next "shot." When, after constant use, the sparks become fewer, one or two turns to the sighter cap should be given, to tighten it. At intervals it is also necessary to remove the cap and change the position of the flint, to insure a full series of sparks.

Handy for a windy night



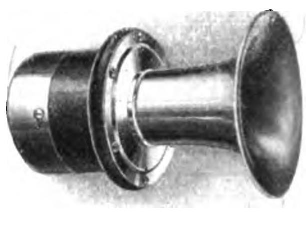
Saves trouble at inter-State ferries

AN AID TO CLEAN GASOLINE

Water and sediment in gasoline are troublemakers for the autoist, and any device which will do away with this evil entirely will be hailed as an unmixed blessing by the motoring fraternity. The Liggett Spring & Axle Company, Park Building, Pittsburg, Pa., after much experimenting, has perfected a gasoline separator for which many claims of excellence are made. Even the highest grade of gasoline contains foreign substances, and the sweating of the tank due to atmospheric conditions frequently adds water to the gasoline, and then comes the trouble of testing batteries, etc., in the effort to locate the trouble. It is claimed for the Liggett Separator that it prevents everything but gas-making fluid from getting into the carbureter. All foreign matter stops at the diaphragm, and is drained off through a petcock.

SMALL, POWERFUL ELECTRIC HORN

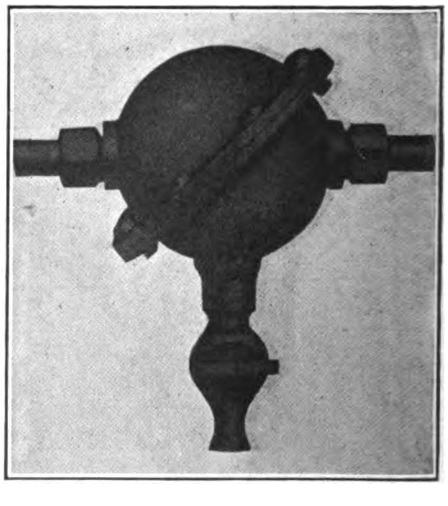
To meet the demand for an electric horn which combines a powerful tone with substantial construction and pleasing appearance at a reasonable cost, the Atwater Kent Mfg. Works, 45 North Sixth street, Phila., has produced the type D Monoplex. It has an improved vibrating system, which is louder and heavier in tone than the one formerly used. Another feature is the one-piece polished brass horn in which there are no soldered seams. This horn is thoroughly substantial and efficient, and may be used on large cars for city use, or on the average car for general use. It consumes little current and gives best results on six dry cells or an eight-volt storage battery. It is small in size only and does not cheapen the appearance of the car on which it is installed.



Small, but far-reaching horn

HANDY REVERSIBLE TAG HOLDER

Little troubles are often the most annoying, mainly for the reason that they are seldom guarded against. The Schell Reversible License Tag Holder, for which a patent has been asked by the Northern Machine Company, Twentieth and Dauphin streets, Philadelphia, will neutralize in large measure the annoyance and delay occasioned at inter-state ferries or boundary lines when the motorist must change his tags in accordance with the laws of the commonwealth he is about to enter. This holder consists of a frame to either side of which a tag can be fastened. The frame itself swings by a pair of spring snaps.



Takes dirt and water out of gasoline

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THE AUTOMOBILE

Perfect Scores May Be Numerous in the Munsey Run

BETHLEHEM, N. H., Aug. 20—With less than one-half of the scheduled distance covered, the Munsey Historic Tour of 1910 has already demonstrated everything that such a tour is supposed to show. It has so far proved a sharp test for the cars engaged; a severe trial of the drivers' skill; enjoyable alike to passengers, newspapermen, amateurs and professionals, and it has proved of some educational value, because nearly everywhere along the line where stops were made there was an insistent demand on the part of the public for information about the tour, the automobiles engaged in it and about the utility of the motor and its present status.

An immense public interest is everywhere apparent, and it is surprising to note how many persons along the route are equipped with lists of contestants and the details of the cars. Save for the city of Providence, R. I., the tourists have been treated with distinguished consideration everywhere. They were usually welcomed with open arms and seemed to be regarded as guests whose presence was desirable and profitable.

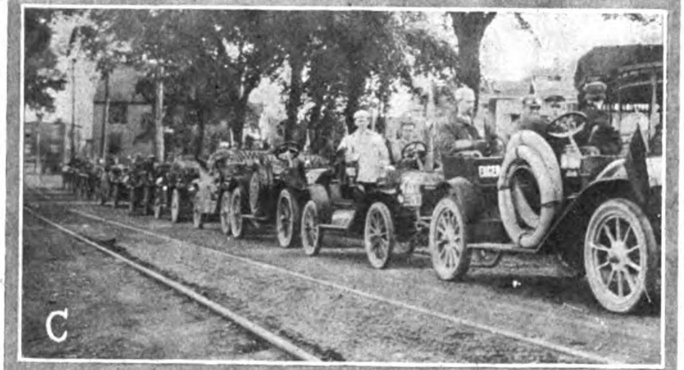
NOON CONTROL AT PROVIDENCE

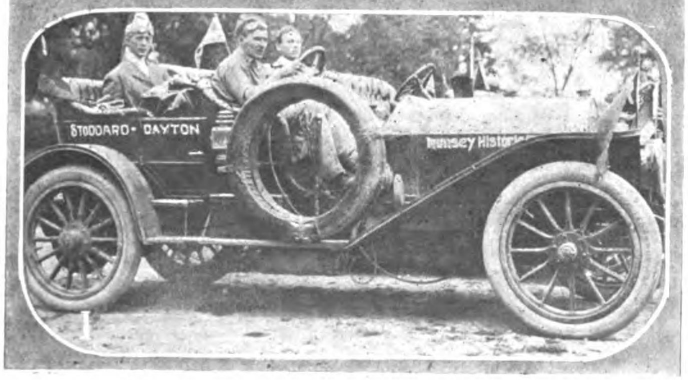
At West Point Monument

As to the latter item, a careful canvass of the situation shows that the caravan leaves behind it at least $1,000 each day. Some of the estimates run as high as $1,500, but the first figure is nearer the truth. Nine cars have been penalized to date, showing that the course has been by no means easy.

Referee Ferguson's system of scoring has proved remarkably efficient and on only one day has the bulletin been delayed until as late as eight o'clock. That was at New London last Wednesday night, when it was posted about that hour.

The coming week will witness several difficult problems being presented to the cars. One





A—Checking out of the noon control at Providence
C—On the outskirts of the city of Portsmouth
E—Where the cars were parked overnight at West Point
G—Staver-Chicago, No. 23, checking out at West Point
I—Leo Shaab and his Stoddard-Dayton, No. 24, at West Point

day the route is to be over 200 miles long and on another it will be over what is regarded by many persons as the worst road in the United States. How the cars will answer these questions, time only can show.

Second Day

New London, Conn., Aug. 17—Several of the cars contesting in the Munsey Historic Tour were penalized as the result of the second day's run, which was from West Point, N. Y., to this city, a distance of 167.8 miles. For the most part the roads were good, but here and there along the route there were stretches of highway that tried the mechanism of the cars severely. This was particularly true of the course ten miles west of Willimantic, after crossing the summit of the hills.

Passing through New Britain, where the Corbin car is manufactured, the whole town turned out to welcome the representative of that factory that is competing in the tour. The Corbin, No. 11, was cheered from the time it entered town until the city limits were reached.

When the tour reached Hartford the scene was repeated with the big yellow Columbia, No. 2, in the stellar rôle.

The day's run was somewhat longer than that of yesterday and was slightly increased in mileage by reason of the fact that the roads selected for the route near New Britain were under repair and a detour had to be made. The smaller cars seemed to do exceptionally fine work during the second day and the whole caravan reported at this city within the time limit. At Waterbury, Conn., the noon control, the officials of the tour were given a warm reception by a committee of citizens and were entertained at the Hotel Elton during the brief stay. Car No. 10, Warren-Detroit, suffered four demerits for working on an adjustment of the carbureter, and car No. 21, the Ohio entry, was penalized a number of points for repairing a leak in the gasoline feed. The exact number of points involved in this penalization will be announced later.

Third Day

Boston, Aug. 18—The third day of the Munsey run was short in mileage, high in interest and long on discomfort. The tourists enjoyed a fine night's rest at New London and everybody was

DAILY PENALIZATIONS OF THE 28 CARS WH

No.	Car.	A. L. A. M. H. P.	Entrant
			CLASS 1A—C
13	Brush	6 2-5	Frank Briscoe
14	Brush	6 2-5	Frank Briscoe
19	K-R-I-T	21	K-R-I-T Motor Car Co.
			CLASS 2A—CARS SELL
8	Ford	22 1-2	Chas. E. Miller & Bro.
26	Maxwell	22 1-2	Maxwell-Briscoe Motor
30	Ford	22 1-2	Ford Motor Co.
34	Ford	22 1-2	Ford Motor Co. (Phil.)
			CLASS 3A—CARS SELL
10	Warren-Detroit	25 3-5	Taylor Motor Dis. Co.
15	Regal	25 3-5	Regal Motor Co.
18	Great Western	28 9-10	G. W. Auto Co.
23	Staver-Chicago	25 3-5	Staver Carriage Co.
25	Maxwell	28 9-10	Maxwell-Briscoe Motor
27	Crawford	28 9-10	Crawford Auto Co.
32	Moon	28 9-10	Moon Motor Car Co
			CLASS 4A—CARS SELL
5	Washington	27 1-8	Carter Motor Car Co.
6	Washington	27 1-4	Carter Motor Car Co.
16	Pierce-Racine	28 9-10	Pierce Motor Co.
17	Enger	30 6-10	Enger Motor Car Co.
21	Ohio	28 9-10	Ohio Motor Car Co.
29	Inter-State	32 3-5	Inter-State Auto Co.
			CLASS 5A—CARS SELL
2	Columbia	32 3-5	Columbia Motor Car Co.
9	Elmore	32 3-5	Frank Hardart
11	Corbin	32 3-5	Corbin Motor Vehicle C
22	Cino	25 3-5	Haberer & Co.
24	Stoddard-Dayton	36 1-10	L. H. Shaab
28	Glide	36 1-10	The Bartholomew Co.
31	Kline Kar	40	B. C. K. Motor Car Co.
			CLASS 6A—C
33	Matheson	48 3-5	Matheson Motor Car Co

ready for an early start. Two more perfect scores were spoiled as the result of the day's run, as the Great Western, 18, was given two black marks for repairing a terminal in its ignition system and the Moon, 32, was assessed one demerit for clearing its quadrant lever of sand.

The Pierce-Racine, which traveled into New London on three cylinders, went through the day in apparently normal condition and without penalty. The Inter-State had only the high and intermediate gears in working shape, but checked in on time and without further penalty. The reverse and the low are still out of commission, but will probably be attended to to-morrow.

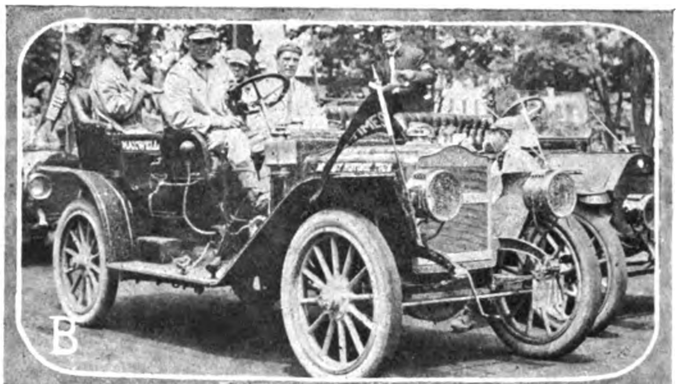
Everything was pleasant, the road, weather and the going at the start of the day's run, and not a cloud shadowed the general situation until after the cars left Narragansett Pier. Then things began to happen fast, for the E-M-F pilot car came to grief a little way beyond the pier, when in turning out to avoid a bunch of polo ponies, the car struck a tree and bent its front axle. Entering Providence, a special speed trap had been set for the tourists and the first one caught was the Brush runabout, 13; next Starter Newmyer fell into the clutches of the law and it cost $17.50 to secure his release. Then it was found that the traffic regulations of the city had been changed, apparently for the annoyance of the tourists, and the cars were not allowed to stand at the hotel named as noon control. This resulted in some confusion and when the city began to drop back from the horizon everybody breathed deeply with relief. But that was not all, for the Randolph truck, which is carrying the heavy baggage of the tour, was caught in the speed trap late in the day and was stringently dealt with.

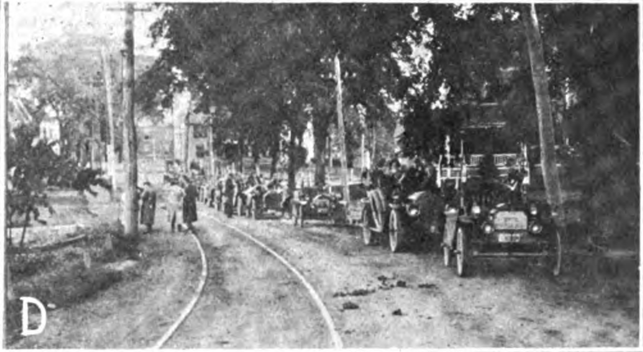
The route of the third day of the tour was from New London to Narragansett Pier to Providence and from thence to Boston, about 117 miles. The first stage of the run was over what was once an Indian trail, which legend says was constructed by the great chief Uncas, who lived during the earliest days of the white settlement. Roger Williams, the father of Rhode Island, improved the trail to a certain extent and for many years it was used as the chief means of communication between the villages

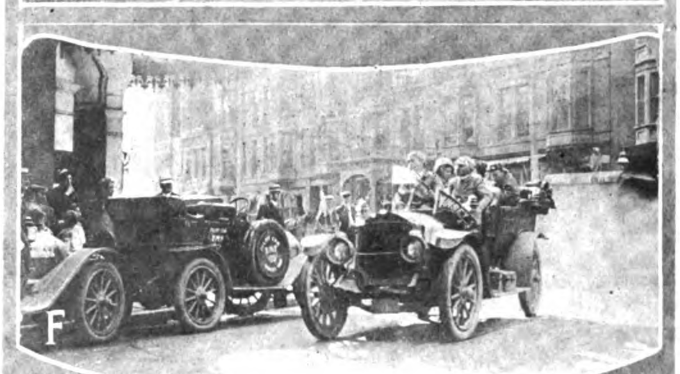
(*Continued on page 342.*)

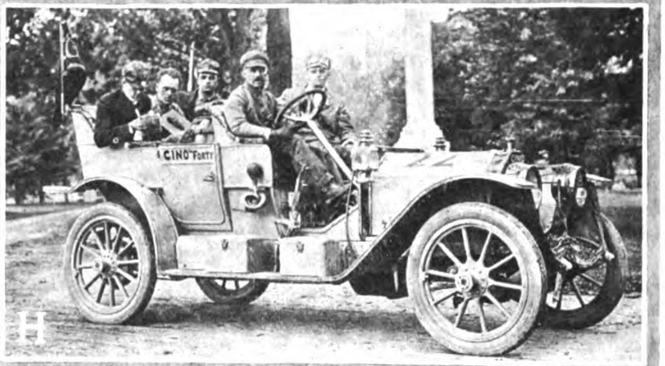
STARTED ON THE MUNSEY HISTORIC TOUR.

	Penalties						
Driver	1st day	2d day	3d day	4th day	5th day	6th day	7th day
SELLING UNDER $800							
E. McCoy	3	0	0	0	0	....	....
P. R. Kenny	0	0	0	0	0	....	....
K. Crittenden	0	0	0	0	0	....	....
FROM $801 TO $1,200							
C. E. Miller	0	0	0	0	0	....	....
C. F. Fleming	0	0	0	0	1000	Withdrawn	
F. K. Peabody	0	0	0	0	0	8	....
J. A. Cherry	0	0	0	0	0	....	....
FROM $1,201 TO $1,600							
Tom Berger	0	4	0	0	0	....	....
A. W. La Roche	0	0	0	0	0	....	....
C. La Mar	0	0	2	0	0	Not computed	
E. T. Knutsen	0	0	0	169	73	....	....
H. E. Walls	0	0	0	0	0	....	....
A. A. Miller	0	0	0	0	0	867	....
R. M. Upton	0	0	1	0	1	....	....
FROM $1,601 TO $2,000							
A. A. Carter	0	0	0	0	0	....	....
W. D. Arrison	0	0	0	0	0	....	....
L. Strang	0	0	0	0	0	....	....
H. Frisch	0	0	0	0	0	....	....
Ross Henwood	0	59	0	0	0	....	....
I. W. Dill	49	0	0	62	0	....	....
FROM $2,001 TO $3,000							
G. M. Wagner	0	0	0	0	0	....	....
A. S. Hardart	0	0	0	0	6	Disqualified	
A. T. Bailey	0	0	0	0	0	....	....
W. Donnelly	0	0	0	0	0	....	....
Leo Shaab	0	0	0	0	0	....	....
Fred Cassel	0	0	0	0	0	....	....
C. Fairman	0	0	0	0	0	....	....
SELLING OVER $3,000							
D. A. Hall	0	0	0	0	0	....	....

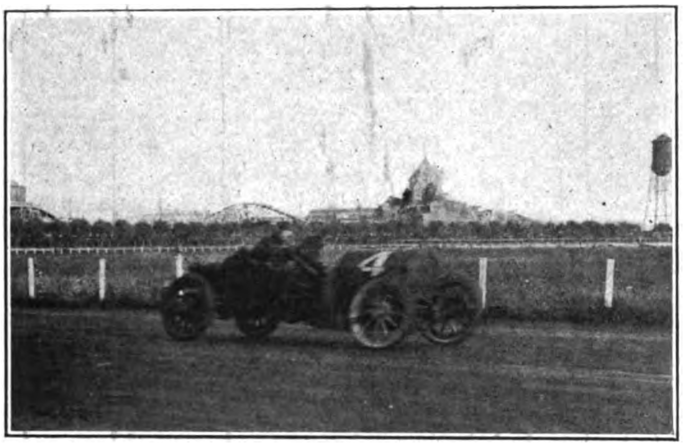








B—Maxwell No. 25, Harry Walls at the wheel
D—The tour met with fine roads entering Portsmouth
F—Elmore, No. 9, last year's winner, entering Portland
H—Cino, No. 22, W. Donnelly at the wheel, at West Point
J—The little Brush was well up in front at controls



Houpt-Rockwell, No. 4, making time in the backstretch

Stearns 24-Hour King

AFTER the most marked exhibition of consistent running ever seen in this country, the Stearns car, No. 5, swept under the wire a winner in the 24-hour race at Brighton Beach last Saturday night, scoring 1,253 miles and beating the best previous American figures for the time by 57 miles. In only two hours during the long grind did the Stearns fail to cover more than 50 miles—the sixth, when 48 were scored, and the twenty-second, when 47 were checked off.

Matheson, No. 8, 1,178 miles, finished second. Houpt-Rockwell, No. 4, 964 miles, and Cole, No. 6, 905 miles, were also running when the race was finished. The Matheson came within 18 miles of equaling the previous record.

Nine cars were entered in the race, but only seven of them started, No. 1, Fiat, and No. 9, S. P. O., having been withdrawn before the start for various reasons. The cars that started were: No. 2, Allen-Kingston; No. 3, Marion; No. 4, Houpt-Rockwell; No. 5, Stearns; No. 6, Cole; No. 7, Midland and No. 8, Matheson. All the cars except the Houpt-Rockwell started promptly at the shot of the pistol, missing cylinders delaying that car for a few moments. After the first turn in front of the clubhouse the Stearns quickly went to the front, increasing its lead over the Matheson and Allen-Kingston to two miles during the first hour. The Stearns made 57 miles during this time, breaking the former record of 56 miles made last year by the Buick and the Fiat.

Shortly afterward the two leading cars were laid up for tire trouble, and for about three minutes were compelled to go to their respective camps. There damages were quickly repaired. The Matheson contingent, proving speedier at this work than the Stearns crew, cut the latter's lead down to one mile. About the same time the Houpt-Rockwell developed ignition trouble and on one occasion the flames burst out at the left side of the car, which soon after retired for repairs. However, it was back on the track shortly after.

As the Stearns passed the 89-mile mark it met with a tire mishap, which let the Matheson into the lead, which, however,

The winning Stearns contingent after the race—Fifty miles ahead and going fast

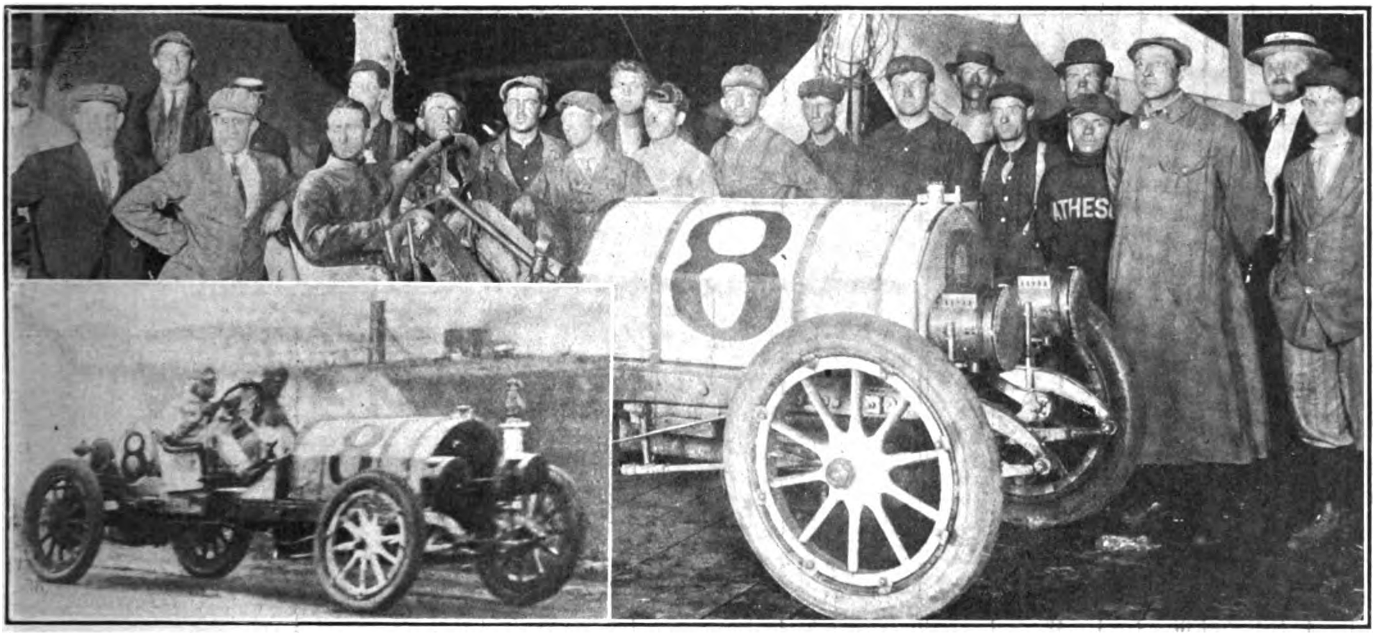
SCORE OF THE 24-HOUR RACE AT BRIGHTON BEACH, SHOWING TOTAL DISTANCES AND MILES PER HOUR

No. Car	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22d	23d	24th	Total
5—Stearns........	57	107	157	211	262	310	361	414	467	520	575	626	679	733	785	838	889	941	993	1048	1101	1148	1200	1253	1253
	57	50	50	54	51	48	51	53	53	53	55	51	53	54	52	53	51	52	52	55	53	47	62	53	
8—Matheson......	52	104	133	183	236	284	333	387	439	487	540	590	637	688	737	781	830	879	924	979	1028	1078	1124	1178	1178
	52	52	29	50	53	48	49	54	52	48	53	50	47	51	49	44	49	49	45	55	49	50	46	54	
4—Houpt-Rockw'l	45	92	141	188	236	294	294	294	294	347	383	436	486	535	583	626	669	720	768	817	870	917	919	964	964
	45	47	49	47	48	58	0	0	0	53	36	53	50	49	48	43	43	51	48	49	51	47	2	45	
6—Cole...........	49	99	144	194	248	271	286	336	389	439	491	540	587	638	670	670	694	694	717	743	788	821	863	905	905
	49	50	45	50	49	28	15	50	53	50	52	49	47	51	32	0	24	0	23	26	45	33	42	42	
7—Midland.......	48	97	143	164	164	164	164	205	255	291	323	372	415	455	455	501	541	590	635	655	Snapped crankshaft				655
	48	49	46	21	0	0	0	41	50	36	32	49	43	40	0	46	40	49	45	20	..	..	..	..	
3—Marion........	46	94	138	184	225	273	323	376	416	425	Went through fence and broke wheels								..	..	..	..	..	..	425
	46	48	44	46	41	48	50	53	40	9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
2—Allen-Kingston	47	93	142	193	232	Bent front axle, broke steering wheel and gasoline tank												..	..	..	..	..	..	..	232
	47	46	49	51	39	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	

BEATS THE BEST PREVIOUS "TWICE-AROUND-THE-CLOCK" TRACK FIGURES AT BRIGHTON BEACH BY 57 MILES. MATHESON FINISHES SECOND

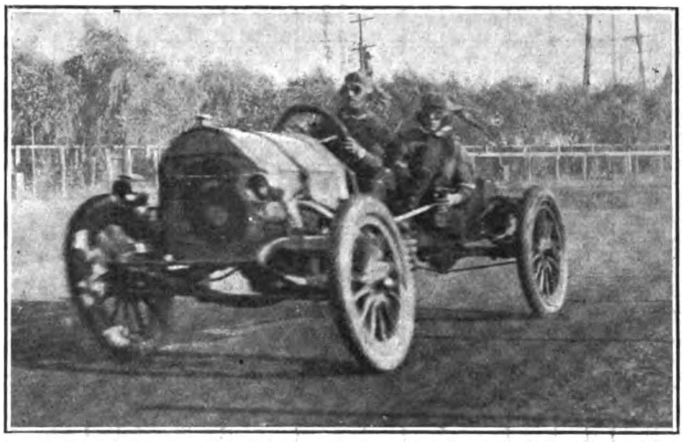
it did not hold for a long time, for after starting on its 104th round its right rear tire exploded and the car skidded into the fence. Owing to its terrific pace it did not come to a standstill before it had gone through the fence for a second time, thereby damaging its left front wheel and steering cross rod. Neither of the two men in the car was injured, but the machine had to stay in the camp for half an hour, which changed the position of the car from first to sixth.

After this the Stearns again went to the front and at the end of the fifth hour it had made 262 miles, being followed by the Cole (243 miles), while both Matheson and Houpt-Rockwell had run 236 miles. During the next hour the latter overtook its rival and at the end of the hour led it by 10 miles. It was during this hour that the first serious mishap occurred, which caused the withdrawal of a car. The Allen-Kingston, with Cobe at the wheel, went through the fence, bending its front axle and breaking its steering wheel and gasoline tank. The driver's face and side were badly cut. An hour before, the Midland had its timing gear damaged and as it also developed valve trouble it had to be taken to the camp for some three hours.



The Matheson outfit, which made a plucky fight—Trying to close up the gap

About 3 a. m. the Houpt-Rockwell broke its universal joint, which took three hours to repair. This car, by the way, changed tires very frequently, and by the end of the eighteenth hour had used 40 of them. Hardly an hour after No. 4 had re-entered the race another car, Marion No. 3, went through the fence and damaged its wheels to such an extent that it had to retire permanently. Wally Owen, who was at the wheel, suffered severe cuts to his face and eye.



Cole, No. 6, was still going at the close of the race

After this the remaining cars continued, the machines going into camp periodically only to take on gasoline or to adjust or change tires. Regarding the latter point the Midland performed especially well, and during more than three-fourths of the time experienced absolutely no tire trouble. In the twentieth hour, however, it met its fate. Owing to the engine being overheated, the car was retired. At the end of the twenty-second hour Houpt-Rockwell went through the fence, breaking a knuckle in the steering gear. Nobody was hurt, but the car was laid up for almost an hour. The other four cars finished the race in this order: Stearns, Matheson, Houpt-Rockwell, Cole.

Al Poole drove the Stearns at the finish of the race, while Charles Basle was at the wheel of the Matheson. The first prize, amounting to $1,500, went to Stearns; the second, $600, to Matheson, while each of the two other cars which finished were rewarded with a prize of $200. The winning Stearns is privately owned by J. M. Rutherford, of New York City, and had been run 40,000 miles before starting in the race. The Stearns engine develops 60 horsepower, that of the Matheson 50, and those of the Houpt-Rockwell and Cole 40 and 30 respectively.

Wants Roads to Serve New York Towns

SYRACUSE, N. Y., Aug. 15.—D. M. Power, of the Maxwell-Briscoe Syracuse Company, calls the attention of the State Engineering Department to a matter of novel interest in the present laying out of State roads. He says of late years the geographical surveys provide only for the obviation of engineering difficulties, the maintaining of a regular grade, etc., to the exclusion of the convenience of communities.

Many such State roads are being built to skip cities of considerable size by as much as three miles. State roads built really to serve the communities, says Mr. Power, would benefit equally tradespeople and tourists.

Industrial Aeroplanes

BY MARIUS C. KRARUP. CONTINUED FROM LAST WEEK. DETAILS RELATING TO EQUILIBRIUM, WEIGHT, SKIDS AND A NEW PRINCIPLE IN PROPELLER CONSTRUCTION

IN the article appearing last week under this title there was illustrated and described in part a type of aeroplane construction in which the requirements for safe equilibrium are met by a number of provisions all designed to work together for the same purpose and therefore forming a suitable basis for a close study of these requirements. To refresh the memory of readers, front and side view diagrams are shown herewith in Figs. 6 A and B representing the monoplane variety of the construction, and the wings are shown in a somewhat extreme adjustment, such as might be required exceptionally in very bad weather in a moment of danger. The wing *L* is turned to a high tilt with its axle in its normal horizontal position, while the wing *K* is tipped around its pivotal suspension at P_1 and at the same time has been turned around its axle, so that the front edge is much lower than its flexible rear edge. The propeller and the skids are not shown. The axles of the wings are designed as consisting each of three spars or tubes spaced triangularly apart with the hypothenuse of the triangle forming part of the wing, while the catheti and the third spar form the necessary reinforcement and extend below the wing. But in the sketches, Figs. 6 A and B, these axles are shown as single spars, X_1 and X_2. The control elements by means of which the wings may be made to assume their whole range of positions jointly or separately are shown with more detail in Figs. 7 A and B, and in Fig. 8, while Fig. 7 C represents details of the skid construction whose practical value, by the way, depends largely upon two other factors in the design, as explained later.

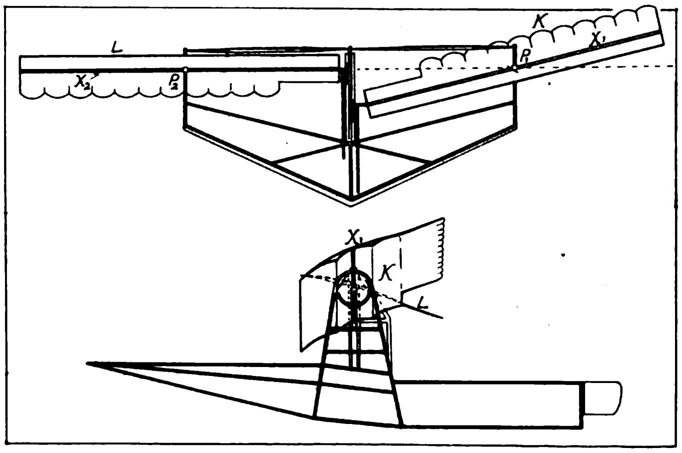


Fig. 6—Front and side view diagrams of monoplane, showing extreme adjustment of planes

The reasons why the design complies with the requirements for enabling an aviator to preserve the equilibrium of the machine under all contingencies may first be recapitulated, though they have been stated at some length in a number of previous articles. And at the same time it may be pointed out, in so far as possible, how and why the construction may be materialized without exceeding the weight limit, and why a construction of this nature seems adapted for industrial development through those methods of manufacture to which the automobile owes its rapid evolution.

As is now becoming more generally recognized, control by rudders depends for safety upon the speed and direction of the machine and is rendered ineffectual when the motor stops and the wind at the same time prevents the machine from assuming the poise for gliding. If the propulsion (not to be confounded with the motor) is weak, the wind alone may interfere with the rudder action. By employing immobile keel planes, either horizontal or vertical, flight in fair weather is steadied, but new dangers are added in irregular weather, when the wind may act more strongly upon the immobile planes than the latter can act upon the air by virtue of the speed of the machine. The whole recent French development, involving increased areas for the immobile surfaces or "empennage" and increased motor power, may therefore be considered as a gambling game in which safety is staked upon the reliability of the motor in conjunction with such fair weather as may be chosen for exhibitions and the winning of prizes. Most of the machines become unsafe when the motor stops working; all of them when both conditions for safety fail. The aeroplane, to become an industrial product, must be on a safer basis. In addition to these reasons for abandoning rudders and "stability planes" and adopting instead a suitable adjustability of the main planes (which in the absence of a positive fulcrum for any control effort means the mutual adjustability of the main planes to the body of the machine and of the body of the machine to the main planes), there may be mentioned the weight and incumbrance of the scaffoldings required for maintaining the rudders and keel planes in their positions far in front or to the rear of the main portions of the machine, as well as the considerable air resistance caused by these scaffoldings.

Some of the difficulties in aeroplane design, and especially those commonly overlooked, may be traced to the fact that the requirements for preserving equilibrium are more severe in the human-made flying machine than in the bird, since the bird can rely absolutely upon its motor power and is of such small dimensions that the chances of a gust of wind attacking one side of its structure, and not the other, are exceedingly remote. But with these more severe requirements the human designer nevertheless has to reckon. The birds, moreover, do not rely on rudders or keel planes, using their tail for a tilt rudder only for hovering and alighting. Their main reliance is in their adjustable wings which are their main planes and propellers, combined.

The construction submitted for study in these articles has not been designed, however, from the bird's or any other living creature's structure as a basis, but from experiments and theories whose adaptation to existing machines dictated one modification after another. The resemblance to a bird which the construction shows in its monoplane variety is purely incidental.

It will be noticed that side steering may be effected independently of the oblique rear rudders. It may be accomplished by tipping the inner wing upward, diminishing its carrying capacity, and at the same time turning it to a higher tilt and increasing the resistance to propulsion on that side. During slow flights with high tilt it may also be accomplished by simply giving the inner wing a quick turn to a tilt above 15 degrees, where the resistance to propulsion increases more rapidly than the lift. For small turns, rises and drops in fair weather one or both of the oblique rudders alone may be turned, the planes always being in reserve to help out the rudder action if necessary.

The advantages of adjustable main planes appear to many so self-evident, in comparison with rudders, that a number of patent applications for this type of design are said to have been filed recently by well-known inventors and engineers, and the tardiness of aeroplane builders in adopting this feature may be ascribed to the difficulties in combining it with sufficient strength and lightness. These difficulties are very real, in comparison

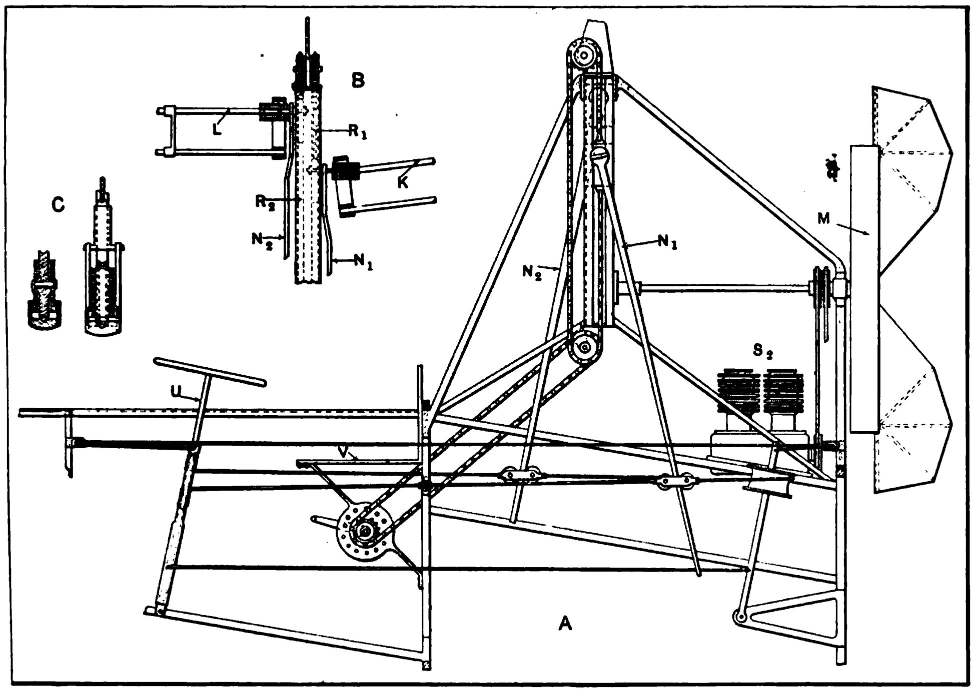


Fig. 7—A, Control elements and propeller; B, Detail view of central slide mechanism; C, Section of double skids and front view of catch for locking and releasing them

with the fascinating ease with which an ordinary biplane may be built from flimsy spars and piano wire stays, but on the other hand all the material which is saved by dispensing with rudder and tail supports may be applied to provide firm support for the points around which the main planes are made adjustable. The stays supporting the pivotal rings, P_1 and P_2, Fig. 6, illustrate the comparison, and the prow and tail in this construction may be of exceedingly light weight, since they taper forwardly and rearwardly and, being covered, are more than self-supporting. Their form, as referred to last week, instead of causing danger by catching the wind obviates the loss of equilibrium by certain self-righting properties. These factors all contribute to sustentation, equilibrium and lightness. In addition, the construction of the planes, with curvatures placed "in series," as also explained last week, is calculated to serve strength, lightness and equilibrium by increasing the carrying capacity per square foot for any given tilt and thereby rendering it possible to reduce the dimensions and wind-catching surfaces throughout the machine for any given weight it has to carry. By choosing the pivots of the wings near their middle, the stresses are minimized and balanced, and the efforts required for control movements are reduced, particularly as compared with any construction by which it might be attempted to imitate bird construction and having the pivots of the wings near the center of the whole machine and at the inner end of each wing, as the bird has it at its shoulder joint.

Not only the apparent difficulties in securing lightness and strength to meet the more concentrated stresses to which a machine with adjustable wings is exposed have militated against the early adoption of this design feature, but also a reasonable advance consideration of the increased air resistance which might be expected in a machine made heavy enough in its parts for supporting this equipment. If the trussed body in the construction shown were uncovered the air resistance against it would be so considerable as to make the design impracticable, but the specific design of prow and tail which goes with it is calculated to not only remove the objection related to air resistance, but to transform this resistance into additional carrying capacity and a means for several other purposes of value. By forming the prow and tail in conjunction with the body proper, as they are shown, the normal resistance to forward movement is figured to be about equal to the resistance against the main planes at all flying tilts and this permits the propeller to be placed midway between the main planes and the body and to have the center of gravity lower with relation to possible disturbances of the balance, or rather the forces brought to bear in such disturbances, than in either biplanes or monoplanes of existing types. That this result is produced may not be apparent at once in comparison with a biplane. The lower plane of a biplane, however, is highly susceptible to disturbing influences, while the under surfaces of prow, body and tail are self-righting against lateral disturbances, which evidently means that the low center of gravity gets an additional chance to correct any disturbance of the main planes; that is, the center of gravity is lower with relation to the disturbing forces. It is further noticed that the shapes of prow, body and tail are self-righting against a backward tumble, so long as propulsion takes place, because any backward tipping brings the under surface of the tail into action as a sustaining surface, while the prow, being placed normally at a tilt which gives nearly maximum sustentation, under these circumstances gives little more sustentation than before. As against a forward dip, the shapes of prow, body and tail are not self-righting, either during propulsion or when the motor is stalled, and with regard to weight distribution the machine is therefore supposed to be so balanced that the forward end will dip, and it remains for the aviator to regulate this tendency by the proper adjustment of the main planes, whether the machine is propelled or gliding. But the natural tendency to dip forwardly corrects that most dangerous possibility of a backward tumble, when the motor is stalled and the all-saving speed for some reason has been reduced, against which no mere shape can prevail, it being amply proven that pure vertical parachute action presupposes much larger areas for the weight carried than can come into consideration for an aeroplane machine.

It is now believed to have been shown that the construction

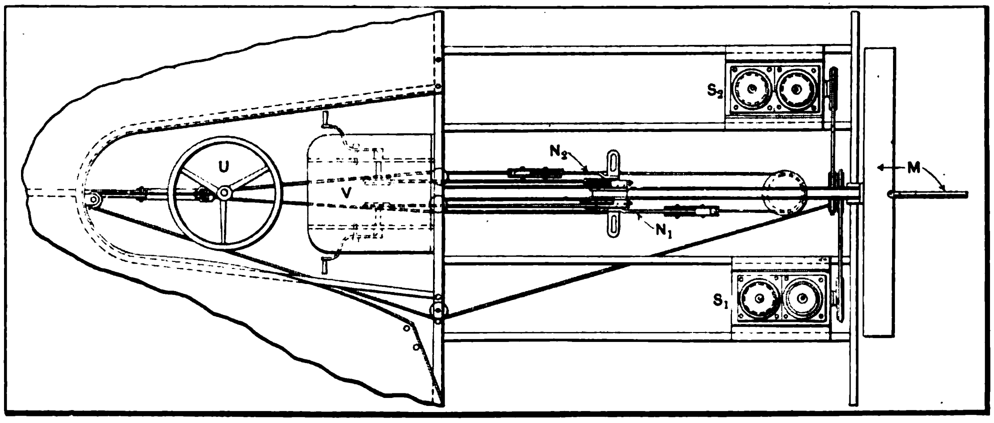


Fig. 8—Top view of control elements for aeroplane with adjustable main wings

illustrates many of the requirements in aeroplanes in general by bringing strongly to mind all the factors and forces involved in the operation of a flight machine and suggesting many ways in which the relations between these forces may be changed by variations in construction. It remains largely a question of engineering judgment and of resourcefulness in the use of available materials to determine the means for reducing the construction, or any similar construction, to its lowest weight limits. Materials and their use form too large a subject to be included in this description, and the writer must limit himself to the statement that he estimates the weight, with one man of 200 pounds and all supplies, including 100 pounds of gasoline or kerosene, at about 1,150 pounds for a machine whose main planes span 28 feet. But by such steel construction as may become practicable by the co-operation of the alloy steel mills or, at much greater cost, by elaborate hand and machine work in such material, it should be possible to reduce the weight to 800 pounds or less with some incidental gains in the reduction of air resistance.

Two extraordinary advantages in a construction deriving its control from adjustable main planes relate to speed variations and to the possibilities for producing very large airships of great carrying capacity. The suitability of the construction for the highest as well as the lowest speeds follows simply from the adjustable relations between the load and the planes, which permit the machine to find its balance in the atmosphere at the tilt which gives the highest resistance against propulsion as well as at the tilt which gives the smallest resistance and therefore the highest speed, without any necessity existing for correcting the balance by a retarding rudder action. The possibility of building large structures follows from the easy adaptation of the design to tandem arrangement. The irregularities in sustentation which have interfered with all previous arrangements of tandem planes naturally fall away when the regulation of the course is accomplished by the mobility of the planes themselves rather than by the operation of rudders, at the front or rear, whose task is so much harder as the extension of the planes fore and aft, collectively, is greater. The possibilities in this respect seem sufficiently attractive to enlist the interests even of those who believe in the development of control by rudder for aeroplane machines of small capacity.

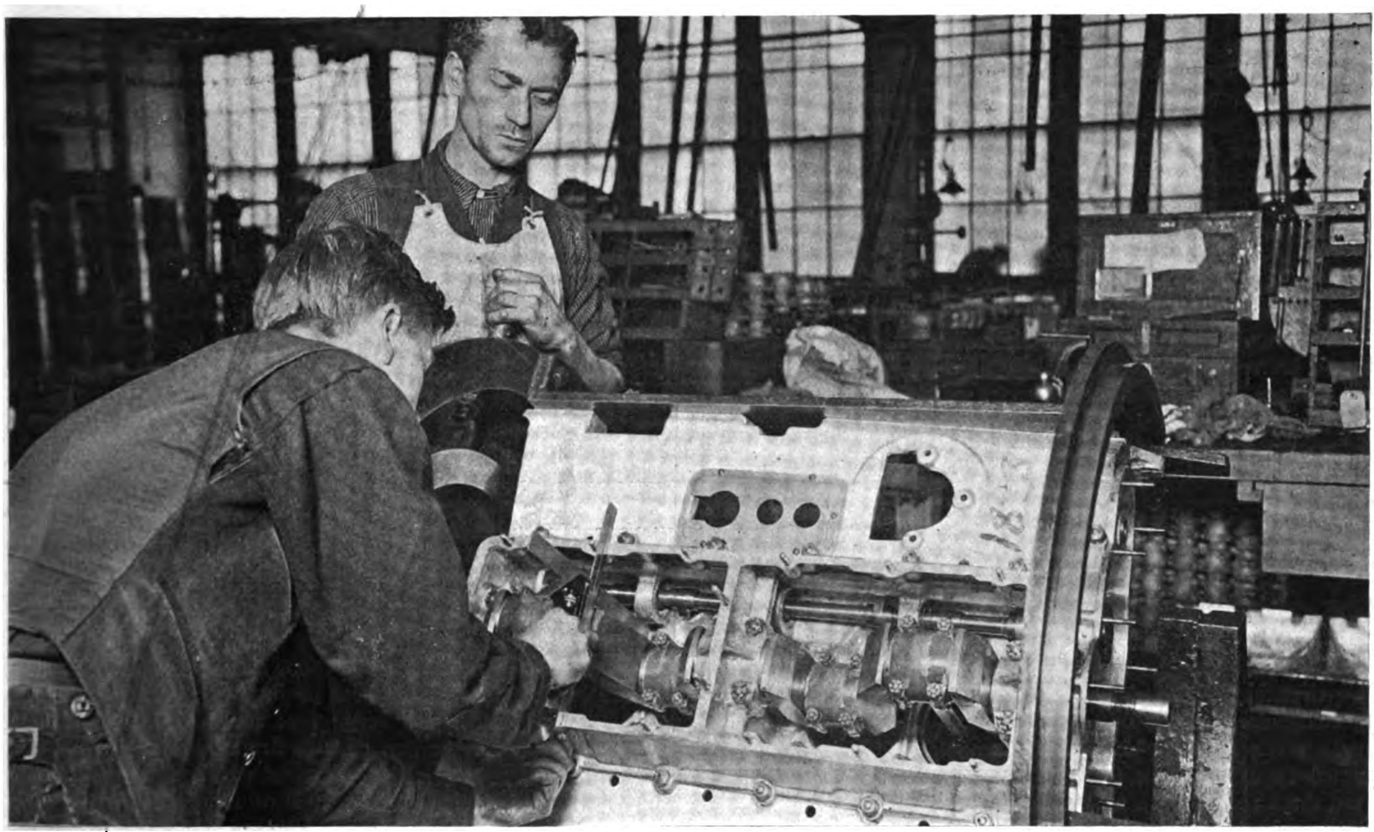
In Figs. 7 A and B and in Fig. 8 certain definite mechanical expedients for effecting the desired control of the main planes are illustrated with sufficient detail to be self-explanatory, in connection with the brief description given last week. As presented they merely show that the control is within the range of practical mechanics.

Mention of the propeller design and of the skids has been reserved for the last because these features represent ideas whose organic connection with an aeroplane construction designed with a view to industrial development and the safeguarding of equilibrium is less close than that of the features already described, and because the practicability of skids designed to launch an aeroplane in the air with a run not exceeding 6 to 8 feet depends greatly upon obtaining a much stronger propulsion from the propeller than has ever so far been obtained in aviation practice and also somewhat upon the efficacy of the special construction of planes, with curvature "in series," which was described in the first instalment of this article. Without the reduced air resistance for a given lift which these planes should produce and the increased propulsion for a given motor power which the propeller construction should produce, the chances for imparting a starting speed of twenty miles per hour, or more, to an aeroplane machine weighing more than half a ton, by a run of only a few feet, seem anything but encouraging, but it is nevertheless means for accomplishing this result under favorable circumstances which are indicated in the skid construction shown in Fig. 2, last week, and in Fig. 7 C. It is assumed that by providing the upper runner of the double skid with anti-friction rollers and the lower one with a wire rail, for the rollers to run upon, and a releasable catch by which the machine and the upper skid-member may be held back until the propeller operates at its full power, the retarding as well as the jolting effect of more or less uneven ground may be so far reduced that a machine with a maximum of propulsion and sustentation and a minimum of resistance may gain the necessary speed on the short run. As shown in the sectional view, Fig. 7 C, the machine is of course intended to carry the whole skid device in flight by means of the flanges on the lower member.

The propeller is combined with a flywheel of thin, rigid material serving the purpose, aside from the flywheel functions, of maintaining the front edges of the two propeller blades rigid while the rest of the blades are turned from their rest positions, which may be in a plane laid through the shaft, to a pitch determined by the speed of rotation and their resilient resistance against deflection. The blades, in other words, are turned to pitch by the air resistance which they encounter. Their efficiency as propellers is poor for any speed of rotation which falls much below that which produces suitable pitch but rises rapidly as this pitch is approached. The pitch is modified by external circumstances, such as sudden gusts of wind or eddies or high forward speed, the blades responding automatically to all forces increasing or lessening the pressures. Probably the most suitable pitch may be found higher for resilient than for rigid blades. The propeller blades are indicated in Fig. 7 A and in Fig. 8 as being perfectly flat, but in reality they should be formed with a pressure surface slightly hollow transversely, and in addition with shallow air pockets corresponding in nature and purpose with the sub-curvatures employed for the under surfaces of the main planes of the machine. The resilient resistance against the deflection of the blades is provided partly by making the material of the blades, except the entire front edge, resilient, as by securing skin or rawhide to flexible steel fingers, but mostly by attaching an adjustable, multiple helical spring to the flywheel rim, near each blade, and compelling the blades to stretch the springs when turning to pitch. By cutting out a niche in the inner wooden felloe of the flywheel rim, the springs may be placed so as to cause neither air resistance or sound in objectionable degree. To serve as a base for the spring action is the third function of the flywheel and a useful one in practice, as it would require endless experimentation to build resiliency directly into a propeller blade and have it commensurate with a given motor power minimum, with the degree of accuracy necessary for accomplishing much better results than may be obtained with a propeller of the customary almost rigid type, when the latter is provided with improved curved pressure surfaces. In theory, however, the relations between the rigid and the resilient propeller are fairly clear. Assuming that two propellers are alike in all features, excepting that one is rigid and the other capable of turning around its rigid front edge, as described, against an adjustable resistance, it is readily seen that the motor must do more work to turn the resilient propeller at a given speed than for turning the rigid one. If the speed is insufficient to create a resistance which will turn the resilient propeller's blades to the same pitch as that of the rigid blades, the requirement for greater power follows from the higher pitch alone, since it is contradictory to assume that high pitch, with equality in all other things, can be driven as fast as low pitch with the same power. Further, as the resistance to rotation must at all times be at least equal to the resilient resistance against the deflection of the blades (plus friction), since it is this resistance to rotation which alone causes the deflection, it becomes mathematically certain, by comparing these two impregnable inferences, that the motor power in the case of the resilient propeller must do both the rotating and the deflecting, while in the case of the rigid propeller it does the rotating only. If then the resistance against deflection of the resilient blades is arranged to be equal to their resistance against rotation at the pitch of the rigid propeller, it will require twice as much motor power to rotate the resilient propeller at the speed which will produce this pitch as for rotating the rigid propeller at the same speed.

(*Continued on page 338.*)

Proper Assembling Represents Half the Quality



ERECTING MOTORS AT THE PACKARD PLANT, ILLUSTRATING THE USE OF SPECIALLY CONTRIVED STANDS

ADVERTISING a fallacy does not make it a truth, but it does induce a large number of people to believe that the statement is founded on fact. It has been advertised year after year, and in a thousand ways, that carbon formations in the combustion chambers of a motor's cylinders come from using too much poor lubricating oil. The distillers of lubricating oil may or may not have believed the story; at all events, all they have ever done about it was to recommend the use of the finest grades of lubricating oil, which is the proper course in any event, but in the meantime carbon trouble in motors has gone on uninterruptedly quite independent of the lubricating oil employed, for the very good reason that the major portion of the carbon which is at the bottom of all complaint comes from the use of an excess of gasoline or the right amount of gasoline in the absence of a sufficient volume of air to supply the requisite quantity of oxygen with which to set fire to the fuel and burn it to finality.

In many of the plants at the present time experiments are going on with a view to determining the real cause for carbon formations, and from what has been learned already it is a moral certainty that the growth of carbon as it is caused by lubricating oil is infinitesimal as compared with the carbon accumulations from other sources, as poor carburetion, improperly provided compression and ignition systems of no great competence.

It would seem that carbon is likely to form in motor cylinders if the compression is very high. When the compression ranges around 75 pounds per square inch absolute, the accumulation of carbon that may be traced to compression is negligible.

If a good ignition system is employed and it is maintained in proper working order, combustion is far more complete and the carbon trouble is much deferred. The reason why ignition may be at the bottom of trouble of this sort is explained as follows: If the ignition does not take place at the proper time the chances are that a portion of the fuel will be burned to incomplete combustion, the terminal pressure will fall below the desired point and conditions of inferior scavenging will set in.

The greater part of carbon trouble, however, must be charged to inferior carburetion, and that this source of trouble is becoming more acute every day is recognized, due to the fact that the non-volatile constituent in the gasoline supply is being increased from time to time at the cost of the more volatile hexane which is being decreased in the same ratio.

If it will be remembered that fully 50 per cent. of all the volatile portion of crude oil belongs in the distillates approaching decane, it will readily be appreciated that the distillers of oil are extremely anxious to have decane liberally represented in automobile gasoline. It is not believed that they consult the builders of carbureters in matters of this sort, nor is there any record of their having called a convention of autoists with a view to being favored with its opinion as to the efficacy of kerosene oil for use in automobiles.

Surprising as it may seem, the inventors of kerosene motors have been put out of business due to the improvements wrought in carbureters and the splendid backing of the distillers of crude oil. Just as fast as carbureters are improved so that they are rendered more capable, the distillers of crude oil add another dash of the less volatile constituents until finally the carburetion problem has arrived at a near approach to the time when automobile gasoline may contain 50 per cent. of kerosene oil.

Since this is the exact amount of kerosene oil present in the whole content, there is no inclination on the part of the distillers of oil to add more—it would even be a detriment to do so.

The thermal value of automobile gasoline as it now obtains is slightly better than that of true gasoline. This is a fortunate circumstance, and it means that more power will be delivered from a motor that is capable of burning automobile gasoline than can be taken from a motor that is fed on true gasoline, the difference being sufficient to be well worth taking into account.

But it is to the detriment of good operation to try to burn the automobile gasoline of to-day, using a carbureter that may have worked extremely well in the days of hexane.

Unless carbureters are so designed that they will vaporize automobile gasoline, it will, of course, pass into the combustion chamber in liquid form, where it will "crack," precipitating carbon, forming a hard crust, which interferes with the proper thermal action of the motor. Cylinder oil plays a small part in this malperformance, since it serves as a binder for the precipitated carbon, to which must be added silicon and other silt formations, which are sucked in through the orifice of the carbureter, and carried into the combustion chamber.

Some of the experiments that were conducted seemed to show quite conclusively that silicon alone does not form a crust in the combustion chamber, so that if the gasoline can be prevented from cracking, there is almost no danger of carbon trouble or the formation of a sufficient crust to produce noticeable trouble.

This is but one of the several important fields that are receiving the attention of the capable engineers whose life work lies in the building up of the automobile. Unfortunately, there is so much to be done, and there are so many questionable traditions to be lived down, that progress, however substantial it may be, takes on pigmy proportions as measured by the wants of the industry. Just how long it will be before this many-angled situation is reduced to a satisfactory working level is hard to predict, but it does seem as if the advertising of fallacies should be confined to "paid for" space, if it is to be tolerated at all, although it is difficult to understand why such an undertaking would be worth paying for. In any case, it is believed that the greatest offenders are among the class of information dispensers who cater to the editorial pages of the technical press, many of them dealing in synthetic matter rather than relating proven facts.

Automatic Tire Pumps

SHOWING A TYPE OF AUTOMATIC TIRE PUMP WHICH IS WORKED BY SUCTION AND COMPRESSION FROM THE MOTOR CYLINDER WITH AN AIR PUMP IN TANDEM RELATION

ACCORDING to the best advices obtainable from makers of tires, supplemented by the practices among taxicab operating companies, the life of pneumatic tires is shortened more if they are run when deflated than from any other cause. It is claimed by experts that a tire is too small for its work unless it will maintain a substantially round shape at the point of ground contact when it is supporting the total load. With a view to obtaining the greatest possible tire life, the first requisite under the circumstances is to employ tires that are sufficiently large to sustain under the load without inducing flexure.

It is a well-understood fact in connection with steel and other materials that they will deteriorate rapidly if they are subjected to flexure, and the only material obtainable that seems to last for a commercial length of time under conditions of flexure is spring steel. Even this product gives out much too soon, and every autoist of experience realizes that the chances of breaking the springs upon which the body rides are very great indeed. Moreover, statistics conclusively show that next to tire trouble springs play a second part from the point of view of failure in service.

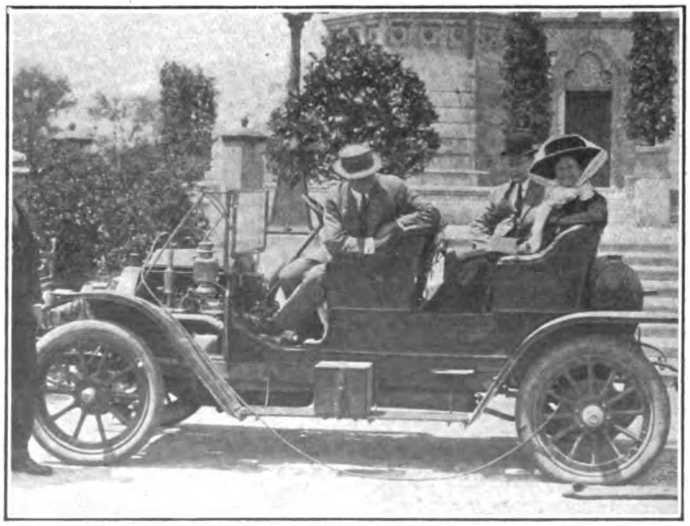


Fig. 1—Depicting the pump in place on a car and the pressure tubing leading back to the left rear tire, which is being inflated

Flexure and shock are at the bottom of spring breakages, but it must be remembered that tires take the initial shock, and it is much subdued by the time it is taken up and dampened by the action of the springs. If the finest grade of spring steel is barely capable of sustaining under conditions of secondary shock together with flexure, it is scarcely to be expected that tires will satisfactorily support initial shock and stand the hardship of flexure besides.

It is impossible to get around the initial shock condition. Tires are used on wheels for the purpose of taking it, but

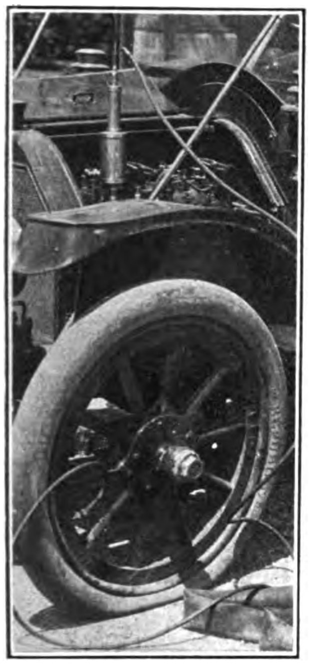


Fig. 2—The pump in place on the motor and the pressure tube leading to the left front tire

it is possible to avoid subjecting them to flexure as well, provided of course the tires are of sufficiently large section in the first place, and if they are sufficiently inflated besides.

The average autoist seems to think that tires will not stand a high pressure. On the other hand, one expert whose ability is recognized in the tire world has carried the inflation problem so far that he used a pressure of 500 pounds per square inch in bicycle tires without endangering the fabric on account of the high internal pressure. If a bicycle tire will withstand this high pressure, there can be no possible chance of inflating automobile tires by any ordinary means to a pressure sufficiently high to endanger the fabric through high fiber strain from this cause.

The one thing that an autoist can do that will reduce the cost of tire maintenance to the lowest possible limit is to maintain the condition of inflation so that the tire where it contacts with the ground will remain very nearly in the same state of roundness as it will be at any other point in its section. That there will be a slight flattening is unavoidably true, but in no case should this flattening be more than that which will reduce the radial diameter of the tire by 1-5 of an inch.

It is now the practice among some of the makers of automobiles to supply power pumps, gearing them from the motor at some convenient point, and so arranging that the autoist will have no excuse for running on partially inflated tires. There are a vast number of automobiles in service, however, that are not provided with power pumps for this purpose, and the Skinner & Skinner Company, realizing the importance and scope of this field, is marketing a power tire pump that may be attached to any automobile, involving no greater undertaking than the removal of a spark plug and the screwing into place of the power pump. These pumps are manufactured by the company, at 1716 Michigan avenue, Chicago, Ill., and they are so put out that they will fit into place without trouble if the autoist desiring one is careful to state the make and model of his particular car.

Fig. 1 shows the power pump in place on an automobile, and the pressure tube leading therefrom to the valve of the tire on the left rear wheel. The motor is turned over slowly, running on three cylinders while this work is being done, and under ordinary conditions the tires are pumped up to about 90 pounds per square inch. Fig. 2 shows the tire pump reaching out above the bonnet, and affords an excellent idea of its size relative to the dimensions of the motor and relating parts. Fig. 3, however, presents the tire pump with the motor almost cut away, showing the thread of the pump, T1, screwing into the spark plug opening, S1. The large cylinder, C2, holds a reciprocating piston, which is actuated first by the suction of the motor which pulls the piston down and, second, by the compression of the motor, which pushes the piston back again. The small cylinder C1 holds a piston in tandem with the working piston, there being a connecting rod between. When the power piston reciprocates, due to suction and compression of the motor, the small cylinder reciprocates in unison, taking air at the end of the down stroke and compressing it on the up stroke, so that it passes out through the valve V1 into the connecting hose H1, thence to the tire to be inflated. For the purpose of admitting free air to the small cylinder, a hole is provided so that when the air piston is at the end of the down stroke the hole is uncovered and the air is free to rush into the small cylinder.

The working cylinder being relatively large in area is capable of supplying the necessary force to compress the air in the small cylinder to at least 100 pounds per square inch, and the pump is so contrived that nothing but pure air can enter the air pump and find its way into the tire to be inflated. Fig. 4 is a section of the pump showing the relation of the two pistons and the connecting rod between, also the spring buffers at the top and bottom of the stroke, by means of which the reciprocating motion is arrested, and the piston set is accelerated in the reverse direction as many times as the occasion requires, without shock or other deteriorating troubles.

The entire outfit is substantially made, using brass tubing, and high duty brass fittings; the joints are threaded and thereafter brazed so that leakage is avoided and the relations of the parts remain firm without showing depreciation in service. The pistons are leather packed, using a special grade of material which has long served in this class of work in other fields, and which proves to be the most efficacious in this work. The pump occupies even less space than a reasonably capable hand-pump, it being somewhat shorter and very little greater in diameter. When it is through with the work of inflating a tire, it is screwed off of the motor, and may be packed away in the tool box, where it will remain without danger of being damaged, ready to take up its burden again should the occasion require.

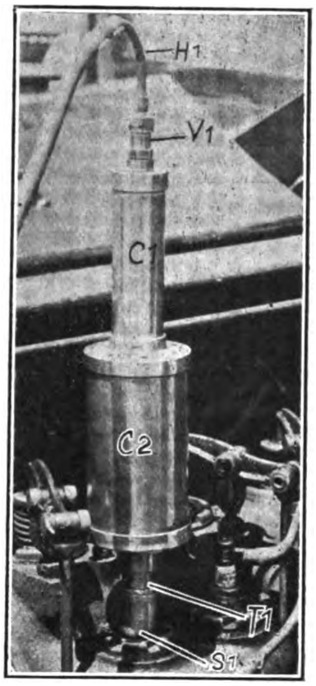


Fig. 3—The pump screwed up in place of a spark plug on the cylinder of the motor

In applying the pump it is not necessary to use a wrench of any kind. Hand pressure in threading on the pump will bring it home with sufficient force to make it tight, and when it is to be removed the same reasoning applies. In operation, if the tires are of large section, and diameter, all that is necessary to obtain a sufficiently high pressure is to speed the motor up a little, and with this facility the autoist soon learns just how fast it is necessary to speed the motor to gain the right pressure. In service the pump runs quite silently, due to the entire absence of any mechanism that can develop lost motion, and there being no gears employed, noise cannot be expected. Connecting hose may be of any desired length and while ordinary rubber tubing is used in most cases, metallic hose is also available.

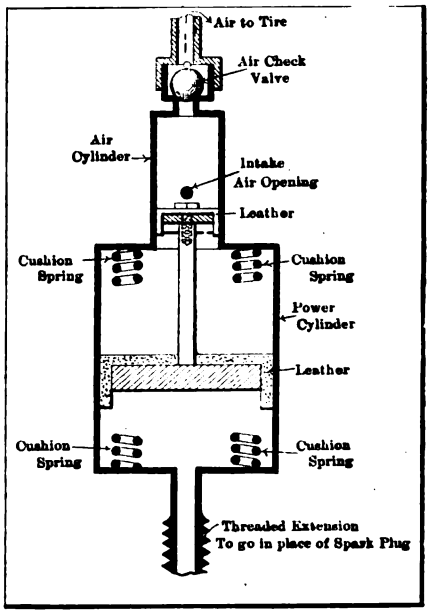


Fig. 4—Cross-section of the pump, showing the connection between the power and air pistons and the buffer springs

The Vortex Vaporizer

PRESENTING A NEW IDEA IN CARBURETER DESIGNING; FUEL IS HEATED TO OVERCOME THE LATENT HEAT OF EVAPORATION; LARGE GLOBULES ARE CAST OUT

JUST what is the composition of "automobile gasoline"? Until this question is answered to the satisfaction of the reader it will be difficult to go on with any explanation of the vaporizer under discussion. The whole range of the hydrocarbon distillates is scheduled as follows:

	Boiling Point Deg. F.
Rhigolene	113 to 140
Chymogene	
Gasoline	140 to 158
Benzine C	158 to 248
Benzine B	248 to 347
Benzine A	
Kerosene	338 to 482

In the early days of the industry, when gasoline was a by-product, it was limited to that as above stated, in which the distilling temperatures were between 140 and 158 degrees Fahrenheit. This distillate existed in crude oil to the extent of 1.5 per cent. It was soon found that there would be a shortage in the supply unless some other fuel could be found that could be used to advantage in automobile motor work, and naturally the distillers of crude oil expressed a preference for the use of heavier distillates of crude oil rather than to have the trade diverted to alcohol. All that seemed to stand in the way of the use of the heavier distillates was the rather poor working of carbureters, and one way to bring about a reform of this part of the automobile was to slowly but surely widen the range of the distillates in the mixture and gradually influence for the better performance of carbureters.

That this policy on the part of the distillers of crude oil was carried out is plain to be seen; each year brought about a change in the fuel to be had upon the market, and the time finally arrived when it was found that the character of the fuel was so heavy and non-volatile that it would not give a reasonable measure of satisfaction when used in the ordinary way.

That this policy on the part of the distillers of crude oil is to be looked upon as an imposition is not believed; the price of every commodity advances as the demand increases, and in the case of (real) gasoline, had it been maintained, the demand would have been so great that the price would have been prohibitive even before the automobile industry reached one-quarter of its present proportions.

But the time has come when it will be necessary to consider further encroachments on the residuum of crude oil in favor of fuel for use in automobile motors. Of all the available distillates between rhigolene and kerosene 50 per cent. belongs to the latter. If this supply could be utilized the whole situation would be enormously relieved, and that some kerosene is now finding its way into automobile gasoline is believed.

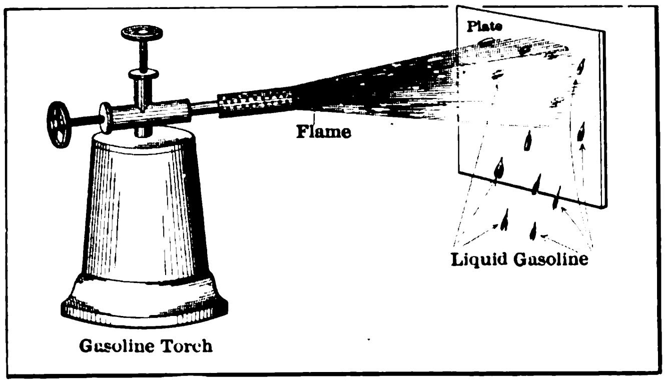


Fig. 1—Experiment using blow-torch indicating non-burning qualities of heavy distillates in the presence of highly volatile hydrocarbons

To whatever extent kerosene is added to the fuel that is now being furnished to autoists, it is just as much of a waste as so much water, unless the carbureter is so designed that it will heat the liquid gasoline and vaporize it before it is allowed to enter the combustion chamber of the motor.

The claim will naturally be made that there will be plenty of heat in the combustion chamber of the motor to vaporize the kerosene if it is present, and that it will be used as fuel under these conditions. Every autoist who is having trouble due to the formation of carbon in his motor is ready to testify to the fact that there must be something the matter with the explanation that fails to explain, and the time is ripe to point out that it takes more than heat to render kerosene oil combustible, and oxygen forms the remaining link.

True, there may be enough oxygen taken in with the fuel to serve for the purpose, but even then it is more than likely that the oxygen will not have time to mix with the fuel after the latter is vaporized within the cylinder, and, unless it does, the fuel will "crack," forming carbon, which will settle upon the surfaces of the cylinder, there to remain until it is scraped off.

That carbureters have been improved from time to time in keeping with motor requirements and the fuel problem is a settled matter, but it is becoming more apparent every day that the end is not yet, and autoists are complaining of the troubles they are having with growths of carbon, and the considerable quantity of residuum that has to be thrown away. But this is not all; smoke ordinances are rapidly being promulgated, and that poor combustion is one of the most prolific reasons for the smoke nuisance is too true to be ignored.

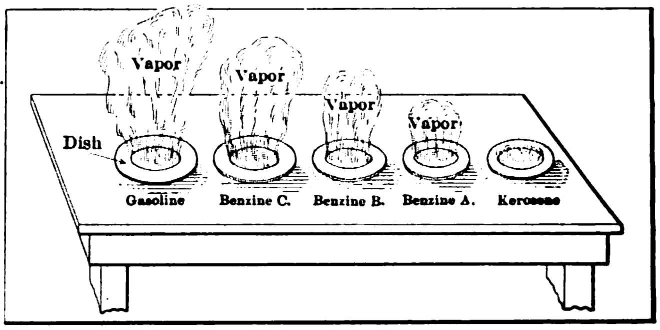


Fig. 2—Dishes holding the several distillates showing the rate of evaporation of each

If there is one thing above another that the autoist of experience dislikes it is the odor of partially burned gasoline; the pungency of the odor is only equaled by the poisonous effect it will have upon the system of the autoist, and these are additional reasons why it is necessary to keep everlastingly at the carbureter problem, not so much with the expectation that a perfect one will ultimately emerge from the brain of some wonderful thinker, but that the pace will be maintained, it being a contest between:

(A) Decreasing volatility of automobile gasoline, due to the growing use of kerosene in the mixture.

(B) Greater demands on account of the improvements that are being made in motors.

(C) More exacting requirements on the part of autoists who appreciate the fine qualities of flexible motors.

Peculiarities of Composite Mixtures of Fuel

When gasoline is made up of certain percentages of gasoline, benzine and kerosene, admitting that each produce has its own degree of volatility, the whole volume of fuel will not burn at the same rate, even if it is all set on fire at the same time. Fig. 1, of a torch of the kind in common use by repairmen, shows how some of the gasoline burns and the major portion of it passes through the flame and splashes up against the plate that is placed quite a distance away, but in line. What does this signify? It is proof of the fact that some of the fuel is so slow burning that even in the presence of an excess of atmospheric air, and plenty of flaming gasoline to ignite it, even so, it will not burn readily.

There is another very simple way to show that there is a great difference in the volatility of the respective contents of gasoline. Purchase a specimen of each of the distillates, as true gasoline, benzine C, B and A, also kerosene, and put a given weight of each in as many saucers placed in a row as indicated in Fig. 2, where a draft of air may strike them, and note the time taken for each content to evaporate. It will be found that the gasoline will evaporate very much faster than the benzine C, and that benzine C will evaporate faster than benzine B, but that benzine A will be slower than B, and that kerosene is very slow indeed.

Sizes of Globules Also Have to Be Considered

That the globule structure of each of the distillates is not the same may be proven by putting gas made from each of the distillates into rubber tires under pressure, when it will be found that the pressure will not fall in each of the tires at the same rate, thus indicating that the several products have different characteristics in this regard.

In liquid form, under pressure, when the several liquids are projected from nozzles, they will not all perform the same; some will split up sooner than others, and this characteristic must also be considered when an attempt is made to gasify the several liquids. Now, what does happen? How is this point to be illustrated to bring it home clearly to the man who has no time to study the situation at length? Perhaps a cannon will suffice for the purpose; when a ball is shot from the mouth of a gun the partially burnt powder, and much smoke, comes out of the mouth of the gun, looking as shown in Fig. 3.

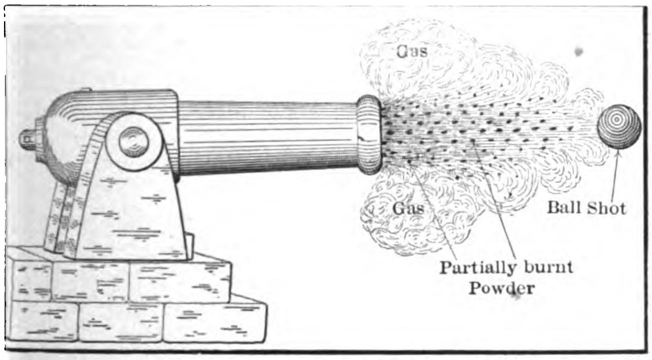


Fig. 3—The firing of a cannon taken to illustrate the action of the various distillates used in automobile gasoline

It is easy enough to understand that the ball travels faster than the partially burnt powder and the smoke. Why, then, will it not be easy to understand that the partially burnt powder will travel faster than the smoke? Of course it does. What is the result? Just what the illustration depicts. How is this phenomenon related to the questions of fuel and carburetion? If it will be remembered that heat must be absorbed by liquid gasoline before it will vaporize, and that it takes substantially 0.500 B.T.U. of heat to accomplish the task, one phase of the problem will be in a fair way to a proper understanding. But if heat is necessary to accomplish the task, the next question is, how shall the transfer be made with certainty and within the time limit, which, in this work, is very short?

Heat will transfer from one body to another if there is a difference in temperature between them, and the amount of heat that will exchange will be directly proportional to the difference in temperature. But there must be surface as well. Of course, each particle of the gasoline as it is ejected from the nozzle has surface, but the area of that surface will not be the same for all unless all are of the same size. Are all of the globules of gasoline of the same size? Unfortunately, no.

Even the differences in the sizes of the globules of the gasoline from the nozzle would not make so marked an effect on the final result were it not for the law of spheres.

The surfaces of spheres as they relate to mass are illustrated in Fig. 4.

What does it signify? With gasoline as it formerly obtained, that is to say, true gasoline, the significance was worthy of note, but it was far below that which must be noted with composite fuel such as automobile gasoline.

The illustration, Fig. 4, involving spheres, shows that the mass increases at a rate higher than the surface. The result is that the larger globules of gasoline will require a much longer time in which to vaporize, assuming a fixed difference in temperature for all.

But if some of the globules are composed of the less volatile products, as kerosene, the trouble is far greater. With kerosene as compared with gasoline, even were the globules of the same size, the gasoline would evaporate with great speed as compared with the kerosene.

The problem, then, in view of the actual presence of a double complication, is one that must be solved on a basis that will check with the demands of the controlling laws.

Just What Must Be Done to be Successful

Granting that the problem is one which has for its foundation the delivery of an efficient mixture into the combustion chambers of the cylinders of the motor, free from liquid fuel, the situation may be re-stated as follows:

(a) Account must be taken of the fact that all the globules of the fuel, as they spout out of the nozzle of the carbureter, will not be of the same diameter, partly due to the action which goes on in the nozzle, and largely on account of the composite nature of the fuel.

(b) When the fuel issues from the nozzle of the carbureter it must be screened, that is to say, all the globules of the same volatility and size must be allowed to mix with the stream of air and be vaporized in quantity sufficient to afford a capable mixture.

(c) The globules of low volatility and larger than those available for instant use must be screened out and held in a trap until they absorb enough heat to vaporize them, after which the vapor must be taken up by the inrushing air, but this process must not upset the normal balance of the mixture.

(d) Means must be at hand for promptly adjusting the quantity of air in proportion to the changing needs.

One of the facilities demanded under the circumstances is a source of heat.

What is the best source of heat? That which will afford a constant temperature and as many heat units as the demands in view of the latent heat of evaporation of the gasoline, to-

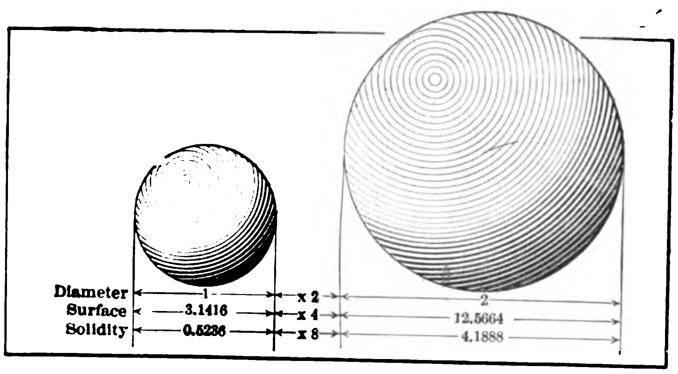


Fig. 4—Placing two sizes of spheres to elucidate the text in relation to the sphere law

gether with the requirements as based upon the specific heat of the air and the vaporized liquid.

Heating the air as it rushes into the carbureter is not in accord with the requirements; there is no way of accomplishing this so that the air will always remain at a constant temperature, and, unfortunately, the temperature of the air so heated is lowest just when it should be highest.

Heating the gasoline before it sprays out of the nozzle offers attractions, but this plan has the misfortune of disturbing the balance, due to the fact that the quantity of gasoline that will issue from the nozzle in a given time depends upon its viscosity and this property changes with the temperature of the liquid. A more stable method of heating depends upon the use of water circulating through a properly contrived jacket around the depression chambers of the carbureter. The water is heated to substantially a constant temperature in the cylinder jackets of the motor, and it is maintained at the working temperature by the radiator. True, even water under such conditions does not hold at a constant temperature level, but it is far more constant than heated air. The temperature of the water is high enough to serve for the purpose, and it is poor economy to heat the fuel higher than just the temperature that will suffice for the needs.

Fig. 5—Section of a snail-like curve offered to illustrate the principle of the vortex

If the large globules are screened out of the train and held in a trap until they vaporize, the working temperature may be held at a far lower level than would be true under other conditions. This idea, then, has more than the ordinary merit.

How is it possible to screen out the large globules of liquid fuel and hold them in "limbo" until they take on enough heat to reduce them to a stage of vaporization? How does the cream separator separate the butter-making contents from the milk, leaving skim milk as a residuum? Shall we call it a vortex action, for short, or shall we quote such of the laws of Newton as justify the contention as it is manifest in the illustration of the cannon ball and the products of combustion of powder? At all events, centrifugal force is imparted to all the particles that are engaged in the vortex swirl, and energy will reside in each of the particles independent of the other on a basis of:

$$E = \frac{W V^2}{2g}$$

When,

E = energy stored in the mass;
W = weight of the mass;
V = velocity in feet per second;
g = force of gravity.

Since the large globules weigh more than the smaller ones, does it not stand to reason that they will reside in a more pronounced state of energy, and, if this is so, is it not a fact that they will part company with the smaller globules, flying out at a tangent for a great distance, unless they are restrained?

What is there to restrain them? Certainly nothing within the body of forming mixture worth taking into account.

When the forming mixture is given the swirling motion as in a vortex, and energy is imparted to the respective globules of fuel in proportion to their respective weights, the larger and heavier globules will work up and out, so that after a few revolutions all the heavy particles will be found on the outer rim of the swirling mass and all the "mist" particles will work in toward the center, or, properly speaking, will be crowded in toward the center or core of the vortex, as shown in Fig. 5.

A Point That Has Never Been Discussed

It will be remembered that the best mixture of gasoline and air is in the proportion of 8,000 parts volume of air to one volume of liquid gasoline; it is also claimed that the richest mixture that will burn has 3,500 volumes of air to one volume of liquid gasoline, and the leanest mixture that will ignite has 10,000 volumes of air to one volume of liquid gasoline. Plotting a curve of these values presents an angle that is even a little startling, as Fig. 6 will show. Of course, the nearly exact proportion of air to gasoline for the best result in practice depends upon the compression; if the compression is very high, more air must be used. The reason for this lies in the fact that the time allowed for the proper mixing of the air and the fuel will be lowered, due to the higher obtainable speed under conditions of higher compression.

The curve, Fig. 6, looking at it from this angle, indicates that rich fuel proportions will work satisfactorily at the lower speeds, and that the torque of a motor should be maximum at the lower speed; also that it will not hold constant at all speeds.

The problem in carburetion is to realize the greatest possible torque at low speed and to fight off the tendency of the torque to fag as the speed is increased.

The way to accomplish this is to sort out the globules of less volatile gasoline and give them time to vaporize; then allow the vapor to enter the train and to be turned to good account in the combustion chamber of the motor. The vortex idea is put forward as a good one for work of this character, and the result in practice of the utilization of this idea is shown in the curve, Fig. 7, of performance of a 4-cylinder, water-cooled, 4-cycle motor of conventional make, with cylinders of 5 1-2 inches bore and 6 inches stroke.

In this curve the ordinates are plotted for speed, and the abscissæ are given values in horsepower. The curve is almost straight between 550 and 1,300 revolutions per minute of the crankshaft of the motor delivering 68.2 h.p.

A closer inspection of the curve discloses a slight kink in the same at 60 horsepower, which was delivered at 1,090 revolutions per minute. At about 1,350 revolutions per minute the curve takes a sharp fall; this is a sign that the motor valve system reached the limit of its capacity; it is not a sign of lack of ability of the carbureter in this case. Were the carbureter at fault there would be other indications, as a wavering of the curve before the knee of the same was approached.

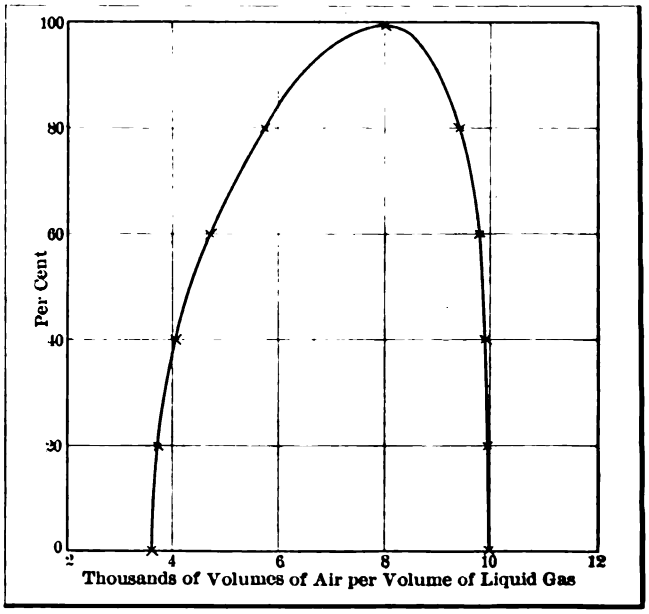


Fig. 6—Curve plotted to show the relations of air to gasoline as it is employed in motor work

It is true that the relation of speed to torque of a motor may be calculated as follows:

Let,

H.P. = Horsepower of the motor;
R = Radius of the lever arm;
S = Speed in revolutions per minute;
P = Pull in pounds at the end of the lever arm;

When,

$$P = \frac{\text{H.P.} \times 33{,}000}{6.28 \times R\,S}$$

Taking the case in point, the value of the torque at 600, 900 and 1,200 revolutions per minute is:

At 600 revolutions per minute:

$$P = \frac{34.3 \times 33{,}000}{6.28 \times 1 \times 600} = 303.2 \text{ pounds.}$$

At 900 revolutions per minute:

$$P = \frac{50.4 \times 33{,}000}{6.28 \times 1 \times 900} = 294.2 \text{ pounds.}$$

At 1,200 revolutions per minute:

$$P = \frac{64.8 \times 33{,}000}{6.28 \times 1 \times 1{,}200} = 283.6 \text{ pounds.}$$

Assuming that the best torque was realized at 600 revolutions per minute, which is a fair assumption, too, it is shown just how much the torque faded as the speed increased, but unfortunately it is not possible to state with certainty that this falling away of the torque is due to ills of carburetion; it may just as well be due to valve and other losses. It might be a reasonable statement of the situation that some of the falling is due to valve and other motor trouble and the rest to carbureter limitations, but it will be observed, nevertheless, that the performance is extremely good.

With a view to showing in a relative way the excellence of the performance as above referred to, reference may be had to Fig. 8, which is a speed and torque curve of a racing motor with a bore of 6 1-2 inches and a stroke of 6 3-4 inches, working 4-cycle, water-cooled. This motor was fitted with a Mercedes type of carbureter, was tuned up to the best point, delivering 66 horsepower at 1,000 revolutions per minute and a study of the chart would indicate that the power realized is none too satisfactory, due, to some extent, to poor ignition, but experience indicated that the mixture was not uniform over the whole range, which accounted for the falling torque.

The Effect of Time and Service Should Be Considered

The fault in the average record of the performance of an equipment is due to the fact that it is made under laboratory conditions. The effect of time and commercial service is not there reflected, and in this connection, referring particularly to carbureter work, there are too many chances against good commercial service, even though the laboratory situation may be something to whet enthusiasm.

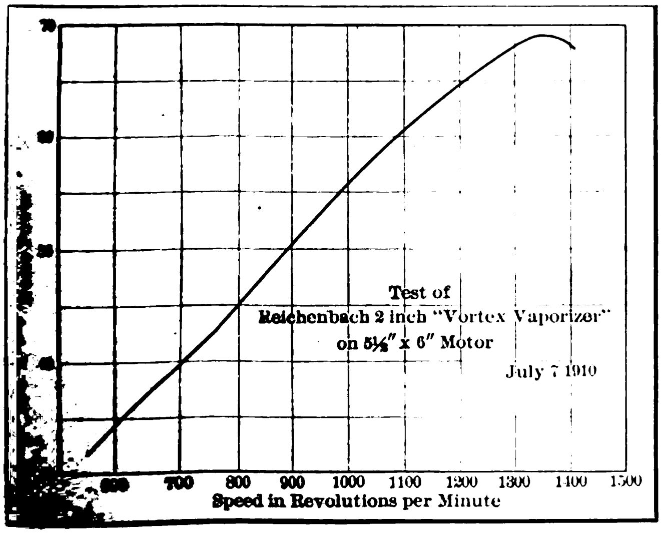


Fig. 7—Curve of performance of a Vortex carbureter on a motor

Take, for illustration, the surface indications as carbureters are used on automobiles in general. In some cases the refrigerating effect, which is produced by gasoline during vaporization, is indicated as frost upon the surfaces of the carbureter, and also over the cooler portions of the intake manifold. The average autoist very properly reaches the conclusion that heat is not being supplied to the vaporizing gasoline at a rate sufficiently high to prevent the lowering of the temperature down to the frosting point. But suppose there is no surface indication of this character. That fact does not prove that heat is being supplied to the liquid fuel on a basis to produce gas out of the same. It might be true, under such conditions, that the liquid fuel is not vaporized until it contacts with the highly heated surfaces within the combustion chamber with a small interval available to complete an operation that requires time.

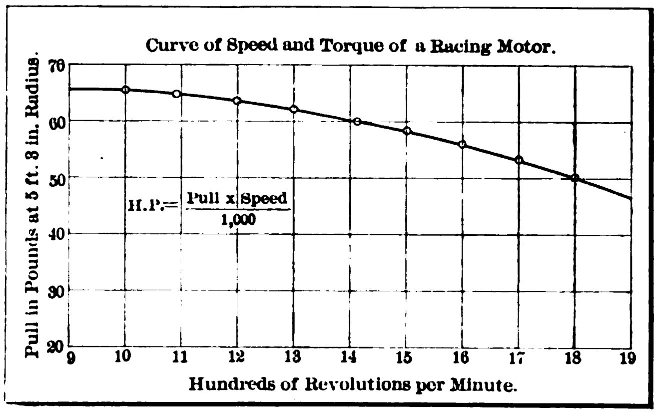


Fig. 8—Curve of torque and speed performance of a racing motor

Every autoist has a fair insight into the history and methods of the average charcoal burner, and it is quite well understood that he burns the wood in the absence of sufficient atmospheric air to produce a flame, and the product is in the form of charcoal. To tell autoists, however, that gasoline, if burned in the absence of sufficient air to produce complete combustion, also produces coke is to reach beyond their normal way of thinking. Fig. 9 is offered to serve as an illustration of the fact that liquids high in carbon will form coke under certain conditions, just as coke is formed out of wood. (A) Fig. 9 is a section of a coking oven on a small scale, the coke being in the hermetically sealed chamber at the top, the fire being made in the middle chamber, and the ashes from the burnt wood of the fire fall through the grate to the pit underneath. The oven at the top is primarily charged with wood, thereafter sealed and when heat is applied for a sufficiently long time the volatile matter is distilled out of the wood, leaving coke as a residuum. The reason coke forms lies in the fact that the chamber is hermetically sealed, thus excluding oxygen, and without oxygen the coke (carbon) cannot burn. (B) Fig. 9 shows the cylinder of a motor in section, with deposits of carbon adhering to the combustion-chamber surfaces and to the head of the piston. This combustion chamber in the cylinder of the motor is in every sense of the word a precise equivalent of the hermetically sealed chamber in the coking oven. When gasoline enters, if there is not enough atmospheric air with it to supply the requisite quantity of oxygen to burn the inflammable constituents of the gasoline, the portion that is deprived of its oxygen mate will remain in its original form. The inflammable constituents of the fuel are composed of carbon and hydrogen. The hydrogen is much more energetic in its search for any oxygen mate and burns first. The laggard carbon, in the absence of the right amount of oxygen, is therefore left in the lurch, and a part of it remains unattached, thus forming coke somewhat intermingled with lubricating oil, and the pasty mass spreads out over the adjacent walls, where it will remain until it is removed by mechanical means. Since there is about 83 per cent. carbon in the gasoline, it is not difficult to understand why carbon trouble becomes acute in automobile motors within a very short time if the conditions of carburetion are faulty.

In the Reichenbach Laboratory at 2420 Michigan Boulevard, Chicago, Ill., a series of tests were conducted for the purpose of ascertaining something of the facts in relation to the phenomena of carbureters. Fig. 10 presents one of the experimental devices that was rigged up to prove that gasoline would not vaporize when sprayed out of a nozzle, excepting when the conditions were such as to bring about the full heat exchange required to satisfy the latent heat of evaporation of the liquid, and the specific heat of the inrushing air. In this illustration C1 is the carbureter bowl, B1 is a base for the glass dome, P1 is the gasoline pipe leading through an orifice at the center of the base to the nozzle N1, which is scarcely discernible through the last dome, but is indicated by the dotted lines and an arrowhead. Suction is induced by the pipe P2, so that a depression is created in the glass dome, and, the latter being transparent, the nozzle action may be seen. With ordinary nozzles, and the suction that obtains under average conditions in automobile work, a stream of gasoline shoots up and splashes against the top of the dome. The more volatile portions fray out and form a mist around the solid stream, but the central core remains in continuous liquid form, which is proven by the force exerted as it splashes against the top of the glass dome and splatters down. It was found that by introducing a proper form of Venturi tube with tangential air passageways in juxtaposition to the nozzle a vortex was formed, and the solid stream as previously noticed no longer obtained. Instead of the gasoline streaming out of the nozzle, it formed in a spiral, attenuated sheet, with a certain separator action, so that the more volatile portions of the gasoline are free to rise and the resisting globules are thrown against the retaining walls with considerable force, where they are flattened out or shattered, thus rendering them more amenable to the further vaporizing process, and hastening the desirable action.

As a direct result of the series of experiments referred to, the vortex idea was incorporated into a carbureter, as shown in Fig. 11 in plan elevation and section.

Plan Elevation and Section of Model L Vortex Carbureter

In service, this carbureter performs as follows: Gasoline enters at E1, is controlled by the needle valve V1, which is pressed home by a spring S1, and when the gasoline falls below the level of the nozzle N1 the concentric float F1 drops down also until it rests on a lever arm L1, which has an upward projecting extremity E2 that presses against the action of the spring S1. These are all details that are not very different from carbureter practice in general, and the real matters to be enlarged upon are involved in the use of a detachable Venturi tube V2 with tangential air openings A1 and A2 located in the Venturi tube at a point somewhat below the top of the nozzle N1. A needle valve N2 is provided by means of which the gasoline flow from the float bowl to the nozzle may be pinched off or regulated. A catch basin B1 is located below the Venturi tube, concentric with the needle valve, with a means for vertical adjustment for the purpose of influencing the depression in the Venturi tube, and for the further purpose of catching a supply of gasoline which will pour into it when the motor is being started, thus facilitating the starting operation. Above the needle valve and the Venturi tube the mixture in passing contacts with a long thin water jacket wall J1, the water being in the jacket W1 and W2, entering at the orifice E3. Above the long water-jacketed wall there is a damper D1, by means of which the flow of mixture is more or less interrupted on its way to the motor through the manifold. Extra air is admitted through the snail-like passageway E4, and, referring to the plan, it will be observed that a rectangular gate G1 is placed over the orifice of the snail-like passageway E4, serving in the capacity of a clapper. The liquid gasoline as it resides in the float-bowl B2 is maintained at a substantially constant temperature, and heat is prevented from transferring from the surroundings to the liquid by means of insulation placed for the purpose, the idea being to maintain the liquid gasoline at a constant viscosity, thus regulating the flow of the same through the nozzle so that it will be constant for a given depression. It was found experimentally that the flow of gasoline through the nozzle into the depression chamber as formed by the Venturi tube was broken up into mist, due to the tangential action of the air sweeping through the passageways A1 and A2, and it was further ascertained that the less volatile particles were thrown up against the thin tube J1, to which they tenaciously adhered until, by virtue of the heat transfer from the water jacket, they were dissolved into a gas.

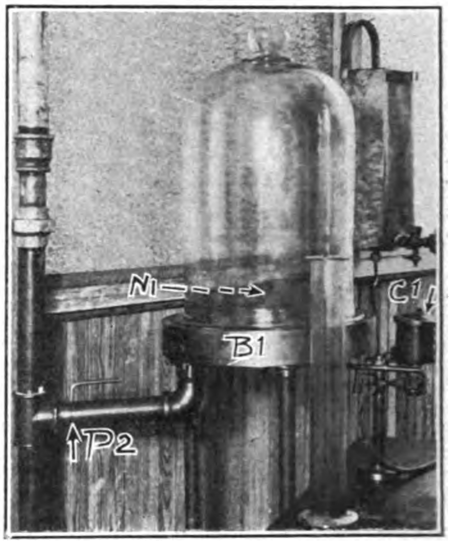


Fig. 10—Experimental equipment employed for the purpose of proving that gasoline does not vaporize at the nozzle of a carbureter

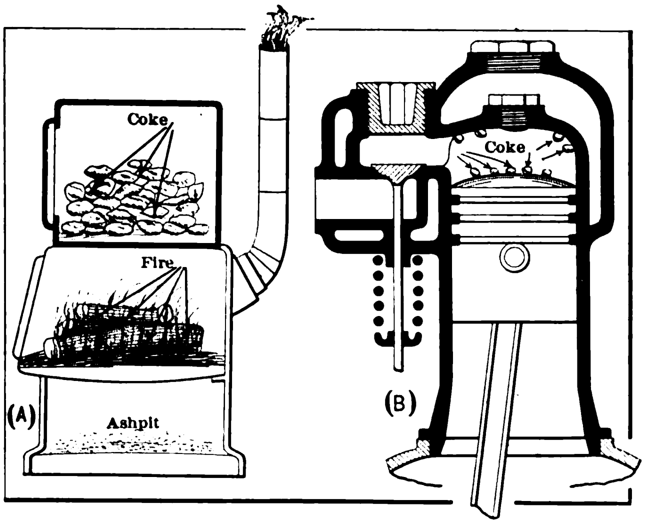


Fig. 9—(A) Section of a coking oven showing how coke is made; (B) Section of a motor cylinder showing how coke is made out of gasoline

Entrained globules of liquid gasoline that might get by the passageway formed by the tube J1 are taken up in the vortex generated by the auxiliary air which sweeps up by the clapper G1 through the snail-like passageway E4 into the space between the top of the tube J1 and the snubbing damper D1, and thrown out of the direct current of mixture against the walls W3, adhering thereto until these globules are dissipated in the process of forming gas.

It will thus be seen that the initial mixture, although it may be rich in gasoline, is nevertheless rendered dry, due to the swirling action of the air as it passes through the tangential passageways surrounding the gasoline nozzle, leaving the non-volatile globules adhering to the hot walls of the tube J1, and the rich mixture passes on engaging with the auxiliary air in

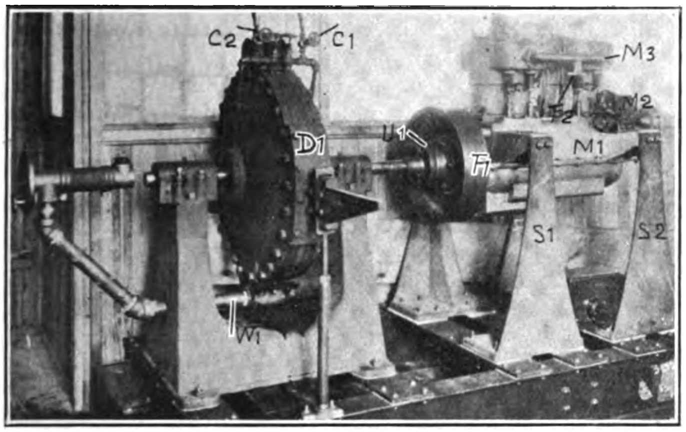


Fig. 11—Hydro-dynamometer designed for testing purposes in the laboratory used for proving the qualities of carbureters

the vortex chamber above. Owing to the lack of volatility of much of the liquid that now finds a resting place in automobile gasoline, it is to be expected that some of the liquid particles will work up into the vortex chamber before they are completely dissolved, but they will be there swept with considerable force against the retaining walls, where they will be shattered by mechanical battering, and will drop down onto the hot platform below, there to remain until the gas formed out of them will tell the tale of their complete annihilation.

The one remaining consideration of unusual purport lies in the means of adjusting the clapper G1 over the orifice of the snail-like passageway E4. This is brought out clearly in the plan showing a contoured finger F2 in rigid relation with the shaft to which the clapper G1 is also rigidly attached, so that when pressure is applied to the finger F2 the clapper G1 is forced open. Force is applied to the finger F2 by means of the bell crank B3, which in turn is actuated by a spring S2 pressing against one arm of the bell crank B3 at one end, and an abutment A3 with an adjusting screw A4, having a knurled head, which if turned in one direction puts tension upon the spring, and vice versa. The object in having the finger F2 suitably profiled along its face is to facilitate the action involved in opening the clapper G1. When the carbureter is running, furnishing a rich mixture, as when the motor is being started, the extremity of the bell crank B3 presses against the point P1 of the finger F2 and the clapper G1 remains substantially closed. As a further means of adjustment the slot S3 permits of moving the base piece B5 in or out with a set-screw S4 available for locking. The effect that this in-and-out movement of the base piece induces is to alter the line of pressure of the face of the bell crank B3 where it engages the face of the finger F2 and in this way the opening and closing of the clapper G1 is made early or late as the exigencies of service would seem to demand. As the clapper G1 opens, the line of contact between the finger F2 and the bell crank G3 shifts in the direction of the extremity of the finger F2, and is shown at P2 in the plan. The adjustment is extremely delicate, and is rendered permanent by the means afforded, so that having set the carbureter in the position of rich mixture for starting, the various other mixtures are obtained automatically over the complete range of performance of the motor, up to the limit as shown by the curve of motor performance presented elsewhere in this article.

In order to be able to test this type of carbureter under conditions of actual service, it was applied to various automobiles and as the result of these practical trials an insight was gained into the mechanical shortcomings of the original design, but simultaneously a series of laboratory experiments were conducted, and it was finally decided to install a dynamometer as shown in Fig. 11 for testing purposes in which M1 is the motor, M2 the magneto, S1 and S2 the stands, F1 the flywheel, U1 the universal joint connection and D1 the dynamometer, with its water entrance W1 at the bottom, and means of control C1 and C2 as shown. The carbureter manifold M3 is of the ordinary type and the carbureter to be tested is bolted to the flange F2. This form of dynamometer affords the means of operating carbureters under a wide variety of conditions, giving the range of performance degrees of flexibility, and indicating with great clearness the dead points as they obtain in carbureters in general.

As the direct result of a long series of investigations, utilizing the most advanced facilities, and persisting, the Reichenbach Laboratories Company arrived at the conclusion that the Vortex carbureter is in conformity with the best requirement, satisfying the principles as hereinbefore enumerated to the exclusion of the troubles so clearly brought out.

Effect of Kinetic Forces on Motors

In view of the presence of reciprocating and rotating parts in a motor, the movements of the parts will set up in the members a system of forces on a kinetic basis. The members that are most responsible for these forces are: (a) the piston, (b) wrist-pin, (c) part of the weight of the connecting rod. Variations in the frictional effort as the piston travels in the bore of the cylinder will also have some influence toward generating secondary moments which may be assigned to the reciprocating class owing to the fact that these variations come on account of the travel of the same. But if the variations of friction have to be considered, it follows that variations of gas pressure and of back pressure will also have to be taken account of.

The manifestations of these hidden forces comes in the form of a modification of the angular velocity of the crankshaft and the flywheel. There will also be a system of unbalanced forces acting upon the frame of the motor. The rotating members as crankshaft, flywheel, camshaft, half-time gears, etc., will induce similar rocking effects, depending upon design, weight, speed and condition of lubrication, but they will not be so marked as those effects which are induced by unbalanced reciprocating masses.

The kinetic forces, under the circumstances, may be divided into two classes: (a) reciprocating and (b) rotative. In a sense, the connecting-rod forces belong to both classes; these members not only reciprocate, but they rotate as well. In the solution of

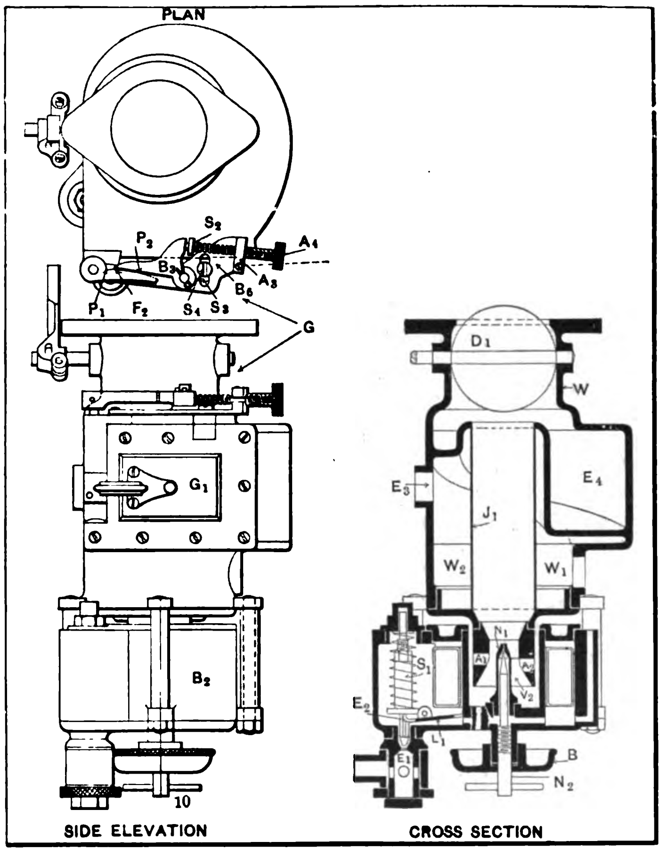


Fig. 12—Plan, elevation and section of the Vortex carbureter showing the Venturi tube, tangential ports and snail-like chamber

the problem invoking the extent of the rocking of the frame and other vibrations set up, it is necessary to attack the matter from four points of view as suggested by Professor Dunkerly, i. e., (a) solve for the resultant force to give the rod its combined motion, (b) plot the inertia of the connecting rod on the cranking-effort diagram, (c) solve for the displacing force on the frame, and (d) determine the bending force on the connecting-rod due to its own inertia.

Should it be desired it is possible to solve for the equivalent inertia forces at the wristpin, it is a choice which adds but little complication, and certain advantages are present in the plan. At all events, in the final sum up, it is necessary to fix the turning moment, rocking effect on the frame and the stresses in the members, in order to proportion their sizes with safety, or forecast the amount of rocking so that it will be possible to decide as to the desirability of changing the form if there is too much to tolerate.

In designs as they obtain, it is barely possible that the greatest mistake comes from assuming that a good static balance of the members is of the first importance. It is quite possible to have a condition of good static balance and an augmented display of kinetic trouble in consequence. In such cases it is better to depart from a condition of perfection static balance enough to correct the kinetic conditions to obtain the best average result.

If a tire is below size it will not inflate to roundness under any pressure that can be applied.

Composition of Steel and Permanent Magnets

To make permanent magnets that will do just as good work as can be accomplished when the magnets of a generator are wire wound, it is necessary to employ a grade of steel that will deliver a high flux density and hold the property termed "retentivity" to a marked degree. It is unfortunately true that most grades of steel, when they are subjected to the hardening process, afford but a low flux density and are only partially retentive. Plain tool steel, while it will serve for this class of work, is not nearly so efficacious as some of the grades of alloy steel, and of the alloying elements available tungsten seems to be best. The very latest practice in Germany involves the use of tungsten, but the steel is made in the electrical furnace and the carbon is well regulated. In addition to this the material is rendered of high specific gravity, which is one of the claims for electric furnace steel. The composition of this particular brand of steel is as follows:

Chemical Composition:

Tungsten	6.00 per cent	Silicon	.20
Carbon	80 points	Sulphur	.03
Manganese	80 points	Phosphorus	.015

Just why the electric furnace is the most appropriate for the turning out of magnet steel is a matter that will have to be disposed of after some study, but it is important to note that there is quite a difference in the structural appearance of steel made in this way as compared with products of the crucible pot, or from the open hearth.

New Carbureter Principle

ILLUSTRATING A NEW IDEA IN CARBURETION INVOLVING THE USE OF A DIFFERENTIAL COMPENSATING VALVE AUTOMATIC IN ITS ACTION WITHOUT INTERFERING WITH HAND-CONTROL

RECOGNIZING the utter impossibility of anticipating the needs of a motor from the mixture point of view, many designers have struggled with the automatic carbureter problem. It would be a simple undertaking to supply mixture to a motor were it to run at a constant speed and under a fixed load. This cannot be true in automobile work, for the reason that the power required depends upon the speed at which the car is driven, and upon the road conditions. Even if the road were to be level and hard, thus eliminating troubles from this source, the carbureter problem would still be complicated, due to the fact that wind resistance intervenes; nor does the power required increase in direct proportion.

Strictly automatic types of carbureters have been designed, involving many mechanisms, and while they offered advantages more or less desirable, they nevertheless fell short of the exacting needs, so that the substitution of automatic means of control for hand-control had the force of swapping one set of troubles for another.

That the average motorist takes more kindly to hand-control carburetion than he does to the automatic system is believed to be true. This preference is due to the fact that while hand-control is prone to introduce dead spots in the range of carburetion, and shows the effect of lack of dexterity on the part of the operator, it eliminates the impossible condition which creeps in under automatic conditions when the range of performance of the automatic device falls short of the indicated requirement.

During the past two or three years autoists have complained of carbon trouble on an increasing basis, and they jumped to the conclusion that excess of carbon in the cylinders was due to some fault in the lubricating system. This idea led to the investigation of the lubricating oil problem, until to-day it is the practice of the average autoist to purchase the best lubricating oil that can be had, and to use it so sparingly as to risk damaging the motor as the direct result of restricted lubrication. It is now a fairly well-established fact that the amount of carbon that is likely to sift out of the lubricating oil and form a crust over the combustion chamber surfaces is too infinitesimal to merit serious consideration.

Before departing from this question of the troubles due to lubrication, it will be proper to state that the best possible performance will come if lubrication is profuse and with the understanding that the lubricating oil supplied will be suitable for the purpose. The fact that the lubricating oil is not at the bottom of carbon trouble does not afford a license for using the kind of lubricant that will crack under the conditions of operation involved. It will be understood, of course, that when lubricating oil does crack carbon will be precipitated. If it may be stated with certainty that the carbon troubles which motors seem to fall heir to are for the most part, if not entirely, due to poor mixture, it goes without saying that a proper remedy lies in the use of suitable fuel and a carbureter that will afford a mixture that will burn completely. The product of combustion, if carbon is to be kept from forming, must be nitrogen, carbonic acid and water. The nitrogen, being an inner gas, enters with the atmospheric air, and comes out unchanged. This part of the mixture, then, is a mere diluting agent, and since it leaves just as it enters it does no harm whatever, provided it is present in just the quantity required. In further relation to this content, it is pointed out that the gas engineers who claim that nitrogen is detrimental labor under the false impression that the mixture would be much more powerful were it not diluted with nitrogen. This contention is based upon fact, but it does not necessarily follow that the performance of a non-nitrogenous mixture would be satisfactory in a motor. The best performance comes when the rate of flame travel in the mixture is slow enough to permit the piston to sweep ahead of the wave of pressure at a certain rate. Referring to Fig. 1, which is a diagram of compression, ignition and expansion, presenting the idealized Otto

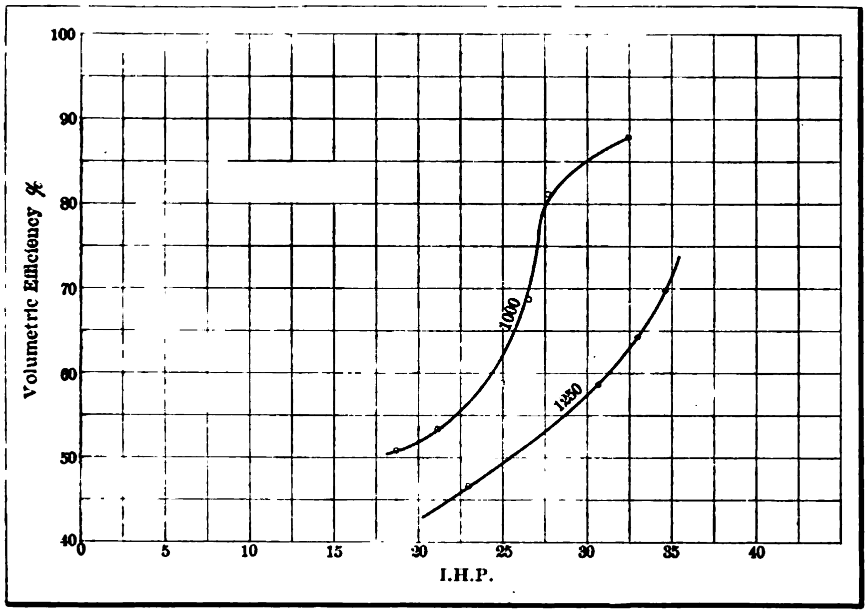


Fig. 3—Chart contrived for showing the changes in volumetric efficiency under changing loads with two different speeds

cycle, it will be observed that the ignition line 2 3 is straight. When the ignition takes place with sufficient speed to afford a straight line, then the rate of flame travel of the fuel after ignition is high enough to serve every proper purpose. That there should be no burning of the fuel during the expansion stroke is shown in this diagram, and is accepted as an established fact in practice. What is wanted, then, is the greatest possible filling of the cylinder during the suction stroke, which will be true if the inlet valves are large, the piston rings tight, and the cooling conditions are such as to maintain a constant and sufficiently low working temperature. With these conditions established, compression will take place on the compression stroke 1 2, ignition will follow, preserving the straight line 2 3, and expansion will take place without burning 3 4, all in Fig. 1. The exponent n_1 is given as 1.31 in the expansion curve, which represents a sufficiently high value of this exponent to indicate somewhat better working conditions than can be expected when the carburetion is poor. Confining the discussion to the merits of nitrogen, for the moment, it is pointed out that it seems to be in about the right presence for the proper dilution of well-contrived mixtures, and it is also worthy of note that it is not the nitrogen that produces trouble when the mixture is poor.

Fig. 2 shows six indicator cards, which are characteristic of the performance under six sets of conditions, as follows:

(*a*) When the ignition is 25 degrees early;
(*b*) with the ignition 20 degrees early;
(*c*) with the ignition 16 degrees early,
(*d*) with the ignition 12 degrees early;
(*e*) with the ignition 5 degrees early.
(*f*) with the ignition 10 degrees late.

The card *d*, Fig. 2, is a good practical representation of what might be expected under normal conditions with good carburetion and with the ignition taking place while the piston is on the top dwell point, so that there is no burning during the expansion stroke. It will be seen, from a study of these cards, that the ignition problem must be properly cared for if the questions of carburetion are to be discussed intelligently, and with the understanding that the ignition will be on a basis of merit; if it is also assumed that the question of nitrogen in the mixture is one that can be set aside, it will then be proper to discuss the further problems which arise in this connection.

Properties of Gasoline and Other Hydrocarbons

Remembering that nitrogen is of the air, and in sufficient presence to serve for dilution purposes, the next step will be to consider true gasoline, which product has a specific gravity ranging between 0.680 and 0.710, with a boiling point as low as 140 degrees, and maximum at 158 degrees Fahrenheit, the chief constituent being hexane, the formula for which is C_6H_{14}. For perfect combustion each kilogram of gasoline requires 11.8 cubic meters of air, so that the proportion of liquid and air under conditions of perfect combustion is in the ratio of 12.4 to 100,000. It will be the same result, if 2.15 per cent of the total volume of mixture is represented by the vapor of gasoline as above constituted.

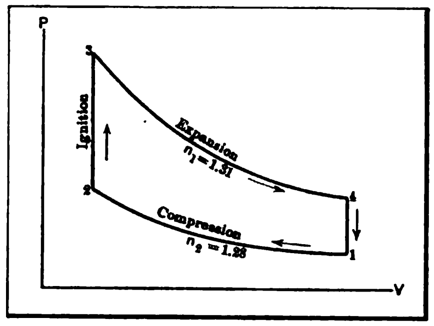


Fig. 1—Idealized Otto cycle, showing compression, ignition and expansion lines

There are two considerations that stand in the way of the realization of the best possible results, and the first of which lies in the fact that "automobile gasoline," which is the product available at the present time, differs from the true mixture as above outlined, and the second difficulty takes into account the variations that creep in when speed and load change. Were the speed to remain constant, and the load to change, that consideration would resent one phase of the problem, and should the load change and the speed remain constant, a second phase of the situation would be recognized, but unfortunately, in practice, both the speed and the load change simultaneously, which, together with the fact that the gasoline to be had is not uniform, adds very materially to the carbureter problem. Automobile gasoline, instead of being a single distillate, as hexane, is substantially composed as follows: Hexane, with a specific gravity of 0.676; pentane, with

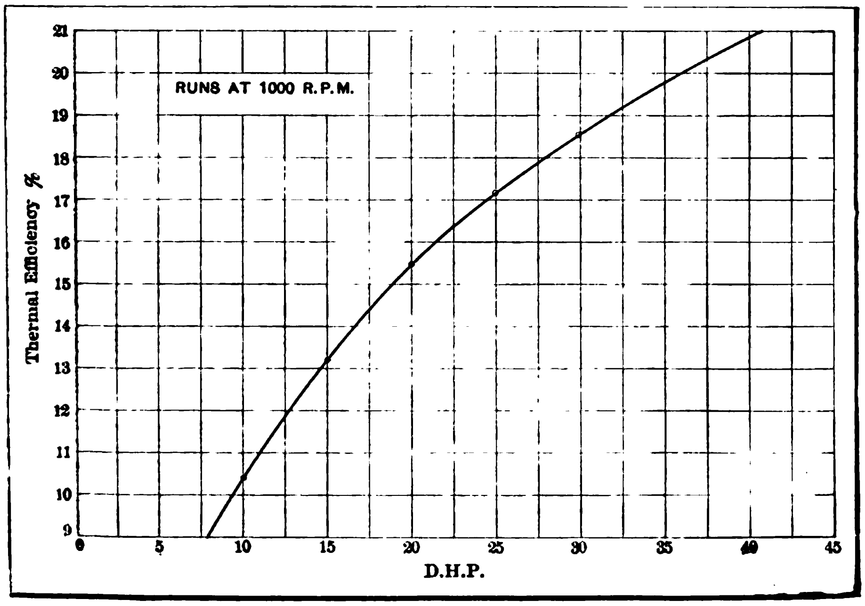


Fig. 4—Chart designed to indicate thermal efficiency under different loads at constant speed

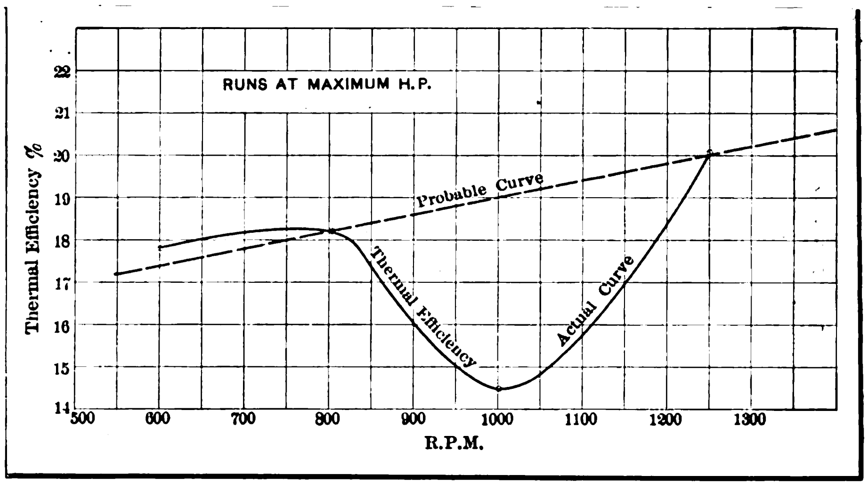


Fig. 5—Plotted to depict the variations in thermal efficiency at a maximum load, speed changing

a specific gravity of 0.640, and heptane, with a specific gravity of 0.718. The proportions by weight, considering a good grade of automobile gasoline, which is far from a good grade of gasoline proper, may be as follows: Pentane 2 per cent, hexane 80 per cent, and heptane 18 per cent; total, 100 per cent.

It is highly improbable that the available supply of automobile gasoline of the above composition is equal to the present requirement, and it is more than likely that octane, nonane, and even decane, will be found in much of the liquid fuel that is now sold over the counter. In proportion as the last three named distillates are introduced, hexane is left out of the mixture, and the volatility of the product as a whole falls off rapidly as hexane is eliminated.

The proportion of carbon in the typical automobile gasoline above named is 83.8 per cent, 16.2 per cent is hydrogen, and 3.5 pounds of air must be added to make the theoretically right mixture.

There is a great difference between figuring the theoretically right amount of air for complete combustion, and trying to find out how much air must be used under the conditions that obtain in practice. That there must be an excess of air is a recognized fact, and just how much excess there will be, when the conditions are most satisfactory, is almost beyond an estimate. All the variables mentioned have bearing upon this phase of the problem. Moreover, the excess of air must increase with increasing compression; in other words, a high compression motor requires a greater excess of air than that which will satisfy a motor with a lower compression, but, unfortunately, the actual compression in any motor varies with the speed of the same, and is affected by other considerations, as scavenging, which in turn is a variable depending upon some thermal considerations, back pressure offered by the muffler, the extent to which the carbureter serves as an obstruction in the intake, etc.

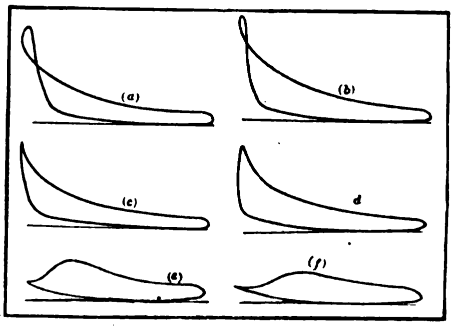


Fig. 2—Six indicator diagrams showing how the card varies with different ignition points

Carbureters Frequently Obstruct the Intake

It is one of the misfortunes in automobile motor work that the amount of gas which is permitted to enter the cylinders is below the best requirement, and, as Fig. 3 shows, the volumetric efficiency resulting is not only low but variable as well. In this chart, the abscissæ read horsepower and the ordinates are given values in per cent. of the volumetric efficiency. By volumetric efficiency is meant the extent to which the cylinder of a motor is filled with gas during the suction stroke to a point where the suction line crosses the line of the atmospheric pressure. The average layman may have difficulty in appreciating just what this means, but there is one fundamental point that should appeal to him, and perhaps by using a parallel the idea may be more forcefully introduced. For instance, the amount of heat that will be given off by the radiator system in the reader's own house will never exceed that which is represented by the heat units in the coal that is shoveled into the furnace. In the same way, the amount of power that can be taken from an automobile motor can never be greater than the amount of heat (minus losses) that is represented in the gas which is introduced by suction methods into the combustion chamber of the motor. In measuring the volumetric efficiency of a motor, it is a simple and comprehensive process by which the fuel is weighed, and if the amount of fuel utilized is below a fitting requirement, the thermal efficiency as measured in per cent will also be low. In determining the thermal efficiency of a motor, a manograph card is taken, and tracing the suction pressure, which is below the atmospheric line, will bring to notice the fact that this suction line crosses the atmospheric line at some point in the stroke. If the volumetric efficiency is said to be 70 per cent. then at a point 30 per cent. down on the suction stroke the line of suction pressure will cross the atmospheric line. The process involved, if a manograph is available, is very simple and reliable. Referring again to Fig. 3, there are two curves plotted, one of which is at 1000 revolutions per minute and the other at 1250. This chart very clearly indicates that the compression must have been lower at 1250 revolutions per minute than it was at 1000. Delivering 30 horsepower, the volumetric efficiency was 57½ per cent at 1250 revolutions per

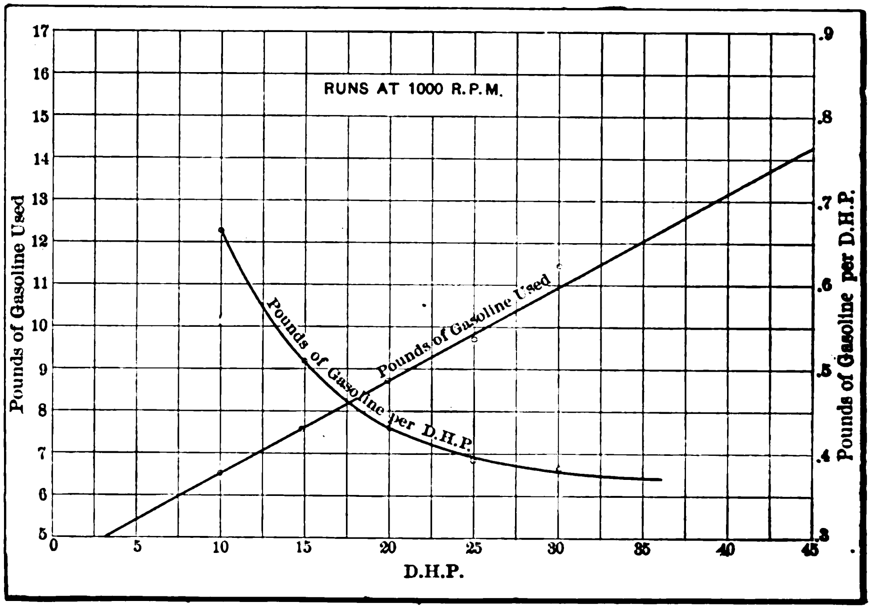


Fig. 6—Charted consumption of gasoline at a constant speed with varying load

minute. Delivering 30 horsepower at 1000 revolutions per minute, however, the volumetric efficiency was increased to 85 per cent. It stands to reason that the motor was doing more efficient work at 1000 revolutions per minute delivering 30 horsepower than it was when it delivered the same horsepower at 1250 revolutions per minute. True, the power was the same in both cases, but the amount of gasoline required was considerably greater at the higher speed.

When the volumetric efficiency of a motor is lowered by increasing speed, even assuming the power delivered is the same as at some lower speed, the thermal efficiency falls off with the decreasing volumetric efficiency. Just how the thermal efficiency varies with horsepower at a constant speed is shown in Fig. 4, in which the delivered horsepower is represented by ordinates, and the thermal efficiency in per cent. is shown on the scale of abscissa. This particular motor showed a thermal efficiency of 18.6 per cent at 30 horsepower and 1000 revolutions per minute.

By thermal efficiency is meant the percentage of the total heat units available in the fuel that are turned into useful work. When the thermal efficiency is 100 per cent all the heat units in the fuel will be turned into useful work. The best thermal efficiency available in steam practice ranges between 8 and 16 per cent, whereas the best thermal efficiency in internal combustion motors ranges between 12 and perhaps 22 per cent. There are a few isolated instances of a better thermal performance of certain types of internal combustion motors, but it is not believed that automobile types of internal combustion motors reach beyond 22 thermal efficiency. This is a very high value, however, and it is one that is never reached in actual practice, owing to the imperfection of carbureters and wide variations in the actual load as well as speed variations of the motor. Just to show how speed changes affect the thermal efficiency, under conditions of maximum load of a motor, Fig. 5 is given in which speed is represented by ordinates, and the thermal efficiency is given in per cent, on the scale of abscissa. In this case, the dotted line, representing probable curve, differs from the plotted curve, due to influences which were beyond the ability of the testers to observe. If the dotted line of probable performance is taken as true, the thermal efficiency was 17.3 per cent at 600 revolutions per minute, and increased to a point slightly above 20 per cent at 1250 revolutions per minute. This curve was taken from a Franklin air-cooled motor, during a series of tests which were made under the direction of Professor Rola C. Carpenter, Sibley College, Cornell University. For the purpose here, it serves every end, and while the actual thermal values might move up and down the scale more or less, depending upon the motor used, the fact remains that the thermal efficiency is not constant with variable speed and fixed load. nor can it be constant with variable speed and variable load.

There is one other point that must not be lost sight of in considering these curves. The tests were made in a laboratory with instruments of precision of every kind available, and they were conducted under the direction of Professor Carpenter, who also had at his disposal a large number of trained assistants, so that the tests were all run after the motor was carefully tuned up, and the records taken were those showing the best obtainable results, which means that the carbureter was hand-adjusted, and manipulated until it showed its maximum capability. On the road, under normal working conditions, there is no method available by which the driver of a car can tell when the carbureter is properly adjusted, nor would he be able to anticipate the varying conditions of service, so that it would be impossible for him to realize anything like the results as shown in these curves.

As a further illustration of the fact that the thermal efficiency, when observed, reflects with exactness the consumption of gasoline per horsepower, or per car mile, as the case may be, reference may be had to Fig. 6, which is also one of the curves plotted under the direction of Professor Carpenter at Sibley College. In this case, the delivered horsepower is represented

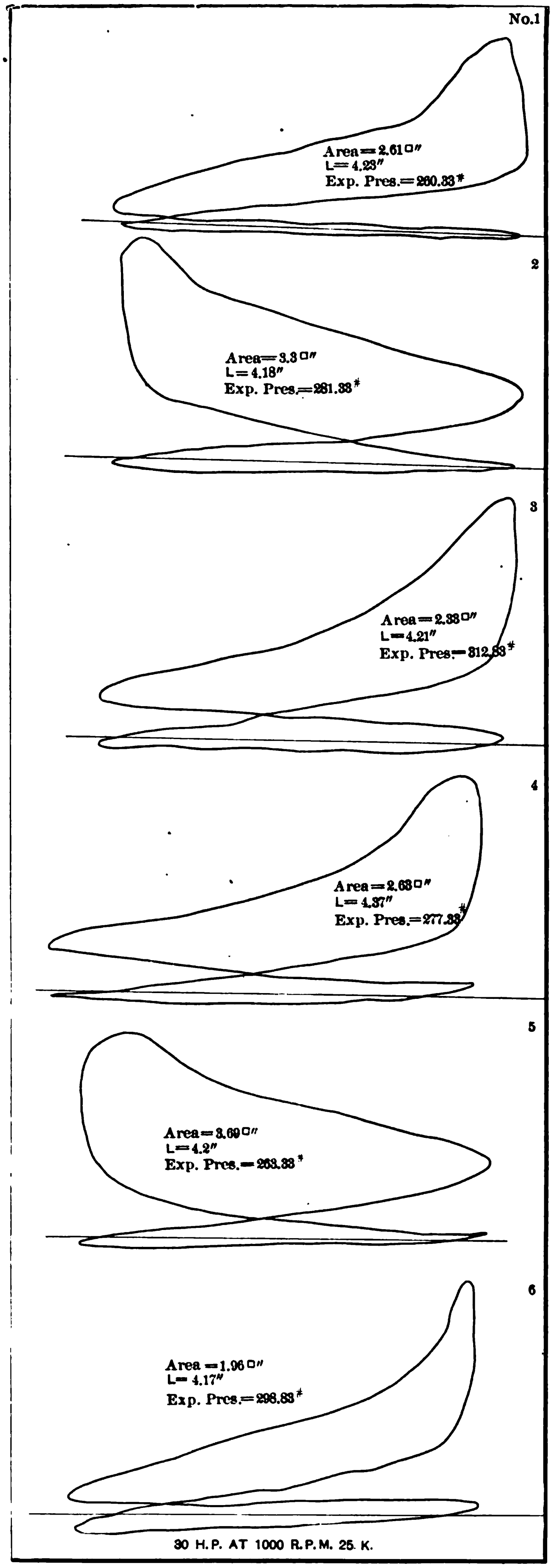


Fig. 7—Six indicator cards taken from a 6-cylinder motor showing changes in expansion due partly to poor carburetion

by ordinates, and the gasoline consumption in pounds is stated at abscissa. The motor was run at 1000 revolutions per minute, and two curves were plotted. The curve representing pounds of gasoline per delivered horsepower (D.H.P.) shows that the most economical consumption was when the motor was delivering about 35 horsepower, and the most extravagant consumption was when the motor was delivering 10 horsepower.

Lack of Uniformity Partly Due to Carburetion

It will be understood that a motor with a plurality of cylinders will not deliver a fixed amount of power, the same in each, unless the means for carburetion are such as to supply to each of the respective cylinders an exact measure of a given quality of mixture. That carbureters do fail in this important particular is readily shown by referring to Fig. 7, which represents indicator cards taken from the six cylinders of a motor. The carbureter is not entirely at fault for the variations here noted, but that carburetion represents the greatest measure of the total trouble there is no gainsaying. At all events, in this case, the expansion pressure was found to be as follows:

EXPANSION PRESSURE IN THE RESPECTIVE CYLINDERS

Expansion Pressure in pounds per sq. inch	Cylinder Number
260.33	1
281.33	2
312.83	3
277.33	4
263.33	5
298.83	6

With such wide variations in the expansion pressure, it is impossible to expect that each of the cylinders will deliver its quota of power on a basis of equality. Under such conditions, it is impossible to say that a six-cylinder motor, for illustration, will deliver as much power as six single cylinder motors of the same size, operating under substantially the same conditions. If this is not true, then it stands to reason that there is a disadvantage attached to having a plurality of cylinders, so that granting the desirability of employing four or six cylinders in a motor, it is equal to saying that the conditions of carburetion must be maintained on a basis that will assure to each of the cylinders its fair measure of the total mixture. This phase of the problem, while it has been recognized as one to be coped with by the makers who are equipped to observe the facts, is nevertheless far from sufficiently treated for the reason that it has been found difficult to so design carbureters that they would respond to the demand.

The Rayfield Principle Offers Serious Possibilities

In the Rayfield carbureter, as manufactured by Findeisen & Kropf, Chicago, Ill., the principle involved takes into account two important considerations, one of which is that the amount of fuel required must be varied, depending upon the speed and power of the motor, and the remaining feature lies in the use of an automatic air valve that will operate for the purpose of supplying air when hand-control fails. The exterior appearance of this carbureter is shown in Fig. 8. It is of the float-feed type, compact in form, and of pleasing appearance, mechanically designed on a stable basis, so that adjustments when once made will remain so.

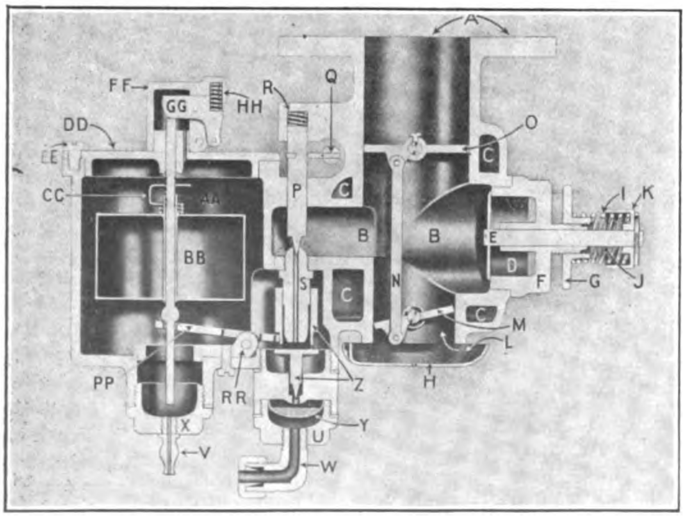


Fig. 9—Cross section of the Rayfield Carbureter bringing out the advantages of a differential compensating valve in conjunction with hand-control

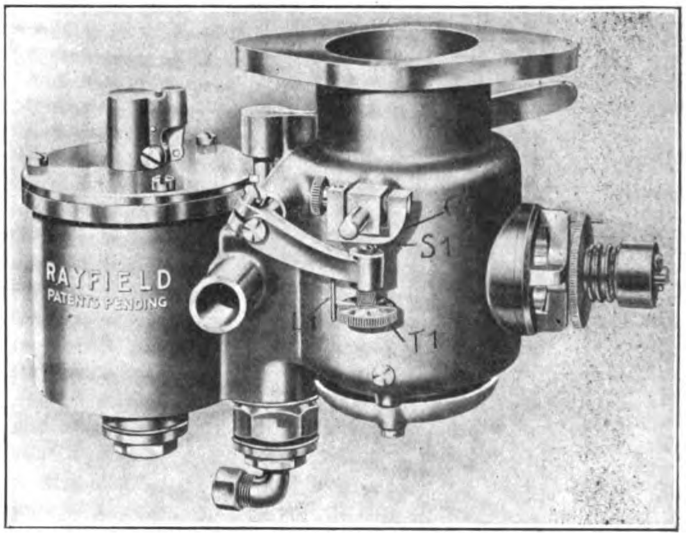


Fig. 8—Exterior view of the Rayfield Carbureter showing the method of adjusting to obtain the best result

To understand the working of this carbureter, it will be necessary to examine the section Fig. 9, while following the description as follows:

Gasoline enters through the fitting W, and its mate U is filtered by the screen Y, and is stopped off by the needle Z, which has a German silver tip, engaging a suitably contrived seat. To stop the flow of gasoline, the float BB in the chamber AA, if properly set by the adjusting spring CC, will raise high enough to free the lever arm PP, thus permitting the part Z, to which the tip of the needle is fastened, to fall by its own weight so that the needle will seat. The nozzle S is concentric with the dashpot-like member Z, and the gasoline is stopped off by the auxiliary needle P, which is pressed to its seat by a spring R, but is lifted off its seat by a bell crank Q, which is controlled through a cam motion, operating when the damper O travels a certain distance. Simultaneously with the damper O the damper M travels, being actuated by the link N, and as these dampers open air is admitted through the space L above the rim of the catch-basin H, filling the cavity B. In starting the motor, a small amount of air passes in through a fixed opening, which is shown by a dotted line surrounding the nozzle S. This air sucks up enough gasoline to make a rich mixture, and this mixture passes into the chamber B, and through a slit in the damper O. The operator, desiring to speed up the motor, alters the adjustment of the damper O, simultaneously lifting the auxiliary needle T and the damper M. The result is a supply of mechanically established mixture, which, under ordinary conditions will suffice for the purpose, and to this extent the carbureter is in accord with the best practice from the point of view of mechanically controlled carbureters of the auxiliary air type.

If, for any cause, the mixture becomes unbalanced, the differential compensating valve E, which is under the control of the spring I, holding the valve to its seat, being supported at one end by the cap K, with means for adjusting its tension by way of a threaded member G, the valve E will open and supply the requisite quantity of undiluted air to bring about a readjustment of the gasoline ration in the mixture, so that if the mechanical adjustment is such that the mixture is too rich, provided the speed of the motor is increasing, the valve will open and permit of the introduction of enough air to render the mixture sufficiently lean to do the most efficacious work.

But should the mixture be too lean, the speed of the motor will decrease, in which event the differential compensating valve will close automatically, and by doing so bring about a condition of enriching of the mixture, with the result that the speed of the motor will become stable, and the power will be that which should obtain when the mixture is exactly right in view of all the operating conditions.

The secret of success of this carbureter lies in the fact that the operator is permitted to exercise his ingenuity to the extent of his ability in nursing the carburetion in response to the indicated motor and road conditions, but should the conditions alter at a rate greater than the ability of the operator to cope with them, the differential compensating valve instantly supplies the missing quantity, either diluting the rich mixture, if the speed increases, or stopping off the air supply if the speed decreases.

The remaining details are purely constructive, and unimportant from the point of this story. It will be observed, however, that the adjustment CC represents a simple and stable means by which it is possible to raise and lower the float level, if the occasion arises. As a further mechanical refinement, the bell crank GG depresses the float BB by pressing on the end of the float stem if it is necessary to time the motor in starting. The bell crank GG, however, is prevented from working excepting at will by the spring HH, which is sunk in a cavity in the metal. The housing FF covers over the mechanism so that when the car is being washed, or during inclement weather, water is not permitted to seep through and contaminate the gasoline.

In the operation of the carbureter there is only one adjustment to make, and that is for low speed. This undertaking is much simplified through the use of a thumb nut T1, the screw end of which, S1, bears against the face of the cam C1 in Fig. 8.

A means for locking, L1, maintains the adjustment of the thumb nut after it is made, and it is this adjustment that fixes the flow of gasoline in accord with the low speed requirement. At all other speeds, the rate of flow of gasoline is maintained by movement of the auxiliary needle P, Fig. 9, and a skilled operator, if he cares to do so, may then take advantage of the presence of the differential compensating valve, adjusting it with a view to further refinement in the range of performance of the motor.

Don't

STILL ANOTHER INSTALLMENT OF SHORT-METER ADVICE TO THE TYRO—AND THE EXPERT—THE FOLLOWING OF WHICH MAY SAVE THE MOTORIST HEAPS OF TROUBLE, PERHAPS SOME MONEY, AND PROBABLY A LAWSUIT OR TWO

Don't think that it is possible to blow up tires sufficiently to compensate for the lack of size that should be used on your car. If the tires are not big enough for the work they are placed to do it is not possible to inflate them sufficiently to prevent excess flexure.

Don't get used to thinking that fabric as it is used in the making of tires is some supernatural material that will stand all sorts of abuse—it costs money and plenty of it to indulge in such a dream.

Don't forget that flexure is the bane of tires—anything that will eliminate flexure is worth its weight in gold.

Don't forget that a power pump is far more likely to afford the requisite pressure for purposes of inflating tires than when a small hand pump is employed.

Don't run on a flat tire just because it is something of a job to make a road-side repair—10 miles of flat running will foot up to the price of a tube and a casing; even a single block may be a sufficient distance to bruise the fabric beyond repair.

Don't wait for the ball bearings in the hubs of the road wheels to go to pieces before taking the hub-caps off and determining as to the prevailing condition. If the bearings are flushed out once a month and new grease is applied the cost of maintenance will be relatively very low.

Don't let the repairman tell you that he is going to burn off all the old finish and refinish from the ground up, and then let him get away with a retouching job instead—a little superintendence once in a while does no harm.

Don't let water accumulate in the fuel system. Drain out all the liquid, say, once a week, and start with a new gasoline supply.

Don't demand the last ounce of power from your motor; it will last longer if it is worked under average conditions.

Don't feed gasoline too fast; carbon accumulations will then be deferred, if, indeed, they ever appear.

Don't expect gasoline to feed through a pipe that is plugged up with solder—it is a form of trouble that is too common.

Don't fill the radiator to overflow. When the water heats up it swells and a little "expansion" room is desirable.

Don't scoop dirty waer from a pool to use in the radiator. Scale, when it forms, is extremely difficult to remove.

Don't tolerate leaky joints in the cooling system. There is nothing that is more unsightly. The water has to be replaced and the chances of trouble from incrustation are very materially increased when the water has to be renewed frequently.

Don't let the hose connections of the water piping become sloppy. Just as soon as they show that they have done all the good work that may be expected of them, replace them with new sections; the cost is but a trifle—this plan will save a bad half-hour on the road some dark night when it is raining.

Don't follow up a street car on a rainy day. Traction is not then as good as it ought to be, and if the car comes to a sudden stop your automobile is likely to "enjoy" a rear-end collision.

Don't tread the car tracks if it can be avoided; the rails are usually frayed out in places, and the knife-edges are likely to cut the tread on the tire casing.

Don't neglect the air valves of the tires. The "sneaking" leak that follows neglect of this character is at great cost. Tires that are not kept properly inflated soon give out.

Don't fail to examine the rear axle and note if the bob-stays are held firmly in the saddles provided for them. Sometimes the stays jump out of the saddles and unless they are promptly replaced the axles will sag due to lack of support.

Don't neglect to examine the front axle and wheels at frequent intervals. If the wheels are not in good alignment the chances of steering trouble will be very great. It is even a good idea to so set the front wheels that they will toe in slightly; at any rate they should not toe out.

Don't fail to take up the slack of the side-chains as often as may be required; in performing this operation be sure and maintain the alignment of the rear axle.

Don't try to run the side-chains too tight; they should be given about one-half a link length of slack.

Don't neglect to keep the side-chains well lubricated. Lubricant protects the joints from the abrasive influence of sand and other road-side accumulations.

Don't be careless when washing the car; water may find its way into the carbureter; the ball bearings in the road wheels may also be given a water bath—what they need is oil, not water.

Letters

ANSWERS TO INQUIRIES WHICH WILL THROW SOME LIGHT ON THE RELATIVE MERITS OF RIGHT- AND LEFT-HAND STEERING; POWER CONSUMPTION OF ELECTRIC VEHICLES; THE BEST METHOD OF NEGOTIATING "THANK-YE-MA'AMS," SWEATING OF CARBURETERS, ETC.

Both Cylinders Do Not Act Alike

Editor THE AUTOMOBILE:

[2,336]—I am very much interested in your valuable journal, and particularly like the two pages devoted to letters and queries from your readers. I have been driving a bus for two summers and never before noticed that the exhaust from cylinder No. 1 sounded louder than that of the rear (the engine being of the 2-cylinder opposed type). Will you kindly tell me what could cause such a thing?

Quogue, N. Y. JOSEPH P. PAYNE.

The probabilities are that the rear cylinder is more or less flooded with lubricating oil. If the lubrication is all right, then the compression in the rear cylinder is not the same as that in the front. When both cylinders are working equally well from the point of view of compression and lubrication the trouble you complain of will disappear.

Autoist Relates an Unfortunate Experience

Editor THE AUTOMOBILE:

[2 337]—A few days since I crushed a Hyatt bearing on my driving shaft in such a way as to completely lock the rear system. The question which puzzled me was how to be towed to the nearest garage. My axletrees are provided with feather keys, for the purpose of fixation of the wheels to the same; these I removed after taking off the rear wheels, when we had no difficulty in being towed the same as any ordinary wagon. Any one having similar experience will do well to bear this item in mind, providing their car is similarly constructed. We had some trouble with the left-hand nut running off, so removed it entirely and fitted several leather washers to the spindle, or axletree, fastening them on with an improvised linch pin made of a common nail inserted in cotter pin hole. Any port in a storm must be the motto with an automobilist.

Troy, N. Y. J. H. BISSELL.

Autoist Wants to Know About Several Things

Editor THE AUTOMOBILE:

[2,338]—Please answer the following questions in your "Letters Interesting, Answered and Discussed" column:

1. What is the proper way to line up the wheels on an automobile so as to be sure they are in perfect alignment? I saw this answered about a year ago in THE AUTOMOBILE.

2. I have a car which is equipped with a non-vibrating coil; why is it that it will not start on the spark?

3. Why do I always have to whirl the engine to get it started, excepting after it is warmed up good and I make only a short stop, then it often starts on the quarter turn?

4. Quite often as I change gears from intermediate to high, as I let the clutch in (however easy), there is a fairly strong click as if there was lost motion somewhere. This is a new machine and did not do this until lately.

5. A friend of mine has a Remy magneto on his car and with all the spark advance he can give it, on either magneto or battery, it affects the speed of the engine but very little. Will be glad to see the above questions answered in THE AUTOMOBILE.

Minerva, Ohio. C. STOCKMAN.

1. The front wheels should toe in, each an equal amount, say, one-half of 1 degree. When the front wheels do toe in, skidding is less likely to occur, and steering is much easier and more certain. The amount of this toeing should not be enough to bring on acute tire trouble, nor will it, unless both wheels toe in very perceptibly. If the wheels do not toe in at all, skidding from other causes will be more damaging to tires than in the case of the toeing wheels, and the chances of damage from skidding will be far greater. A simple way to ascertain if the wheels are parallel is to measure the distance from felloe to felloe at the front and back of both the front and rear wheels. When the distance between felloe faces are the same at the front as at the rear the wheels are necessarily parallel. When fixing the distances for the front wheels, if it is desired to have them toe in, then the measurement between the faces of the felloes at the front of the axle should be slightly less than the measurement between the faces at the rear of the axle. There are, of course, other ways of arriving at parallelism of the wheels, but they are no more certain, having the disadvantage, moreover, of increasing the chances of error because the number of operations is increased.

2. The reason why your non-vibrating coil will not permit you to start on the spark is because you have no means available to produce the spark with the coil as described.

3. It is not unusual to have difficulty in starting a motor when it is cold, in which event it is necessary to spin the crank. A good ignition system is a long step in the right direction. Strong batteries will also help you out.

4. The click may be due to lack of clearance of some of the parts. Examine the mechanism closely and see if there is not a rubbing spot somewhere. If the click is due to lost motion, as an ill-fitting key, you will have serious trouble to cope with soon. The wise plan is to go to work.

5. This question cannot be answered with certainty because the information afforded is insufficient. By way of a remedy it will be necessary (a) to provide a battery that is in good working order, and that will deliver at least 6 volts on closed circuit; (b) good spark plugs must be utilized. Beyond the points as above stated it will be desirable to see that the compression is high enough in each of the cylinders, and it will be also necessary to look after the timing of the motor. When all these matters are properly cared for it will be time to suspect the magneto if the results are not satisfactory.

Largely a Matter of Personal Taste

Editor THE AUTOMOBILE:

[2,339]—Please advise me regarding the advantages in placing the steering wheel on the left or right-hand side of a motor.

Detroit, Mich. J. H. T.

It is something of an advantage in fore-door types of torpedo bodies, and for that matter with all touring cars, to be able to enter the front seat from both sides. If the steering wheel is on the left side, the side levers will come in the middle of the car and access may then be had to the right seat as freely as to the left. This advantage is entirely wiped out under ordinary conditions, due to the fact that spare tires are placed opposite the right entrance. The question as to whether or not a driver can do better work if he sits on the left-hand side of the car depends upon his previous practice. If he has overcome the difficulties involved in right-hand steering, there is nothing more to be said.

Worm Gear Is There for Purposes of Adjustment

Editor THE AUTOMOBILE:

[2,340]—In the July 7 issue of THE AUTOMOBILE there is a cut of the Owen differential. Is the little worm gear shown for adjusting the bearings? If not, what is its utility?

Allegheny, Pa. M. F.

Data of the Tests Must Be Examined

Editor THE AUTOMOBILE:

[2,341]—I am in receipt of a circular dealing with the power consumption of electric vehicles. In this circular they endeavor to make comparisons between different vehicles and they work out an expression for efficiency which takes the following form: "It takes 96 watts per carriage mile for a vehicle with two people on fair macadam. If a heavier battery is put in, it requires 123 watts per carriage mile." The conclusion is therefore drawn that the second vehicle is less efficient than the first. Inasmuch as the velocity of the two vehicles is not mentioned in any way, I fail to understand how these figures are in any way a legitimate comparison, and, as a subscriber to your valued publication, I would greatly appreciate an explanation from you which would clear my comprehension of this matter.

Denver, Col. K.

It is not possible to either refute or approve a test, if only the results are stated, and the data of the test is ignored. All that is claimed might be true, and yet the value of the statement would have to be measured in the light of the detailed facts.

Wants to Know How to Mix Picric Acid in Fuel

Editor THE AUTOMOBILE:

[2,342]—In THE AUTOMOBILE issued under date of July 21 I noticed an article written by James S. Madison on the subject "Enriching of Automobile Fuel," in which he states picric acid is most frequently used. I have heard that picric acid and sal ammoniac were good for this purpose. I would be pleased to have you state how much picric acid should be added to five gallons of gasoline to give good results.

Rossville, Ind. O. A. B.

Looks Like Interference on Neutral

Editor THE AUTOMOBILE:

[2,343]—I would like you to give me some information through your paper regarding a "kink" in my motor which I am unable to locate. The clutch and brake are both worked by one foot pedal, and in going down hills, when I throw out the clutch the motor will stop, and when I let the clutch in just before reaching the bottom of the hill the motor will start up again and works good on the level and in going up hills. The motor also frequently stops when I throw out the clutch and set the brake in bringing the car to a stop. Any information you can give me as to the reason for this will be appreciated.

Florence, Wis. F. B. WOLF.

When you throw out the clutch you evidently throw in something else. We should think that the neutral point is insufficient. Address a communication to the company stating clearly the nature of your trouble.

Some Drivers Use the Motor for Braking

Editor THE AUTOMOBILE:

[2,344]—While descending long grades it is the practice of some drivers to engage the intermediate gear and close the throttle. When they approach a waterbreak and wish to further retard the car's motion they use the foot brake momentarily without releasing the clutch. Is this practice detrimental to the motor or transmission? The waterbreaks of Western Pennsylvania can be crossed with less discomfort to the passengers if taken diagonally as shown at A, but it is easier on the car than to cross them head-on as shown at B (see illustration).

Allegheny, Pa. MURRY FAHNESTOCK.

There seems to be no objection to coasting down hill with the motor engaged and a low gear thrown in, provided the hill is not so steep as to make the motor race. In the latter event, it would be desirable to assist the motor by applying the brakes sufficiently for the purpose. It is not believed there is any objection to this practice.

Carbureter Sweating and How to Remedy It

Editor THE AUTOMOBILE:

[2,345]—Could you tell me through "Letters" in THE AUTOMOBILE the reason for the sweating of a carbureter on an air-cooled car when the carbureter is placed in front of the motor, having two cylinders? I would also like you to suggest a remedy.

Woodmere, L. I. LOSS OF POWER.

Sweating is caused when the gasoline is vaporized, due to refrigerating effect. Every liquid, when it is changed from its liquid state to a gas form, absorbs heat from its surroundings and the temperature of the surroundings is lowered. The amount of this refrigerating effect depends upon the characteristics of the liquid employed. Gasoline, for illustration, does not refrigerate nearly as much as anhydrous ammonia. The mere fact that the carbureter exterior and perhaps the intake manifold frosts up is a sign that a considerable amount of gasoline is being vaporized, perhaps too much. It might be well to readjust the carbureter with a view to starving the mixture with the hope perhaps that there will be less frosting and that the mixture will prove to be more efficiacious for its purpose. The fact that there is no frosting must not be taken as an absolute sign of good working conditions, because if the liquid goes into the combustion chamber before it vaporizes it will then "crack," forming a carbon deposit over the internal surfaces and arouse trouble in consequence.

Loss of power is due to so many things that it will be impossible to put your finger upon the precise trouble without going to some pains, more or less systematically. It is to be hoped that the compression in your cylinders is good, that the carburetion is satisfactory, and that the ignition system is capable and well timed. With all these matters properly attended to, it remains for your air-cooled motor to work at a sufficiently low temperature to permit of a sufficient weight of mixture to enter the cylinders and perform useful work. If your trouble is due to overheating, loss of power may then be charged to one or more wrong conditions, as pistons that stick when they are heated, due to expansion, poor lubrication, due to the burning up of the lubricating oil, and insufficient mixture, due to the fact that the incoming mixture is rarefied by heat, and this condition may be accentuated sufficiently to result in a noticeable loss of power.

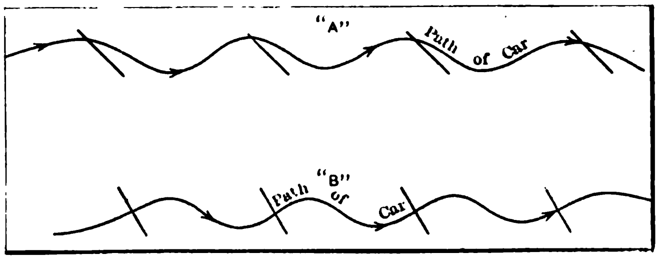
Depends Upon the Efficiency of the Steam Engine

Editor THE AUTOMOBILE:

[2,346]—I would like to know through your "Letters Interesting, Answered and Discussed" how many steam horsepower an automobile gasoline engine of 20 horsepower represents.

Quebec, Canada. KANUCK.

If the steam engine has a mechanical efficiency of 80 per cent. it will have to deliver 25 horsepower (indicated) in order to make the same actual delivery as that of a 20-horsepower gasoline motor. If the steam engine delivers 20 indicated horsepower it will deliver four less than a gasoline motor, or 16 horsepower. There is no difference between an actual horsepower delivered by a steam or a gasoline engine. In a steam engine the indicator does not measure the delivered horsepower; it does measure the indicated horsepower from which the mechanical losses must be taken. In a gasoline motor the delivered horsepower is measured on a dynamometer, hence the mechanical losses do not have to be taken into account to arrive at the actual delivered power.



How to take a waterbreak—A, easy on the passengers, but hard on the car; B, vice versa

Questions That Arise

FORMULAE SHOWING PROPER PROPORTIONS OF KEYS FOR SHAFTS; WHY ALUMINUM DOES NOT SOLDER READILY; SALT BATHS AND THEIR COMPOSITION

[211]—Is it not true that the proportions of keys for shafts are oftentimes wrong in that the shaft or the key is out of harmony on the assumption that the weakest link in any chain is the strongest? Why should the key be stronger than the shaft, or vice versa? What is the good of using two keys if one will do the work?

The shaft should be large enough in diameter so that when the keyway is cut the strength of the shaft should be equal to the ability of the key and the combination of the two should be equal to the work to be done with an ample factor of safety to assure that the service demanded will be rendered continuously. The formulæ as follows are intended to aid the designer to accomplish the undertaking. Let,

D = diameter of the shaft in inches;
B = breadth of the key and way in inches;
L = length of the key in inches;
T = twisting moment to be restrained in inch-pounds;
S_1 = Extreme fiber strain in the shaft due to the torsional moment;
S_2 = Extreme fiber strain in the key due to the torsional moment;

When,

$$T = \frac{\pi D^3 S_1}{16}$$

If the key is $\frac{D}{2}$ from the center of moments, then, for the key, we have:

$$T = \frac{\pi D^3 S_1}{16} = \frac{DLS_2D}{2}$$

$$\pi D^2 S_1 = 8BLS_2$$

and,

$$L = \frac{\pi D^2 S_1}{8BS}$$

[212]—Why is it that aluminum may not be soldered quite as readily as copper or other metals?

The aluminum alloys used in castings for automobile work, while they differ as to composition to a considerable extent, hold from 90 to 92 per cent. aluminum, the balance being copper, manganese, a trace of iron, etc. In attempting to solder aluminum, the first difficulty encountered is due to its low melting point. With copper it is possible to tin the surfaces when they will remain in good condition, and may be soldered by the mere application of a sufficient amount of heat at the right temperature, with no danger of damaging the copper by overheating, nor is there any tendency to oxidation. Aluminum, on the other hand, can scarcely be cleaned sufficiently to permit of "tinning," due to the fact that oxides form so rapidly that they interfere with the tinning process even though the work be done speedily. In order to solder aluminum it is necessary to heat the parts to be joined up to the melting point of solder, and after the surfaces are freed of moisture they must be cleaned by scratching with a metal brush, after which, if a suitable grade of solder is allowed to melt and run over the newly scratched surfaces, using the brush to bring about intimate contact, the solder will adhere to the surfaces, thus completing the tinning process. The solder must be made up of zinc (predominating), some tin and a small proportion of aluminum. The best way to proceed is to first bring about a condition of tinning as above indicated, using the solder high in zinc, and when the surfaces are tinned over join them together before they are allowed to cool off, thus preventing the formation of any oxide.

[213]—It is frequently stated that in quenching steel the results will vary depending upon the quenching baths, and that some baths are much more efficacious than others. What is the range of values of the respective baths?

The bath to use depends upon the results desired, and the efficacy of the respective baths may be taken as follows:

(A) Mercury.
(B) Acidulated water (ice cold).
(C) Salt water (ice cold).
(D) Salt water (normal temperature).
(E) Potable water (normal temperature).
(F) Water and skim milk.
(G) Lime water.
(H) Fish oil.
(I) Cod liver oil.
(J) Cotton seed oil.

It will be understood that mercury is too poisonous a material to utilize as a quenching bath for anything but very small pieces; even then the artisan must exercise great care. With mercury the parts to be quenched will be rendered the most hard. In the scale of hardness acidulated water comes next, then salt water, and so on down the line, finally reaching cotton seed oil which has the least ability of all the baths given from the purely hardness point of view. The oil baths, however, impart tough-hard qualities, which are frequently much to be desired as compared with the more brittle hardness due to water quenching. Sometimes it is found desirable to double quench, that is to say, quench first in oil and second in water, or have a surface of oil on the water so that the parts in being quenched contact with oil first, and finally drop into the water.

[214]—What is the particular advantage of salt heat treatment baths as compared with muffled furnaces and the open hearth? What salts are used in this class of work?

Despite the excellent control which may be had over gas furnaces, the fact remains that the temperature is not absolutely uniform at all points, and the parts to be heat treated are only uniformly heated when an expert handles the furnace. Open-hearth work is of course much more irregular than that following the use of a muffled furnace. Salt baths have the virtue of being uniform in temperature throughout, and the parts to be heated are of course raised to the temperature of the bath. The great advantage of the salt bath then lies in the perfect uniformity of the maintained temperature, and the results should be more perfect, due to this fact. The composition of the salts used in heat treatment work depends upon the temperature desired, the following being some of the mixtures that are found to be efficacious for the purpose:

SALT BATH FOR WORK UP TO 1,000 DEGREES CENTIGRADE

	Per cent.
$NaOH$, Sodium Hydrate	8
$NaCl$, Sodium Chloride (common salt)	91
KNO_3, Potassium Nitrate	0.5
K_2CrO_4, Potassium Chromate	0.5

The above compound of the available salts is designed for use at temperatures ranging between 800 and 1,000 degrees centigrade, and for lower temperatures it is possible to employ other compositions, as chloride of barium and chloride of potassium in the ratio of 3 to 2, if the maximum temperature is not to exceed 950 degrees centigrade. The low limit of this compound is 670 degrees, which is the temperature of melting of the same. The 1,000 degrees bath is more nearly universal than that of barium and potassium chlorides. By varying the proportions of the mixtures, other temperatures may be introduced. In working these salts it is necessary to employ an electric crucible.

The Pyrometer

ITS DEVELOPMENT AND USE. BEING THE FINAL INSTALLMENT OF AN ARTICLE BY WM. H. BRISTOL READ BEFORE THE SOCIETY OF AUTOMOBILE ENGINEERS AT ITS SUMMER MEETING

A PIECE of steel which is to be tested is made in cylindrical form, about 7-16 inch in diameter and 1 1-4 inches long, with a hole drilled in the end to receive the tip of the thermo couple. A vessel of water is provided for maintaining the cold end of the couple at the desired temperature. The quartz-lined furnace allows it to be brought to a high heat very promptly, and after the sample has been inserted the complete heating curve showing the absorption point will be recorded on the chart within a few minutes, after which the cooling curve can be also obtained by lifting the small sample out of the furnace and allowing it to cool.

The recording instrument is provided with a mechanical half-second vibrator so that the continuous record is made on the chart as the temperature rises and falls, even though the changes are quite rapid.

The fire end used in connection with this apparatus is made from exactly the same material as the couple which is used in the treatment of the steel from which the sample is taken, and, therefore, the practical results desired are made to depend upon the preliminary tests.

A special form of thermo-electric couple has been designed for quickly taking the temperature of molten metal. It consists of two elements of different alloys which are left disconnected at the end where the junction is usually made.

In Fig. 18 one of these couples and a portable instrument is shown, with a cross-section of the couple. One element of the couple is a tube, the other a special alloy wire with insulation between the wire and tube. When this couple is immersed in a crucible of molten metal, electric connection is made between the outside tube and the insulated wire at the end of the tube, and a reading will be obtained of the temperature of the molten metal at the tip of the thermo-electric couple.

This form of couple has been successfully used for taking the temperature of molten metals while crucibles are in the furnace.

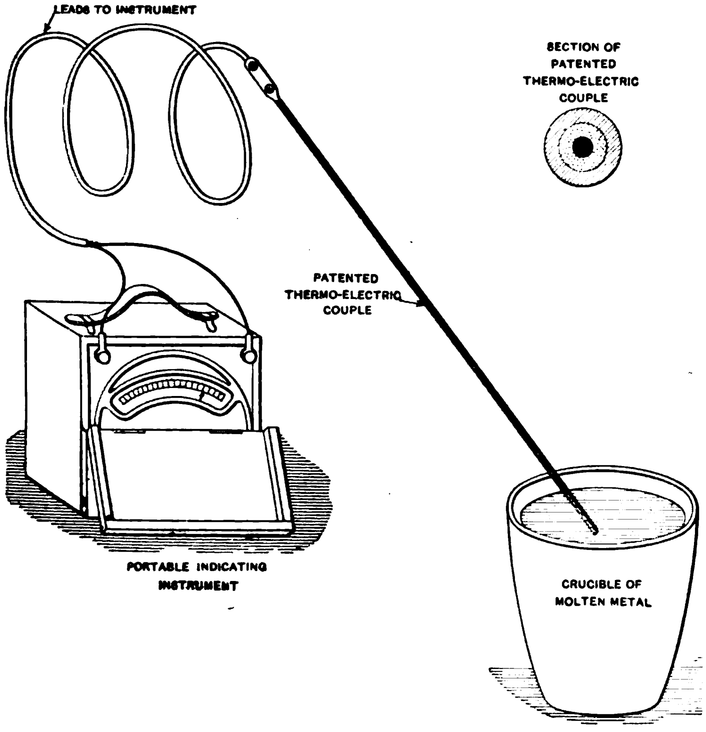


Fig. 18—Portable thermo-electric couple for taking temperature of molten metals

In the use of pyrometers for every-day shop practice, methods of checking the accuracy of the instruments are important.

The initial cost of spare fire ends is so low that extra fire ends should always be kept on hand. To be sure that the fire end which has been in service is accurate, a new one may temporarily be connected to the leads of instrument, both fire ends being placed side by side in the furnace or bath of molten metal during the test. To check the instruments an auxiliary portable pyrometer is recommended having its own set of leads and extension piece. Then the portable instrument may be connected to the fire end in service in place of the regular instrument, thus furnishing a ready means of determining its accuracy.

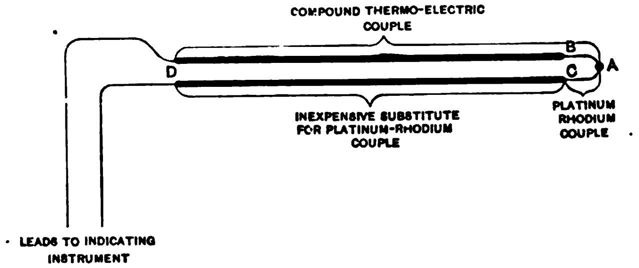


Fig. 19—Diagram showing construction of compound thermo-electric couple

The fusion points of metals also afford convenient means of checking pyrometers. Le Chatelier platinum, platinum-rhodium couples with suspension-type galvanometers are recommended for laboratory tests and for calibration.

For quick measurement of furnaces having temperatures between 2,000 and 3,000° Fahr. a modified form of the standard platinum, platinum-rhodium couple has been developed which has proved valuable in practice.

The diagram Fig. 19 illustrates the construction of the compound couple as it is called. Special alloy base metals having cross section several times greater than the platinum elements are joined to the platinum and platinum-rhodium elements at A and B, the special alloys used being selected so that the thermo-electric effects of the juncture at A and B balance each other, and the reading on the instrument depending entirely upon the thermo-electric current produced by the junction C. The secondary junction should not be heated above 1,200° F.

The cross-section of the special alloy extensions of the platinum, platinum-rhodium couple are made of sufficient size so that the resistance will not appreciably affect the accuracy of the readings on instrument, even if made of considerable length. The tip of the platinum-rhodium couple is left exposed for about one-half inch, the remainder of the couple being inclosed in an iron protecting tube. An extra guard tube or sheath is provided with a set screw to cover the delicate platinum tip for transportation, and while inserting and while drawing fire end from furnace.

Readings of the flame temperatures of a furnace may be made with the instrument within a few seconds.

Steel Must Be Selected in View of the Duty

It is too frequently claimed that by a mere process of heat-treatment it is possible to obtain the most desirable results without selecting the grades of steel that are suited to the place and the character of the work to be done. That this is a fallacy is well appreciated by those who have studied the situation. Proper selection must not be neglected—heat-treatment is secondary.

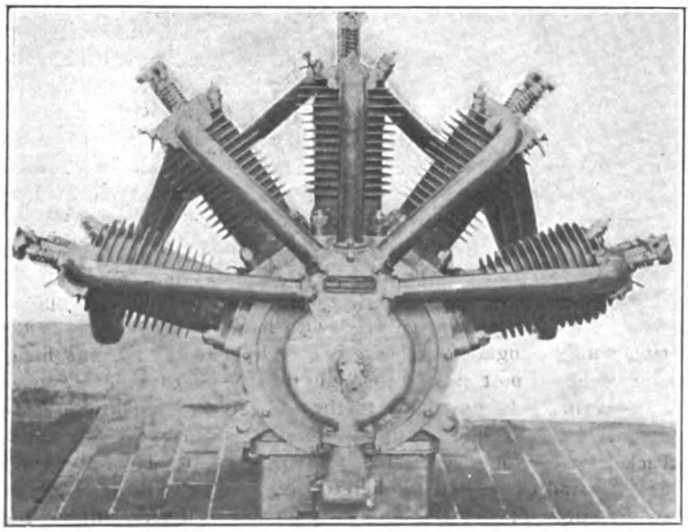
Digest

BRIEF RESUME FROM 50 FOREIGN PAPERS: GERMAN PRECAUTIONS AGAINST FIRE IN GARAGES—THE R. E. P. MOTOR—MAYBACH'S LUBRICATOR WITHOUT SPRINGS—SOME TELLING TESTS OF GNOME MOTOR

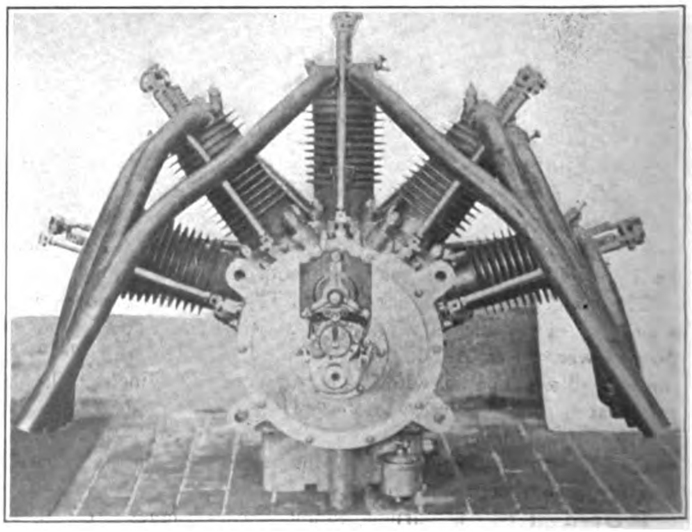
With a view to safety against fire in its garages the Berlin General Omnibus Company has for some time endeavored to develop an explosion-proof incandescent lamp plug which may be connected and disconnected by simple insertion and withdrawal (Westinghouse type). The regulations of the Association of German Electrotechnicians prescribed that no apparatus in which the breaking or making of electric contact is a normal function may be employed in any business place in which there may be danger of explosion, unless its construction has first been approved as explosion-proof. And the Omnibus Company had found that lamps suspended from movable wires to be connected up at any convenient place by insertion of a plug (not a screw plug, since this would twist the wire and the lamps suspended from it) were indispensable for the night work of cleaning, testing and repairing of automobiles regularly carried on in the company's large garages. Several plugs offered in the open trade were tried but were found either not safe enough to be approved or not substantial enough to withstand wear and tear. The connection shown in the accompanying illustration was then developed by the company's engineer, and its security consists of course in the double air space around the contact, the outer space remaining closed till the arc in the inner one disappears. It was tried officially in connection with an incandescent lamp in a box containing an explosive mixture of benzine, gas and air, and the capacity of this mixture for producing an explosion was tested at regular intervals during the test. The connecting and disconnecting was done mechanically, and after contact had been switched off and on 5370 times without causing an explosion the plug was examined and, while it showed wear at the push joint, its continued safety was considered satisfactory. The question arising whether the height of the switch above the floor of a work room did not in itself offer sufficient guarantee against explosions, on the ground of the higher specific gravity of benzine or gasoline vapor as compared with air, another test was arranged at which the underwriters and representatives of the fire department were present. Sixty liters of benzine of specific gravity 0.750 was poured out over the floor of a garage with 80 square meters of floor space and six meters height of ceiling, and all openings were closed, in so far as practicable. The temperature of the place was about 20° C. After about one-half hour, when nearly all the benzine had evaporated, samples of the air were taken at heights of 1-2, 2, 3 1-2 and 5 meters. Trials with an explosion tube failed to bring any of the samples to explosion. Quantitative analysis showed that the samples taken from the lowest stratum contained 0.9 volume-per cent. of benzine vapor. But according to Bünte a mixture of benzine vapor and air does not become explosible until the volume-per cent. of benzine vapor reaches 2.5, and ceases to be explosible when it reaches 4.8. On the basis of these trials a permit was granted to the Omnibus Company to make use of the construction here shown, provided the plugs were placed at least 1 1-2 meters above the floor.—*Zeitschrift des Mitteleuropaischen Motorwagen Vereins, ultimo* July.

Among the aviation motors whose type promises a wider application, the R. E. P., called after its designer, the young aviator-engineer-builder Robert Esnault-Pelterie, attracts attention. It develops 50 to 60 hp. with five cylinders 110 by 120 which work on a single crankpin similarly as the Italian Miller motor, one of the connecting-rods embracing the pin with a hard bronze bushing and the others working upon the knuckle of the first one, by which arrangement the piston travel is not quite alike for the five cylinders. The ignition takes place in two cylinders in the order, 2, 4, 1, 3, 5. A single valve cam disk rotated at one-fourth the speed of the crankshaft takes care of the valve movements by means of a plurality of cam formations on its grooved periphery. Each cylinder carries on its hemispherical combustion chamber two valves operated by a rocker arm controlled by tappet from the aforesaid cam disk. The intermediate shaft for the gear driving the latter drives the magneto direct, having a speed suitable for this purpose. Lubricating oil is carried to the crankpin and other connecting-rod bearings through the hollow crankshaft. The double disposal of the exhaust is shown plainly in the accompanying rear view of the motor. The carbureter has a special air intake controlled in connection with the throttle, and this intake is sheltered from sudden atmospheric variations. A five-day trial from June 16 to 21 in the testing department of the Automobile Club of France showed a consumption of fuel of 270 grammes per horsepower hour. The weight of the motor with magneto, carbureter and storage battery for auxiliary ignition amounts to 150 kilos.—*La Vie au Grand Air.*

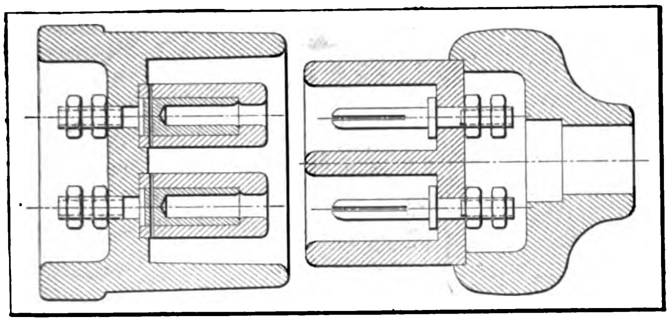
In a multiple lubricator patented by Maybach (German Daimler) visible feed, independence of temperatures and adjustability for each oil lead are features secured in a very com-



Front view of the R. E. P. aviation motor

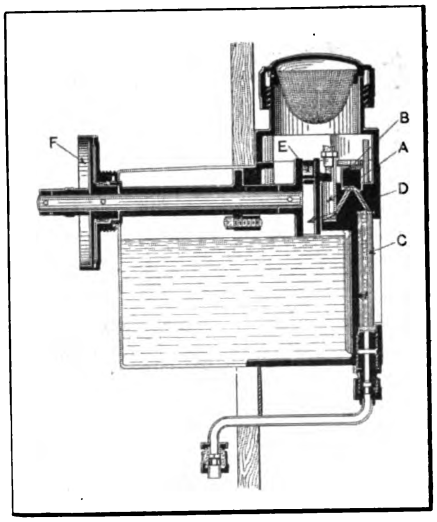


Rear view of the R. E. P. aviation motor



German safety lamp connection for garages

pact construction dispensing with springs, valves and fittings. The visibility of the feed is obtained by having the pumps for each individual oil lead send measured air bubbles alternately with oil through the glass sights. To insure equal feed, whether the oil is cold or warm, thick or thin, the distribution of oil and air from the reservoir to the pumps and from the pumps to the leads is effected by means of a sliding plate which effectively interrupts all communication between suction and pressure conduits, so that no oil can run back during either the suction stroke or the pressure stroke. In the illustration *A* represents the individual pumps, *B* the distribution slide, *C* the sights, *D* the actuating bar or ruler, *E* the driving crank and *F* the external driving pulley. The slide is shown in the position which produces a connection between pump and lead. Accordingly as it is moved, the oil and air suction conduits are alternately connected with the pumps. The bar *D* is moved to and fro by the crank *E* and at the same time up and down by means of a cam. The to-and-fro movement actuates the slide and the up-and-down movement the pumps. By a gear in the ratio of 1 to 12, taking the place of pulley *F*, the oiler may be driven from the camshaft and by variations in this ratio the general feed may be increased or reduced. To give the individual leads less oil, the adjustment nuts on each piston may be turned back, imparting a corresponding amount of lost motion to the piston.—*Zeitschrift d. Mittel. Motorwagen Vereins.*



New Maybach patent force-feed oiler

At a half-hour test of the revolving 14-cylinder Gnome motor weighing 138 kilos and rated at 100 hp. the consumption of gasoline at 1 000 r.p.m. was 5.7 kilos and of lubricating oil 4.4 kilos, hp. 76.1 and at a one-hour test at 1,100 r.p.m., 22.7 kilos gasoline and 11 kilos oil, hp. 74.4—*Bulletin Officiel.*

Lozier Announcement

THIS WELL-KNOWN MAKE OF CAR IS OFFERED FOR 1911 SUBJECT TO SUCH REFINEMENTS AS ANOTHER YEAR'S EXPERIENCE DICTATES

FOR the season of 1911 the Lozier Motor Company, of Plattsburg, N. Y., and Detroit, Mich., still retains its slogan of "The highest grade and quality of motor car possible to produce, and regardless of expense." The company will devote its energies during the coming twelvemonth to the production of two high-class cars—Types 46 and 51, high-powered four and six-cylinder models respectively. With these two chassis eight different varieties of body equipment will be furnished—Touring, Briarcliff, Lakewood and Limousine for each of the two models. The seven-passenger touring car will be practically the same as last season, except that it will be fitted with fore-doors. The Lakewood, which, by the way, was the first American stock car built with fore-doors, is a decided improvement over last year in that it has a side door which folds downward and outward, disclosing a chauffeur's seat, this affording accommodations for five passengers. There will be no change in the Briarcliff body from the 1910 lines. It is to be remembered that any style of body which can be fitted to a four-cylinder car is also applicable to the six-cylinder chassis, there being no difference in the chassis construction aside from the motor. The touring and limousine bodies in both models accommodate seven passengers; the Briarcliff and Lakewood bodies seat five.

The six-cylinder chassis, known as Type 51, has cylinders with a bore of 4 5-8 inches with a 5 1-2-inch stroke, developing 51 horsepower, A. L. A. M. rating. The four-cylinder model, denominated as Type 46, with 5 3-8-inch bore and 6-inch stroke, is rated at 46 horsepower A. L. A. M.

The six-cylinder chassis has a wheel-base length of 131 inches, that of the four-cylinder model being 124 inches; the tread on all Lozier models being 56 inches.

The weight of the various equipped cars ranges from 3,375 pounds for the Briarcliff and Lakewood fours to 4,375 pounds for the six-seated limousine.

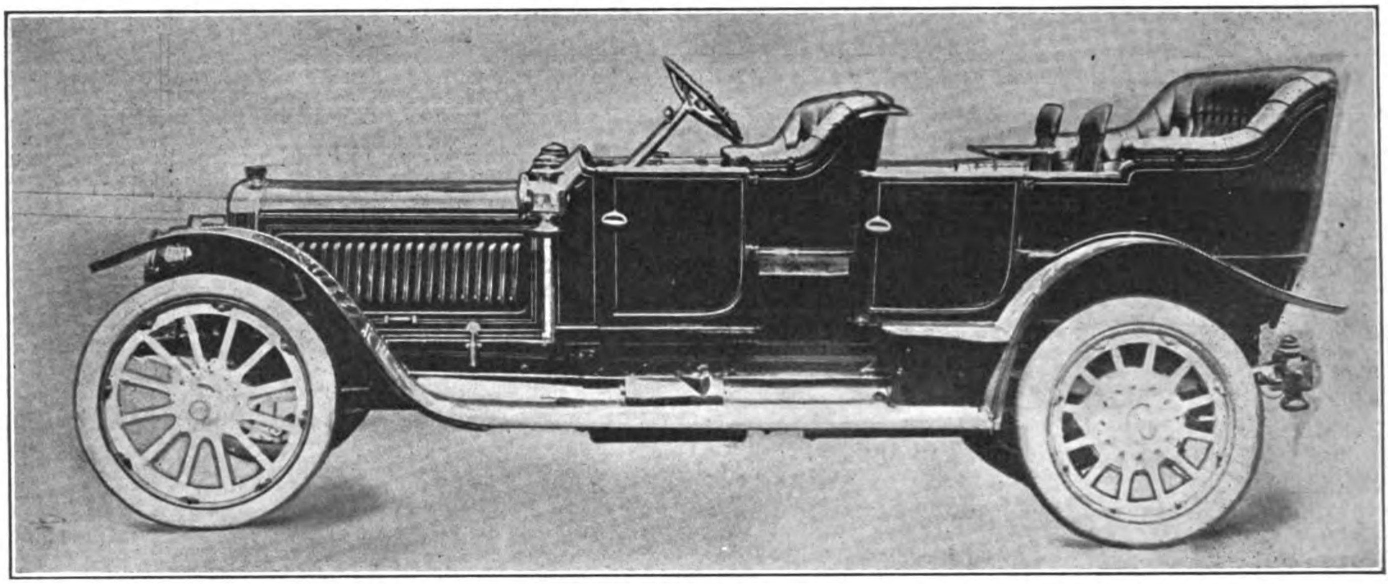
Four powerful brakes on the rear-wheel drums constitute the brake system. All movable or wearing parts of the brake system are fitted with grease cups. The emergency brake rings are of the floating type, perfectly equalizing in themselves; and in addition, brake-beam equalizers are fitted through slots in the frame. The adjustments of the braking system are worthy of note, the contracting bands being provided with winged nut adjusters, while in the emergency brake rod is inserted a turn buckle with hand-lever adjustment. Springs are of the half-elliptic front and platform rear type, all shackles being fitted with hollow pins, bronze bushed and fitted with grease cups.

Suspended under the rear of the chassis frame is the gasoline tank with a capacity of thirty gallons, and gasoline is supplied to the carbureter by an automatic pressure system. In the gasoline line is fitted a combination strainer and water separator, it being possible to remove the strainer for cleaning without removing any of the floor boards.

The frame is of alloy steel, heat treated in lead, with arched rear and extremely narrow front, giving short turning radius. The steering gear is irreversible, of the worm and toothed wheel type; and instead of using a sector the gear wheel which engages the worm forms a complete circle and new faces may be presented to the worm in case of wear.

The steering wheel consists of a cast aluminum rim, spokes and hub, the rim being covered with hard rubber, cast over the rim, with corrugations to give a firm hold to the driver's hand. The steering post passes through the toe-board in an annular ball-bearing, adding greatly to the easy steering qualities of the car. The cross link of the steering mechanism is positioned back of the front axle, while the drag link is above the front axle instead of below it as heretofore.

The entire underbody of the car is protected from injury and road drift by a continuous casing of cast aluminum alloy, and while the clutch is protected from road drift and dirt by being encased in a dust-proof metallic case, the cast-aluminum fly-



Six-cylinder 51-horsepower fore-door type Lozier touring car with a long hood, straight lines, wide entrances, and clean running-board

wheel pan assists in keeping the power plant clean and free from mud or dust.

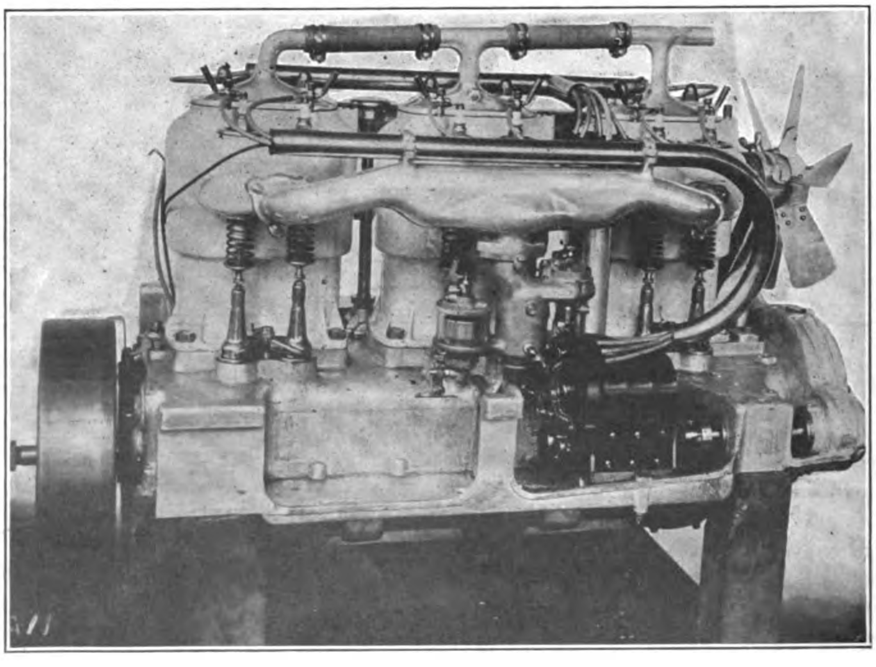
Road wheels are 36 inches in diameter, the front being equipped with 4-inch tires, the rear with 5-inch tires. All models are regularly fitted with Continental demountable rims. The front wheels are now fitted with adjustable cup and cone ball-bearings instead of bearings of the annular type.

Notable Changes Made in the Cars

Perhaps the most notable change in motor construction lies in the adoption of the long stroke. The cylinders are cast in pairs, T-head type, and finished in pearl gray by an enameled process with a final baking. The water-piping, intake pipe, fan standards and other small parts are cast from aluminum and given a polish. The motor valves are of high nickel steel with integral heads, and it is worthy of note that the fillets at the joints of heads and stems are large, so that the heat picked up by the heads is quickly transmitted over the whole length and warping is prevented. The valves are larger in size than they were in last year's cars, and valve guides are inserted in the cylinders, making it possible to renew them should they become warm without having to renew the whole cylinder. The valve covers of both the models are screwed into the heads. The pistons and rings are given a final grinding and are brought to gauge. The reciprocating parts are balanced. The hollow wrist pin is made of tool-steel and is prevented from floating out by two set screws near the ends, and they in turn are prevented from backing out by a wire lock between the heads of the two screws. As in former years, the crankshaft is mounted on annular type ball bearings; even the camshafts rotate on ball bearings of the annular type, and this type of bearing is extended to include the rotative parts of the magneto, pump shaft, fan, clutch, leaving no bearings to the tender mercies of chance or the exigencies of hard service.

SPECIFICATIONS FOR LO

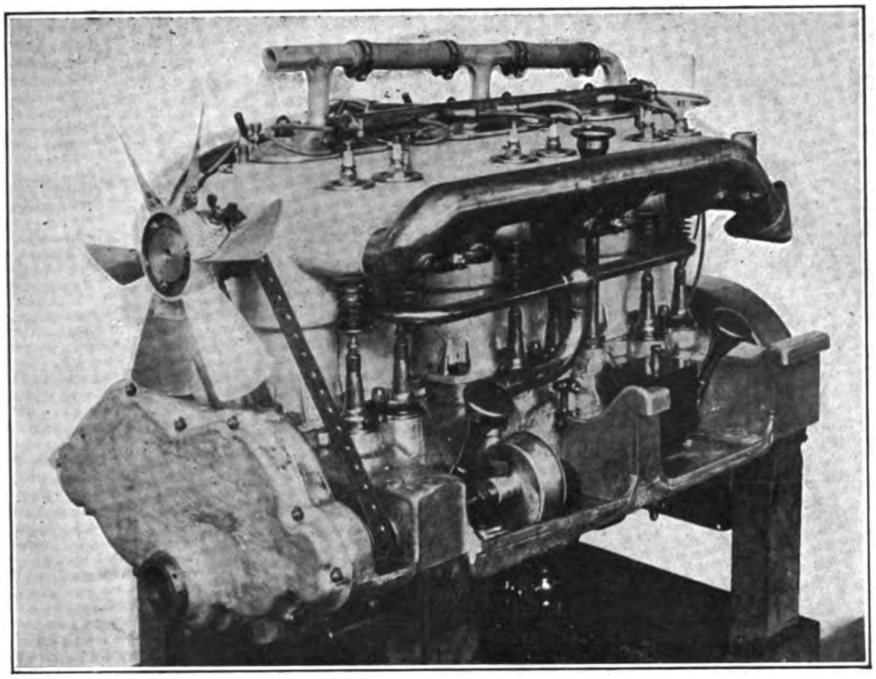
MODELS	Price	H.P., A.L.A.M.	BODY		MOTOR				COOLING		IGNITION	
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery
51............	$5500	51.6	Tour'g.	7	6	4⅝	5½	Pairs..	H'comb..	Pump...	Bosch...	Storage..
51............	5500	51.6	B'cliff..	5	6	4⅝	5½	Pairs..	H'comb..	Pump...	Bosch...	Storage..
51............	5500	51.6	L'wood.	5	6	4⅝	5½	Pairs..	H'comb..	Pump...	Bosch...	Storage..
51............	7000	51.6	Limous.	7	6	4⅝	5½	Pairs..	H'comb..	Pump...	Bosch...	Storage..
46............	4600	46	Tour'g..	7	4	5⅜	6	Pairs..	H'comb..	Pump...	Bosch...	Storage..
46............	4600	46	B'cliff..	5	4	5⅜	6	Pairs..	H'comb..	Pump...	Bosch...	Storage..
46............	4600	46	L'wood.	5	4	5⅜	6	Pairs..	H'comb..	Pump...	Bosch...	Storage..
46............	6000	46	Limous.	7	4	5⅜	6	Pairs..	H'comb..	Pump...	Bosch...	Storage..



Right side of the Lozier six-cylinder 51-horsepower motor, presenting the Stromberg carbureter, magneto, and method of driving

The ignition system remains as before. It consists of two separate methods, including a Bosch high-tension magneto and a storage battery of large capacity, working in conjunction with a coil and distributor, with two independent sets of spark plugs.

Lubrication is by splash. A gear-driven pump supplies the oil to the motor, an auxiliary oil tank is placed on the chassis and a hand-pump is connected therewith through the good office of which lubricant may be supplied to the bearings needing it at the



Left side of Lozier "six" motor, showing water pump connections, and fan drive

will of the operator.

The clutch is of the multiple disc type, as in last year's car; it is made up of 31 steel discs in an oil-tight, dust-proof flywheel housing. The driving discs are mounted on annular ball bearings. A clutch retarding brake is utilized for the purpose of overcoming inertia, thus rendering the gear shifting operation simple and preventing disastrous clashing.

The transmission is of the 4-speed, selective sliding type, with an aluminum box in one piece, provided with a cover. This is a departure from the usual practice of halving the box, and it is claimed for this construction that oil leakage is eliminated. The direct drive is on third speed, as in former Lozier cars. The ratio is about 3 to 1, it being the idea that in autoing it is practicable to run on the third speed for most of the time. Using this speed direct assures a certain silence of performance and reduces the necessity of listening to the hum of gears nearly all the time.

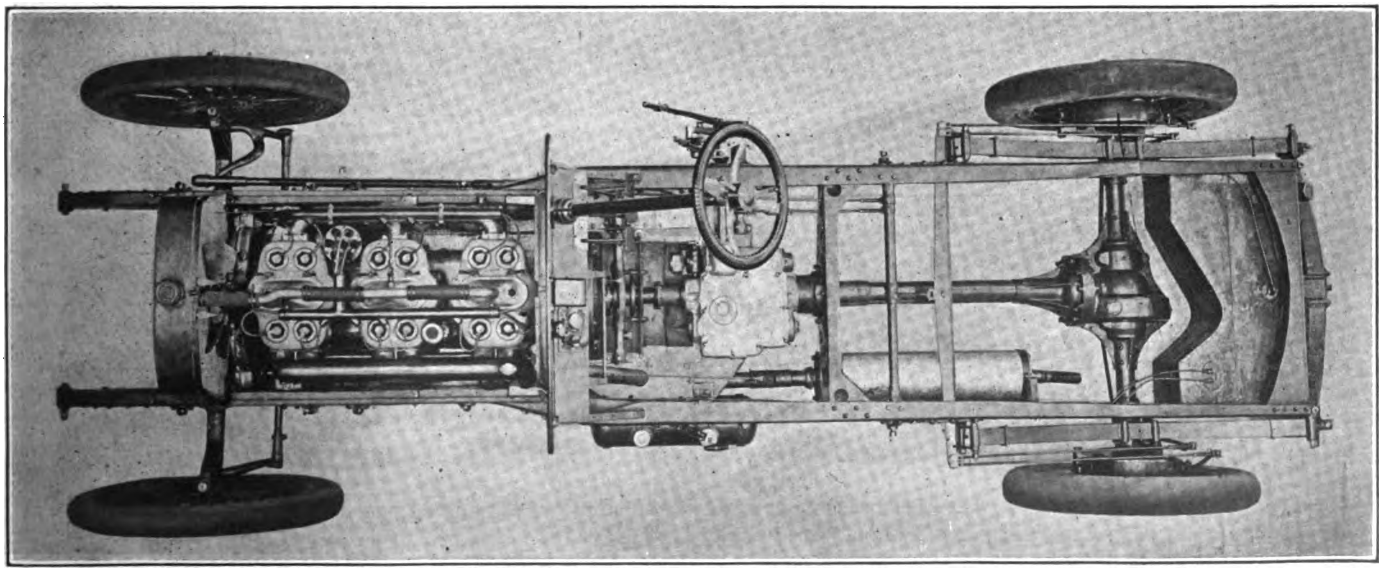
CARS AS OFFERED FOR 1911

Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
	Type	Speeds	Location	Drive				Crankshaft	Transmis'n	Axle		Front	Rear
Disc.....	Selecti'e.	4	Frame.	Shaft...	131	56	Al. Steel	Ball....	Ball....	Ball....	3,655	36x4	36x5
Disc.....	Selecti'e.	4	Frame.	Shaft...	131	56	Al. Steel	Ball....	Ball....	Ball....	3,450	36x4	36x5
Disc.....	Selecti'e.	4	Frame.	Shaft...	131	56	Al. Steel	Ball....	Ball....	Ball....	3,450	36x4	36x5
Disc.....	Selecti'e.	4	Frame.	Shaft...	131	56	Al. Steel	Ball....	Ball....	Ball....	4,375	36x4	36x5
Disc.....	Selecti'e.	4	Frame.	Shaft...	124	56	Al. Steel	Ball....	Ball....	Ball....	3,580	36x4	36x5
Disc.....	Selecti'e.	4	Frame.	Shaft...	124	56	Al. Steel	Ball....	Ball....	Ball....	3,375	36x4	36x5
Disc.....	Selecti'e.	4	Frame.	Shaft...	124	56	Al. Steel	Ball....	Ball....	Ball....	3,375	36x4	36x5
Disc.....	Selecti'e.	4	Frame.	Shaft...	124	56	Al Steel	Ball....	Ball....	Ball....	4,300	36x4	36x5

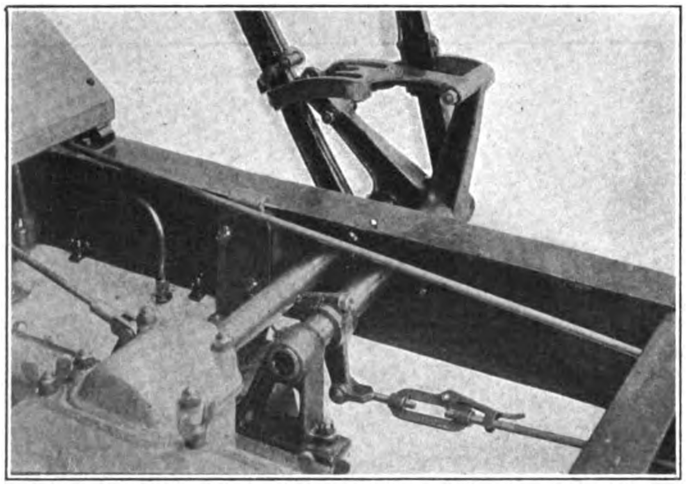
The final drive is by a cardan shaft of the full floating type without universal joints, although the forward end of the shaft terminates in a universally held member related to a substantial cross bar fastened in the two members of the chassis frame, there being a large ball-shaped housing with ample bearing surface to take the shock and do the work.

This construction eliminates the need of a torsion rod, the torsion function being performed by a tubular housing, of nickel steel, bolted rigidly to the differential case of the live rear axle with its extremity composed of a telescopic joint as before mentioned. The live axle is so designed as to be readily withdrawn, and by unbolting the two straps holding the differential in place the entire differential and main gear may be removed. Both of the main drive bevels are mounted on ball bearings, the drive shaft bevel being supported on the floating end by a ball bearing, as well as at the forward end, and both bevels are provided in addition with adjustable thrust bearings.

A change has been made in the radius rod, which, instead of terminating in ball and socket members, is designed to encircle the rear axle at the rear end, while the forward end terminates in a bronze bushed eye and is held by a pin of liberal dimensions. The radius rods are made from D-shaped drop forgings. The spring perches are free to turn on the rear axle tubes, it being the idea to induce flexibility, which quality is also added to through the good properties of the telescopic joint at the forward end of the propeller shaft housing.



Chassis plan of the six-cylinder 51-horsepower car indicating the relations of units and method employed for obtaining clearance for the gasoline tank in the rear



Part of the Lozier side-frame at the point of fastening of the quadrant for the side-levers

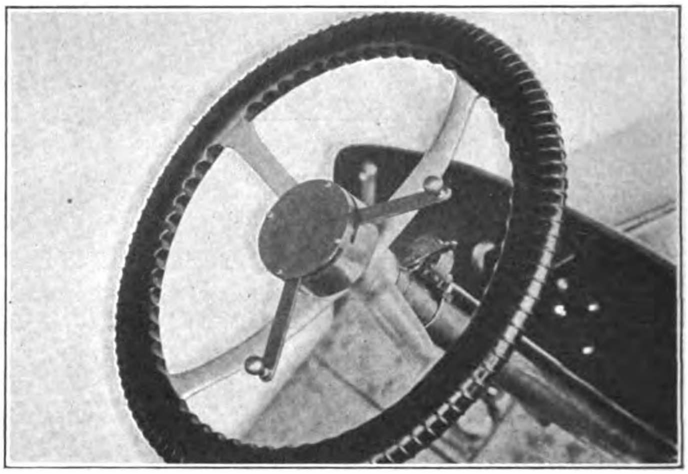
Among the improvements to be noted in the motor is a compression release on the exhaust valves. The starting-handle axle is enclosed in an oil-tight housing, excluding the entrance of dust, and when the handle is let go after starting the motor it is so contrived as to remain in the upright position, nor is there an external latch or strap employed. The magneto and carbureter are located on the right side of the motor, the latter being of the Stromberg type. The magneto is driven by an extension shaft out of the half-time gear housing, the pinion of which meshes with the train; the magneto is flexibly mounted, the universal joint for the same coming just back of the right fore arm of the motor case. The left side of the motor holds the water pump, makes room for a well contrived exhaust manifold, with the water piping just beneath, and the fan is driven by a belt which passes around a driving pulley, the latter being on a shaft which is driven by a pinion located relatively the same as the magneto drive. The motor is supported by three arms, and instead of an underpan, the aluminum case is flanged out between the arms and is faced to snug up against the underflange of the chassis frame.

An examination of the chassis will disclose a nice relation of the units with means for ready assembling, and among the other features of distinctly Lozier characteristics is the idea of the independent placing of the emergency brake mechanism so that the ills of torsion do not interfere with the sliding mechanism. The gasoline tank is placed back of the rear axle high up to afford the proper ground clearance, and it is so shaped that the differential housing clears, but the capacity of the tank is increased, due to the advantage taken by fixing a constant clearance line following the contour of the axle.

The regular Lozier equipment includes trunk rack, robe rail, foot rest, horn, brass tire-holders, tool box with complete set of tools, Prest-o-Lite tank, two gas headlights, dash lamps and tail lamp, the latter being a combination of oil and electric. The battery has extra large amperage calculated to furnish ample current for motor, lamps, Klaxon horn, speedometer, etc.

As to price, all the models of Type 51 are listed at $5,500, with the exception of the limousine, which is quoted at $7,000. The latter style in Type 46 is catalogued at $6,000, the other three styles at $4,600.

Upon the completion of the magnificent Lozier plant at Detroit no more complete cars will be built at the company's Plattsburg factory; that plant will thenceforth turn out castings, gears, machine screw parts and other supplies for the new works at Detroit. Two large additions have recently been put up at Plattsburg, and the plant there will continue to be operated to the fullest extent.



Lozier steering equipment, showing a large diameter fluted grip on the wheel, stout post, with secure anchorage at the foot-board

Ideal Electric Vehicle

MECHANICAL AND ELECTRICAL FEATURES OF THE IDEAL, SHOWING THE RELATIONS OF THE COMPONENT UNITS AND METHOD OF CONNECTING UP THE ELECTRICAL SYSTEM

LONG-continued effort in the electrical field of endeavor has brought most of the equipment down to a standard basis, but there is still a chance for the individual to exercise his ingenuity. The Ideal Electric Company, of Chicago, Ill., having in mind certain requirements for vehicles in this class, entered the field with the intention of supplying the obvious needs. The appearance of the car is shown in Fig. 1, which, in a general way, may be set down as a town car with inside control, side-chain drive, using an individual motor and a silent chain for the primary reduction. The chassis is so contrived that the battery is properly housed in two sections; one at the front, and the other at the back end, bringing the weight over the springs and so distributing it that the riding qualities of the car are very good. The center of gravity is low and the road performance notable.

The motor is shown in Fig. 2; it is of the Westinghouse vehicle type, fully enclosed, and is flexibly mounted upon the jackshaft J1, using bearings B1 and B2. The support to the side-frame S1 at one end has a liberally proportioned flange F1, and the silent-chain drive S2 is clearly shown at the point where the cover is removed from the housing for the same. The differential gear is in the same housing at the enlargement E1 and the point of fastening or flanging to the remaining side-frame comes at F2. The driving sprockets are pressed on the ends of the jackshafts at S3 and S4. The wiring for the motor is secured to suitable terminals at W1, and the arrangement is such that the wiring conforms to the diagram of the same as depicted in Fig. 3.

One of the Matters of Recognized Importance

In electric vehicle work it is almost impossible to keep acid fumes out of contact with the wiring system, and in order to avoid the resulting difficulties it was deemed expedient in this car to run the wiring system in such a way as to have it accessible for repair, but at the same time protected from acid fumes and mechanical interferences of every kind. The wiring is done according to the plan as shown in Fig. 3, and is so arranged as to include the connections to a battery divided into two parts, one of which is marked "front battery" and the remaining subdivision is designated as "rear battery." The controller is so designed as to include four forward speeds, the "off position" and reverse. In first speed a resistance is employed, and its relation to a field shunt is shown in the wiring diagram. The equipment includes a single motor, a voltmeter V and an ampere meter A, also a bell for signaling, and the lighting is done by means of electric lamps with connections to lamp circuit as indicated. The charging receptacle connects the two halves of the battery in series, including an ampere meter, with the understanding, of course, that the voltmeter is connected in parallel to show the voltage on charge and the voltage of the battery during discharge. Beyond commenting upon the correctness of the method employed in the connecting up of the equipment used, it is worth while taking into account the fact that the company has standardized its methods, so that the artisans when they become accustomed to the work are enabled to proceed with accuracy and dispatch, thus reducing the cost of repairs, and what is more to the point, the time a car will be out of commission, should repair work become a necessity.

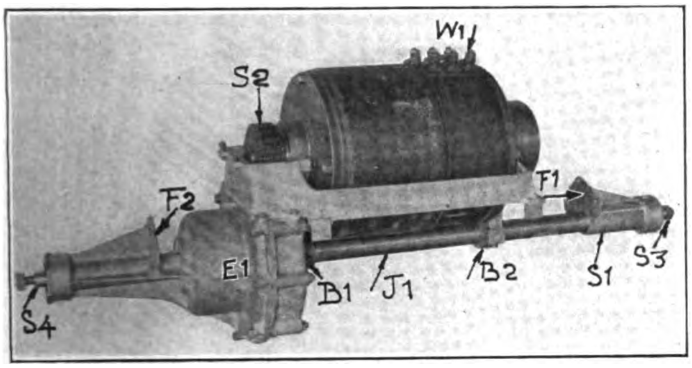


Fig. 2—Westinghouse motor with a double-reduction gear, the primary reduction being with a silent chain

Methods of Control Carefully Looked After

The fact that electric automobiles are to be driven a considerable portion of the time by those who may be entirely devoid of mechanical training renders it necessary to so contrive the control system that it will not prove to be too complex to be readily understood. In addition to the question of the number of speeds available, it still remains to so arrange them that they will respond logically and when the power is cut off the brakes should be readily applied if it is desired to do so. In this car the control lever is placed to the left of the driver, who also sits at the left side of the seat, and there are four forward speeds arranged progressively so that pushing the lever in the forward direction throws in the four forward speeds one after the other, and pulling the lever backward has the reverse effect. If, after the lever is shifted to the zero position, it is desired to apply the brakes, all that has to be done is to pull the lever back from neutral to perform this operation. If it is desired to go into reverse, however, the lever must be shifted sidewise for a short distance and then pulled back.

The steering equipment consists of a tiller within the car located on the left side convenient to the driver, and the mechanism it actuates is simple and strong. The connecting links are of adequate strength, placed in protected positions, and all the joints are so carefully made that lost motion is kept out. The axles are of the I-section, forged in one piece from suitable grades of steel, and the remaining details are worked out in a fitting manner.

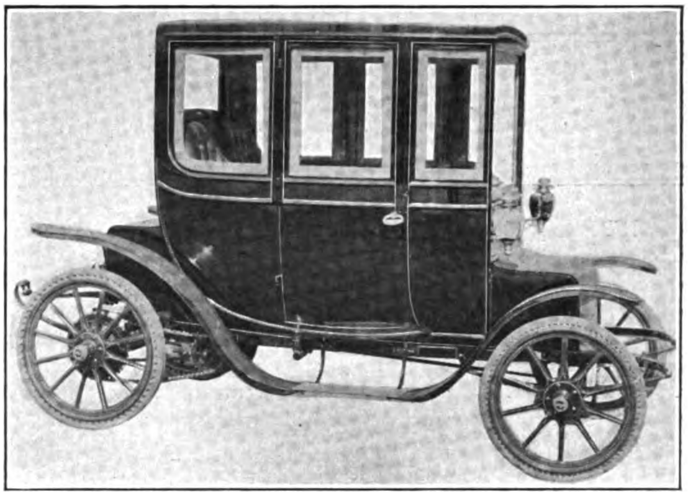


Fig. 1—Ideal Electric town car with inside control

The car is built up on a chassis frame of the I-section, of dimensions to render it wholly unnecessary to rely upon the body framing to support any of the load, and the method of bracing the side bars is that which obtains in regular practice in the construction of gasoline types of automobiles. The motor suspension is so devised that the side chains are relieved from undue strains, and alignment is brought about and maintained through the use of distance rods that are sufficiently strong to withstand the work that is likely to be put upon them in severe service.

Exide Battery is Used in the Ideal

Reliance is placed upon the Exide battery in the cars of this make, and the number of cells as well as the number of plates per cell is determined by the service to which each car is to be devoted. Preference is given ample battery equipment rather than to skimp with a view to economy of weight or to lower first cost.

In view of the general character of the service to which electric vehicles of this class are put, the greatest attention has been given to the details of the battery installation. If, in the course of events, it is found desirable to remove the battery for purposes of cleaning, it may be accomplished in the shortest possible time by the owner, or if a man is in charge of the car, it is not necessary for him to be a battery expert. All the connections are carefully identified and the method of marking is such that, in putting the battery back into the car, it can only be done in one manner and that is the right way. The work of charging the battery is much simplified, and the chances of damaging the battery are reduced to a remote contingency. The cost of maintenance of the car is held at a lower level in this way.

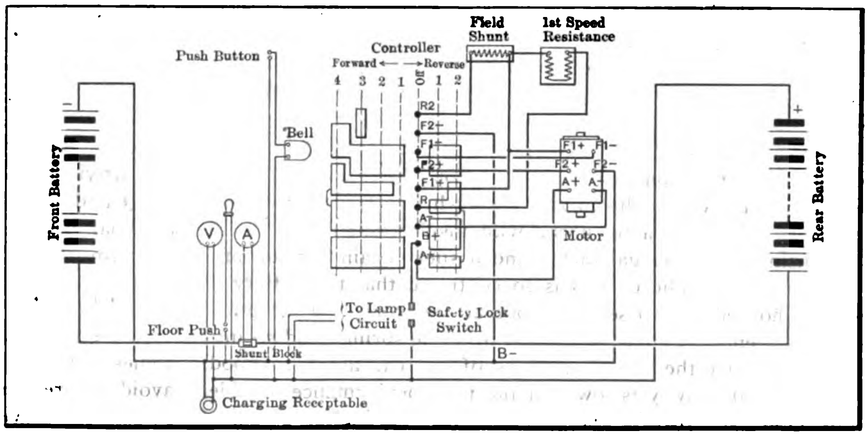


Fig. 3—Wiring diagram arranged for a unit motor and the battery in two parts, designed to give four forward and one reverse speed

Graham Differential

PRESENTING A CROSS SECTION IN TWO PLANES OF THE GRAHAM DIFFERENTIAL GEAR WHICH IS OF THE OVERHAULING TYPE. ALSO DETAILS OF DESIGN AND CONSTRUCTION

DIFFERENTIAL gears of the conventional type consist of a system of planets engaging similar suns. They are so contrived and arranged that they weigh out the torque of the motor, conforming to the conditions as follows:

(A) If the automobile is traveling straight ahead on a hard level road an equal amount of power is delivered to each traction wheel, and the differential-gear system remains inactive just as though the two wheels were attached, having an axle between them.

(B) When the automobile is turning around the corner, the differential gear permits one wheel to rotate faster than the other, but it delivers power to both wheels if the traction conditions are the same for each of them.

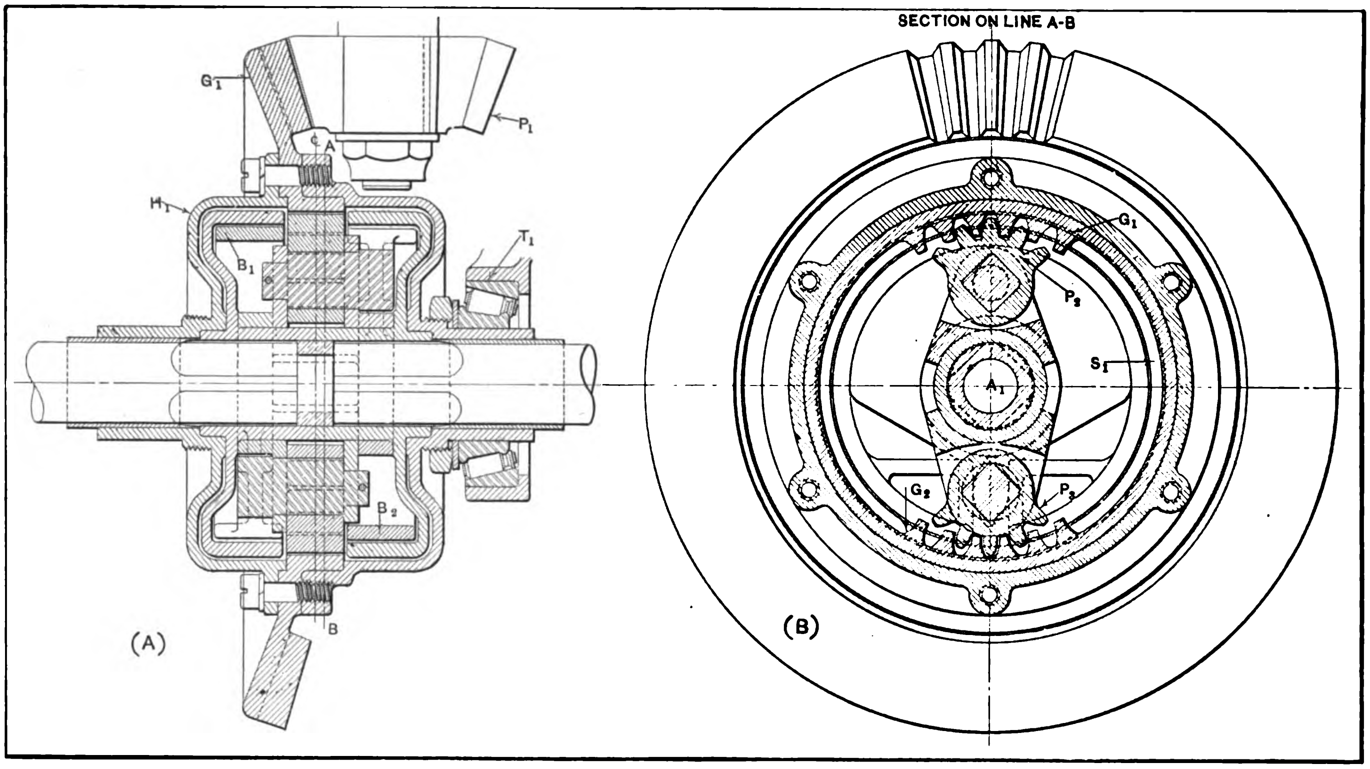


Fig. 13 (A)—Longitudinal section of assembled differential gear; (B)—Cross section of the same

(C) If the road condition is varying and one of the traction wheels drops into a soft spot, the amount of power that may be taken by the other is reduced by the lack of traction of the wheel resting on the soft spot, and if the conditions become sufficiently bad the wheel that is resting upon the soft spot will turn backward and the other wheel will stand still so that effective traction is defeated.

The reason for using a differential of this type is to permit of driving on a curve without having to slip one of the wheels. The disadvantage (C), while it represents a serious condition that must be reckoned with, is less than that which would obtain were there no means for preventing slipping when an automobile is going around the curve.

The Graham differential gear, as illustrated in Fig. 13, shows a section parallel to the axle at (A) and a section at right angles to the axle at (B). This gear is manufactured by the Graham Differential Gear Company, with an office at 2123 Michigan avenue, Chicago, Ill., and the principle of operation departs from the conventional type of differential gear sufficient to overcome the ills as referred to in (C) involving the performance under bad road conditions, offering at the same time the facility referred to in (B) in that the automobile is permitted to go around a curve without dragging one of the wheels.

The particular axle shown in Fig. 13 was gotten up to include the use of Timken roller bearings, one of which is indicated at T1. The bevel pinion P1 meshes with the bevel gear G1 in the regular way. Briefly stated, the construction as indicated is such that when an automobile is going around a curve the outer wheel, which must travel the greatest number of revolutions, is permitted to go faster than the inner wheel, but the load is taken by the inner wheel during this period unless it enters a soft spot on the road, when if it slips the outer wheel takes the work. If the outer wheel can travel faster than the inner wheel, provided the roadbed is firm, it stands to reason that the inner wheel if it slips will overhaul the outer wheel, which the construction permits, in which event the outer wheel will take the work until the time arrives when the inner wheel is permitted to take up its burden again.

Referring to (B), Fig. 13, P2 and P3 are pinions, each on independent spiders revolving around the axis A1. These pinions mesh in the teeth of the internal gear at G1 and G2 on the common spider S1. One pinion P1 is rigidly attached to one of the jackshafts, and the other pinion P2 is rigidly attached to the remaining jackshaft. Referring to (A), Fig. 13, there are two brake bands, B1 and B2, which are actuated when power is applied through the pinion P1 from the motor by way of the propeller shaft, thence to the gear G1, and finally to the housing H1. From the housing H1 the power is transmitted to the teeth G1 and G2 of the spider S1, causing the pinions P2 and P3 to

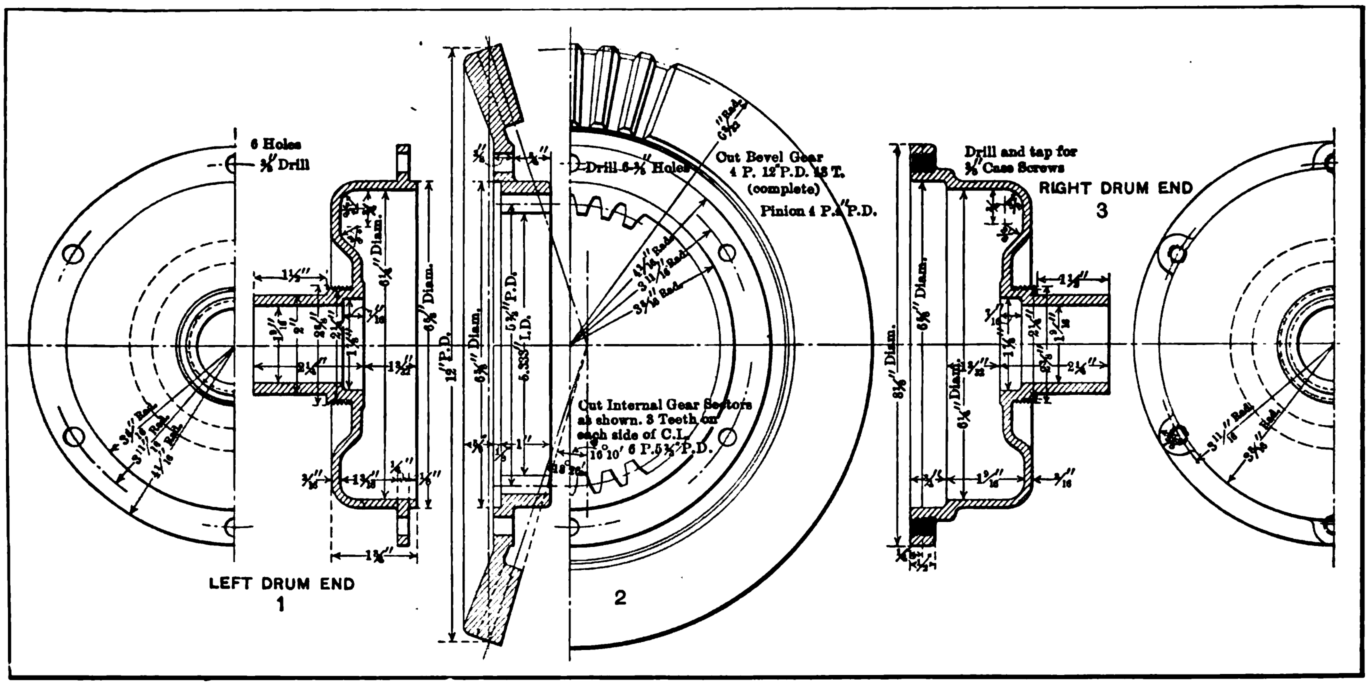


Fig. 1—Left drum end; Fig. 2—Bevel gear; Fig. 3—Right drum end

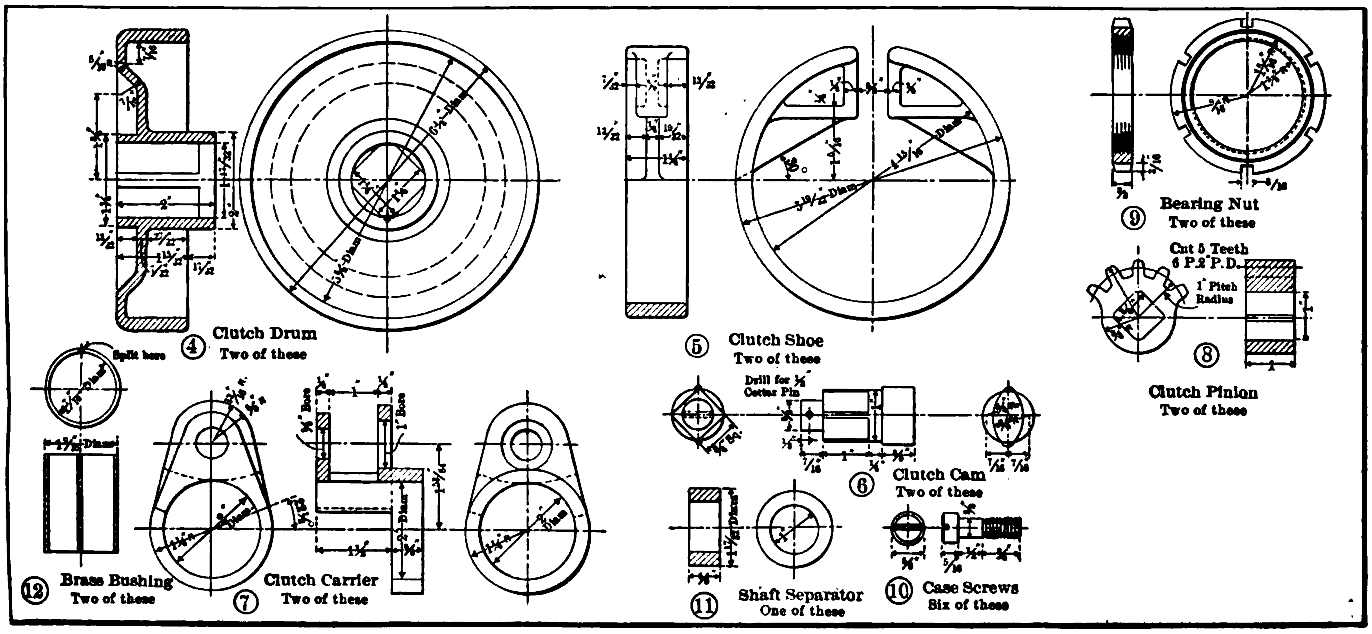
rotate, thus imparting motion to a cam, which in turn expands the brake bands, and completing the drive.

It is possible for one wheel to rotate faster than the other, due to the simple process of overhauling and the straightening up of one of the cams in response to the motion. Under such conditions the remaining cam and one of the brake drums in rigid relation with its band afford the means of driving. Under ordinary conditions the inner wheel does this work, but it is not essential to success that either of the wheels does the driving. As the construction shows, the wheel that travels the slowest is the one on which the work will come. This low speed may be due either to the negotiation of a curve or lack of traction of the other wheel.

The brake bands are provided with cork inserts and they carry the load with great certainty, due to the fact that the bands are expanded before rotary motion is imparted to the members, so that relative motion is obviated. Moreover, the construction is such that the pressure causing expansion of the bands increases in greater proportion than the torque, hence the conditions that are ordinarily chargeable to the failure of brakes are eliminated.

The proportions of the Graham differential are such that it will go in the housing as ordinarily provided for conventional differential gears, and the weight of the mechanism compares favorably with the other means at hand. A better understanding of the needs will be found by glancing at Figs. 1, 2 and 3, representing the left drum end, the large bevel gear and the right drum end respectively, they being shown in plan and section. Considering the importance of differential gear systems, and the necessity of having the parts of good design and stable, it was deemed expedient to reproduce here all the parts employed in this gear, so that Figs. 4, 5, 6, 7, 8, 9, 10, 11 and 12 are given as representing the miscellaneous parts and fittings required.

It may be interesting to observe that the conventional types of differential gears offer unusual disadvantages under certain conditions, as when the roadbed is poor and the load is heavy. The Graham differential is being taken up to supplant other types of gears under these severe conditions, and it seems to be efficacious for the purpose.



Figs. 4 to 12, inclusive—Parts to scale with sizes given

The Halladay Automobile

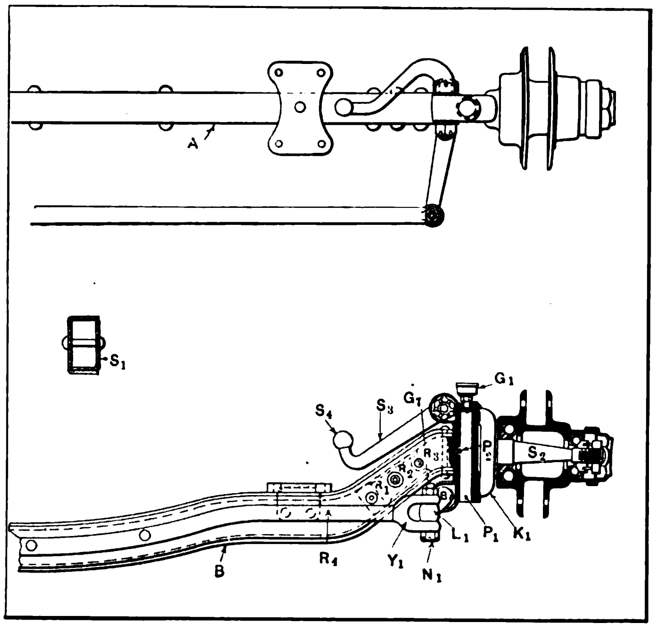


Fig. 2—Plan and section of A. O. Smith type of pressed-steel front axle using cup-and-cone ball bearings

RECOGNIZING the necessity of being able to give to a discriminating clientèle the character of automobiles it expresses a preference for, the Streator Motor Car Company, Streator, Ill., builder of the "Halladay," presents for 1911, among its several models, the Model 40, which is the subject matter here. The specifications of this car are offered in tabular form for the sake of brevity and utility, and the general appearance of the car, as it is designed for touring, is shown in Fig. 1. Referring to the design of the body, it is of the convertible type, i.e., if the purchaser elects to take a touring body as shown in Fig. 1, it is with the understanding that it can be converted into a "gunboat" at short notice and small cost. Just how this is accomplished is shown in the illustration of the body, and the method of doing the work is clearly described in connection therewith.

Points of Note in the Front Axle Design

The front axle is shown in Fig. 2 in plan at A and in part section looking at the front in B. The axle is of the A. O. Smith pressed-steel type, the section of which is shown at S1. Referring to the front view B, the knuckle casting is a close fit in the pressed-steel axle and is riveted at R1, R2 and R3. The knuckle pin P1 passes clear through, is prevented from dropping out by a tangent pin P2, and has a grease cup G1 at the top. The knuckle K1 is a drop forging of special steel, annealed to subdue internal strains. The spindle S2 is machined and ground so that the inner races of the cup-and-cone bearings are a sucking fit. The cross rod R4 is of large diameter of annealed drawn steel tubing, with a yoke Y1 with liberal bearings accommodating its mate on the end of the lever L1, and the hardened bolt B1 is provided with a grease cup G2 in its head, and a castellated nut N1, with a locking pin at the other end. The steering arm S3 is of special steel with a large diameter sphere S4 on its end, which accommodates the socket of linkage between it and the arm on the steering post. The material and workmanship throughout are up to a fitting standard, with all the parts carefully heat treated to induce a proper measure of kinetic ability. Referring to Fig. 3 of the live rear axle and torsion tube combined, it will be observed that drawn and pressed steel tubings and housings are used throughout. The differential gear system D1 is of the bevel type, and the jackshafts J1 and J2 have square ends S1 and S2 where they fit into the "suns" of the differential system. Cup and cone bearings are employed at every point with locking adjustments so arranged that lost motion may be taken up if in the course of time it is developed.

SPECIFICATIONS OF HALLADAY

MODEL			BODY		MOTOR				COOLING		IGNITION		
	Price	H.P. A.L.A.M.	Type	Seats	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	Lubrication
"40"	$1650	32.4	Tg. Toy Rt.	5	4	4½	5	Single	H'comb	Cen-trif'l	Bosch	Dry	Pump

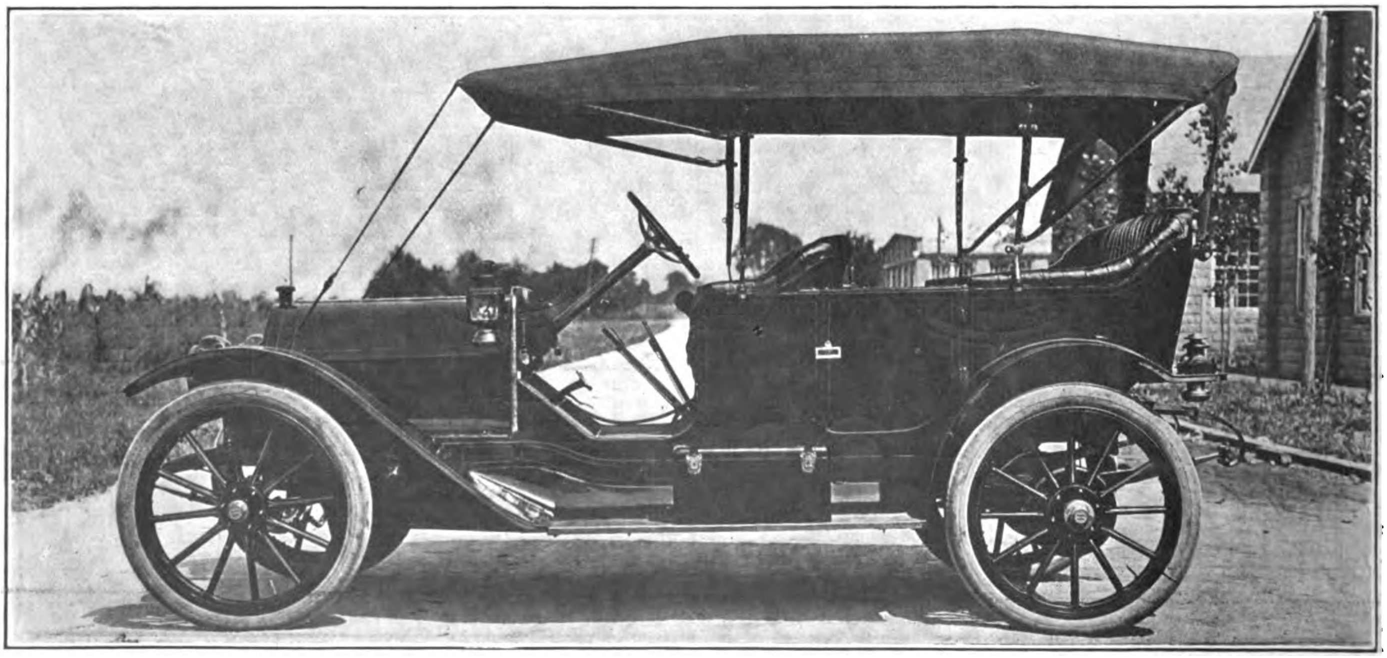


Fig. 1—Model "40" Halladay with a conventional straight-line touring body and means for converting same into a gunboat at any time

FOR 1911. THIS IS SO MADE THAT IT CAN BE CONVERTED FROM A NORMAL TOURING TYPE TO A FORE-DOOR PROPOSITION

The bevel pinion shaft S3 has two bearings B1 and B2 with a considerable spacing between them, and the pinion P1, which is carried by the bearing B2, is fitted close up to the bearing so that the cantilever effect is reduced to a minimum. The torsion tube T1 is shown in two planes, and the universal joint J3 at its extremity is relatively large, fitting into a socket which in turn is supported by a substantial cross member of the chassis frame. The hub H1 shown at the right is accurately machined, and driving takes place through a jaw J4 so that the construction has all the virtues of a floating system. The brake drums, one of which is shown at B3, are of large diameter, housing the brakes B4 and B5 alongside of each other, so that both the service and emergency brakes are of the internal expanding type, hence protected from the silt of the road and rendered effective by a straight line system of links and levers.

The Multiple Disc Type of Clutch and Housing

The clutch used is of the multiple disc type as shown in Fig. 5 and is flanged on the flange F1 of the crankshaft, being centered at C1 and securely bolted in the manner as shown. The driven member D1 rotates on a plain bearing with a bushing B1, and the discs D2, of which there are a suitable number made of saw-blade steel, have the especial virtue of being conical on their friction faces, and it is also worthy of note that the driving faces D3 for the outside and D4 for the inside are extra large. The housing H1 is oil tight and the cover C2 has a bearing B2 at the shaft and an oil tight joint J1 where it fits the housing H1. The clutch spring S1 has seven turns, using a large diameter wire, thus affording a sufficient pressure to prevent the clutch from slipping under the most severe conditions. Thrust is taken by a ball bearing D3, and one member of the universal joint U1 is shown in place on the taper of the shaft with a locking nut L1 to hold it in place. The clutch is released when the pedal is pressed with a pressure of approximately 40 pounds, which pressure is transmitted to the trunnions T1 and T2 through a suitable motion.

"40" AS OFFERED FOR 1911

	TRANSMISSION							BEARINGS				TIRES	
Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Transm's'n	Axle	Weight	Front	Rear
Mul. Disc.	Selecti'e	3	Unit	Shaft	118	56	P. St'l	Plain	Ball	Cup and Cone	2750	36x3½	36x3½

An Innovation Resides in the Touring Body

The Model Forty body is shown in Fig. 6 with the plan at A, side elevation at B and cross section at C. All dimensions are given and the general appearance of the body when it is entirely completed, as per plan, is that of a fore-door type along gunboat lines. The innovation hinted at is involved in the construction by means of which the body may be delivered to the purchaser as a strictly touring type, without fore-doors, but the arrange-

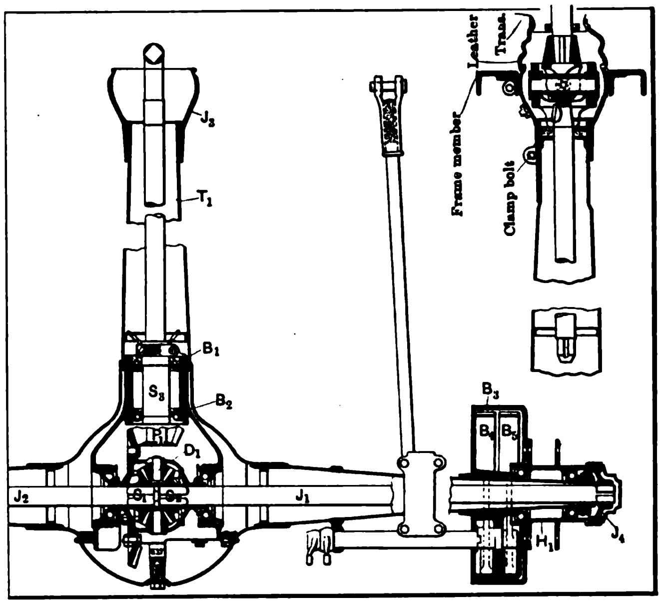


Fig. 3—Pressed-steel type of live rear axle, section to show bevel differential and two pairs of internal expanding brakes

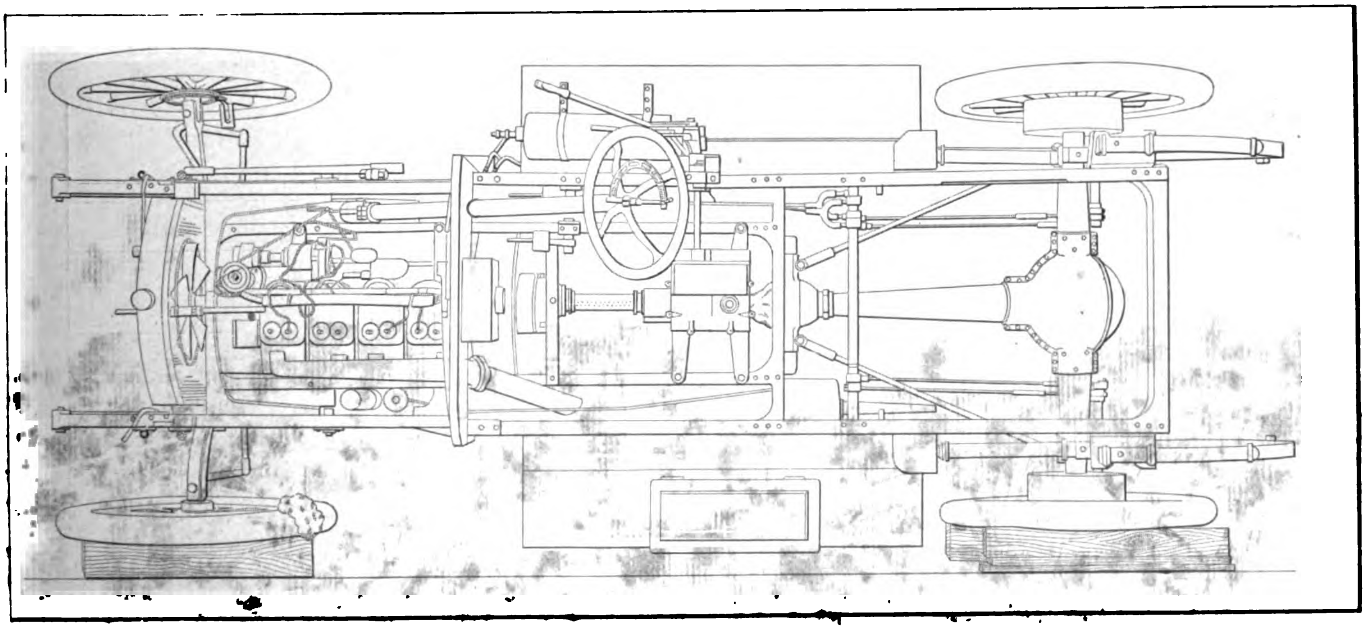


Fig. 4—Stripped chassis, showing relations of units mounted on the double-drop I-section frame. This wax cut was made from a photograph of the car as it stood on blocks, resting on two wheels

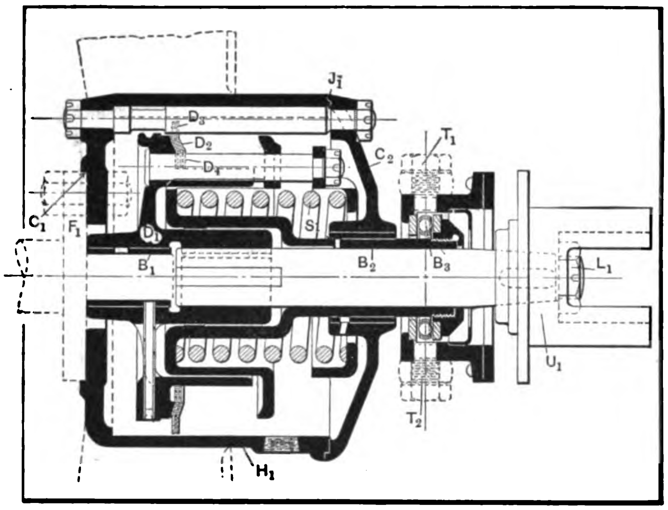


Fig. 5—Multiple-disc clutch within the flywheel confines, with a stout spring and ball-thrust, and an oil-tight housing

ment of the framing at the front is such that the fore-doors may be added at any time at no great cost and without delay.

A close examination of the front end of the body as depicted in the side elevation B will show the dash D1 with a cowl C1 fitted over it, sweeping back to the jam of the door J1, supported around the rim R1 by a bead and at the lower point by the footboard F1 as well as at the framing below. The fore-door is shown in the section through EE, and a foot note at the bottom states "sills must be made to fit sillplates." The design includes an aluminum accommodation piece which is so fashioned that it will fit readily into place on the regular touring body, and by removing the old dash and substituting the new one as before described the entire undertaking is consummated without having to alter the body in any way, but the finished appearance is up to the most exacting demand so that the autoist who purchases a car of this make may have his choice of this car with a touring body of the conventional type with the full understanding that it will be converted to a fore-door type of body at any later date, thus giving him a choice and an option. The character of material, workmanship and finish as represented in this body is in keeping with the latest and most approved practices.

Worm and Sector Steering Gear with Ball Thrusts

The importance of a substantial steering gear is recognized as fitting, and the Gemmer type of worm and sector gear as shown in Fig. 7 is used on this car. The worm W1 is of hardened special steel, meshing with the sector S1, which in turn is pressed onto the shaft S2, and keyed by the key K1. The housing H1 is oil tight and thrust is taken by thrust bearings T1 and T2. The spark and throttle control is interpreted by bevel systems B1 and B2, driven by concentric shafts S3 and S4 within the worm shaft, with a protecting shell outside. The steering wheel W2 is of mahogany, fitted over the rim R1 of the spider, and the spider is keyed to the shaft (on a taper) using two Woodruff keys K2 and K3. It is also pressed down by means of a nut N1. The spark and throttle control levers are shown in part section above the steering wheel. The section A in the left bottom corner of the illustration affords another view of the worm and sector, thus rendering the whole construction sufficiently clear to make further discussion unnecessary.

Annular Ball-Bearing Type of Transmission Gear

The scheme of design of the transmission gear is shown in Fig. 8, which is a section in the vertical plane, cutting through

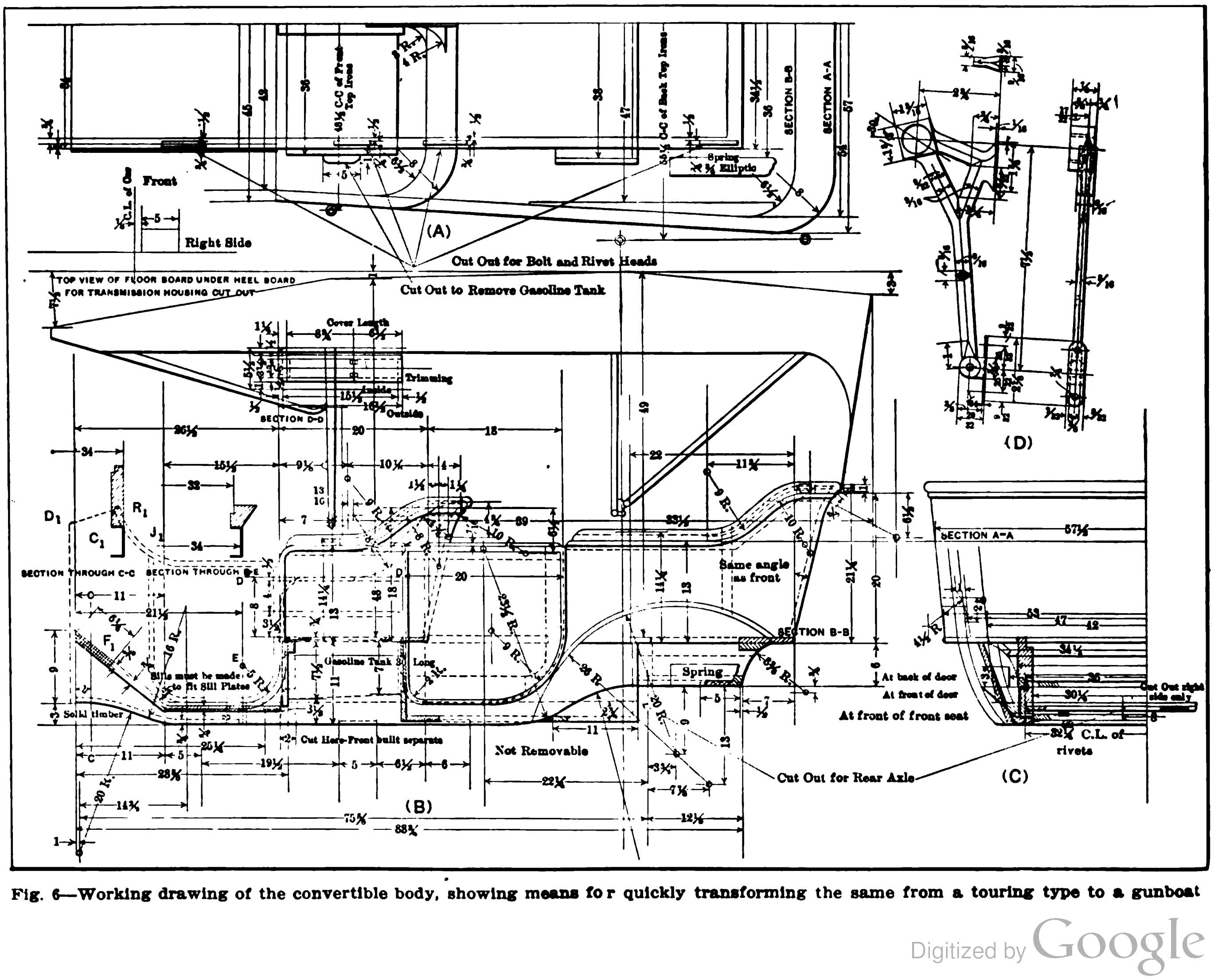


Fig. 6—Working drawing of the convertible body, showing means for quickly transforming the same from a touring type to a gunboat

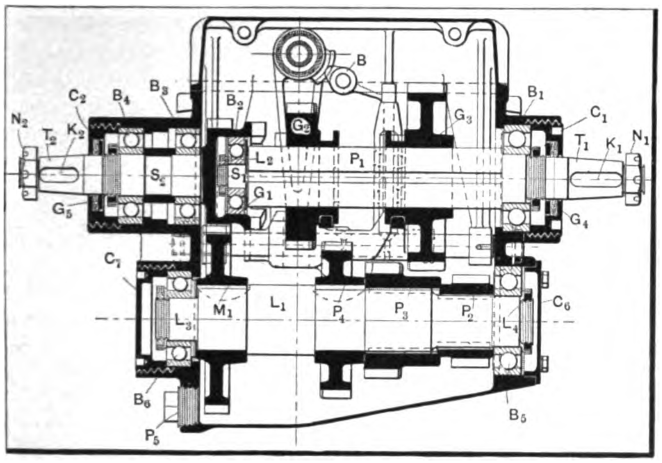


Fig. 8—Section of the transmission gear of the selective three-speed type with stout spindles centered on F. & S. annular ball bearings

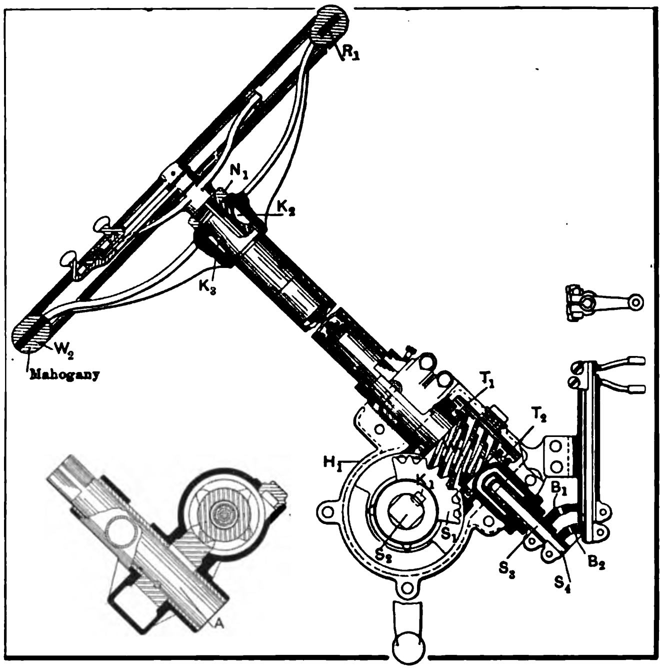


Fig. 7—Worm-and-sector type of Gemmer gear with internally located concentrically disposed spark and throttle mechanism

the prime and lay shafts. Referring to the prime shaft P1, which is directly above the lay shaft L1, it is centered in a large annular-type ball bearing G1 at the end, and where it engages the jaw drive a ball bearing B2 is a sucking fit on the shouldered portion of the shaft S1 with a locking nut L2 placed to hold the inner race in secure relation. The outer race is a hand fit in the bore of the internal gear G1 with endwise freedom. The ball bearing is therefore in a position to do its work without having to resist thrust, and the design is such that the bearing affords a relatively large factor of safety. The sliding gears G2 and G3 are fitted over the square shaft P1, and the pinion for low gear P2 on the lay shaft L1 has a large surface, is a press fit and is provided with two keys. The pinions P3 and P4 as well as the master gear M1 are also keyed on, but they are so much larger in diameter than the pinion P2 that trouble from this source is not to be anticipated. The stub end shaft S2 has two ball bearings B3 and B4 with center distances between them sufficiently great to eliminate lost motion. The lay shaft L1 is provided with large ball bearings B5 and B6 with a sucking fit on the shouldered portion of the shaft on each end and locking nuts L3 and L4 holding the inner raceway securely in place while the outer races are a hand fit, hence self-aligning. Both shafts are of large diameter and relatively short; deflection is therefore aborted and the ball bearings throughout are provided with closures in the most approved way. For the prime shaft the closures C1 and C2 screw into place, making the housing perfectly tight, and oil is prevented from migrating out by the grooves G4 and G5. The lay shaft covers or closures C6 and C7 are not provided with openings because the shaft does not protrude through. The universal joints are fetched up on tapers T1 and T2 on a basis of 1½ inches to the foot, the idea being to provide a slow taper so that a small amount of pressure will force the joints on so that they will withstand the torsional effort without requiring the keys K1 and K2 to do very much work. Castellated nuts N1 and N2 are provided and screw up against the hubs of the universal joints, forcing them up upon the tapers, after which the castellated nuts are locked. At the lowest point in the aluminum case a 1-inch taper plug P5 is provided, by means of which the whole interior of the case may be flushed out, thus making it possible to clean out "shabby" lubricating oil, replacing it with new "slippery" product. There are other nice features that might be lingered upon, but the general character of the design, construction and workmanship of the transmission gear are brought out in sufficient force to satisfy the purpose here.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL CLIMBS, ETC.

Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11, '11	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.

Races, Hill-Climbs, Etc.

Aug. 16-27	Munsey Tour.
Aug. 26-27	Elgin, Ill., Road Race, Chicago Motor Club of Chicago, Ill
Aug. 31	Minnesota State Automobile Association's Reliability Run.
Aug. 31-Sept. 8	**Kansas City, Mo., Reliability Run, Auto Club of Kansas City.**
Sept. 2-5	Indianapolis, Ind., Speedway Meet.
Sept. 3-5	Run and Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 3-5	Brighton Beach, Two-day Track Meet.
Sept. 5	Cheyenne, Wyo., Track Meet.
Sept. 5	Denver, Col., Road Race, Denver Motor Club.
Sept. 5	Los Angeles, Cal., Speedway Meet.
Sept. 5-10	Minneapolis, Minn., Track Meet at State Fair.
Sept. 7-10	Buffalo, N. Y., Reliability Run, A. C. of Buffalo.
Sept. 9-10	Providence, R. I., Track Meet.
Sept. 10	Los Angeles, Cal., Mount Baldy Road Race.
Sept. 10	San Francisco, Cal., Golden Gate Park Road Race, Automobile Club of San Francisco.
Sept. 10-12	Catskill Reliability Contest and Hill Climb, Motor Contest Association.
Sept. 10-12	Seattle, Wash., Race Meet.
Sept. 15	Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Sept. 16-26	Asbury Park, N. J., Aviation Meet, Aero Club of America.
Sept. 17	Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept.	Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.

THE AUTOMOBILE

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The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

PURCHASERS are much concerned about the body problem this year. Will they be safe in acquiring a conventional type of touring body or will the fore-door type prevail?

* * *

AUTOMOBILE bodies and millinery, are discarded when they go out of style. It is at some cost in both cases.

* * *

WHEN millinery is discarded the head of the owner is retained and it is usually capable of further service. When an automobile body is rendered *hors de combat* by the dictator of style the whole contrivance, including the body, is disposed of at a small part of the total cost.

* * *

ECONOMISTS are watching the automobile industry, hoping, perchance, that some way will be found to prove to the average mind that it is an economic waste.

* * *

HOMBRE de un libro (man of one book), the average economist, looks through a dollar, or for a dollar-owner, more likely than not, but the fact remains that it is a gross extravagance to cast off a $2,000 automobile to get rid of a $400 body.

WHAT is the right solution of this vexing problem? Is it to come by educating the owner, who, lacking in stamina, abandons a serviceable body just because Jones, his neighbor, has one that looks different?

* * *

CONVERTIBLE bodies offer attractions from this point of view, and it is the plan of at least one maker this year to offer an option with the body. If the purchaser elects to acquire a conventional type of touring body it will be with the full understanding that it will be converted into a fore-door type of body at any later date if the purchaser so wills it.

* * *

GAUGING the automobile business is a process that can only be conducted successfully if the instrument of precision employed is one that will present the result in known and well-recognized terms. The breaking of the record by the Stearns car at Brighton Beach, advancing the standard 57 miles from 1,196 to 1,253 miles in twenty-four hours, represents something of the real advance that the automobile has made within a year.

* * *

BUT the situation is considerably better than is shown by this new record. Tire trouble interfered seriously with the performance not only of the Stearns but of the other contestants.as well. To whatever extent tire trouble retarded this performance account should be taken, and in the final sum-up it must be remembered that the strain on a car increases as the velocity square. In interpreting this statement it is equal to saying that there is no test to which an automobile can be put that is equal to a record-breaking run on a circular track.

* * *

APROPOS of the tire problem it may not be out of place to call attention to the fact that the main proportion of it is due to running on partially inflated tires. The autoist who prefers to use the tires in the capacity of springs will find them high-priced for the purpose. The man who sets up the claim that a tire is fully inflated simply because he is wearied of pumping is, of course, wrong. What he needs is a power pump.

* * *

BUDDING autoists are the most inclined to jump to the conclusion that cotton, as a fabric, is lacking in strength, hence incapable of sustaining under considerable pressure. It is a great mistake to undertake to relieve a tire from pressure by the infernal expedient of running it in a partially inflated condition.

* * *

THE fact that a tire is not wholly inflated by the man who injects the air into it will not reduce the working pressure by a hair. When the weight of the car together with the inertia component comes on the partially inflated tire, the working pressure will be just as high as it would be under fully inflated conditions. There is the added misfortune of flexure with a partially inflated ire, to which must be ascribed the greatest reason why tires do not last too long.

Detroit Trade News

HAPPENINGS OF THE WEEK IN THE AUTOMOBILE MANUFACTURING CAPITAL—NEW CORPORATIONS, FACTORY GLEANINGS, NEW AGENCIES, TRADE CHANGES, ETC.

DETROIT, Aug. 22—Another accession to the ranks of small car makers is the Whitney Motor Car Company, which has just been incorporated with a capital stock of $150,000. It is the intention to manufacture a gearless friction drive roadster that will sell around $400. Brock C. Eby is president of the company; J. C. Hudson, vice-president; H. C. Whitney, secretary, and George O. Taeckels, treasurer.

The recently organized Universal Motor Truck Company has filed articles of incorporation, placing its capital stock at $350,000. Coincident with this, C. H. Haberkorn has resold to the Universal Motor Truck Company the factory site he recently purchased in the north end of the city, and ground will be broken this week for the new plant.

The Paige-Detroit Motor Car Company has increased its capital stock from $100.000 to $250,000, in anticipation of large extensions for the coming season. James Borquin, superintendent with the Chalmers Company since its inception, has severed his connections with that concern, and becomes general factory manager for the Paige Company, which means a livening up all along the line.

Commencing September 1, the Maxwell-Briscoe-McLeod Company, Michigan distributors for Maxwell and Columbia cars, will change its name to the United Motor Detroit Company, in conformity with the plan being followed wherever selling branches of the United States Motor Company are found.

Edward R. Hewitt, of New York, is now a stockholder in the Metzger Motor Car Company and one of its staff of technical experts. Mr. Hewitt was for years the moving spirit in the Hewitt Truck Company, taken over by the Metzger people about a year ago. Since that time he has been identified with the same line, but henceforth the benefit of his experience will be given to the pleasure as well as commercial cars being turned out by the Metzger Company at its Detroit plants.

A "sociability" run will be held by Detroit motor enthusiasts next Sunday, and to arouse added enthusiasm Albert R. Smith has donated a handsome silver loving cup as a trophy to the driver making the nearest approach to the time Mr. Smith occupied in covering the course. The road leads from Detroit through Plymouth, Pontiac, Utica and back to this city. From the number of entries received the run promises to be a great success.

The Michigan Buick Auto Supply Company has filed articles of incorporation, with a capital stock of $2,000,000.

The E-M-F Company has leased the four-story brick structure at Fourth and Abbott streets, just vacated by the Detroit Bag Company, and will devote it to some of the many ramifications of the motor car business as conducted by this concern.

Quite the most interesting bit of personal news to local automobile circles comes with the acquisition by the Hudson Motor Car Company of Edward H. Broadwell, vice-president of the Fisk Rubber Company. Mr. Broadwell recently acquired stock holdings in the Hudson company, and has been elected second vice-president of the company. He will assume complete charge of the selling end of the business, and will have as his assistant sales manager E. C. Morse. "Ned" Broadwell has been associated with the motor car industry from its inception, and for the last ten years had been with the Fisk Rubber Company, the last five years serving as vice-president. He assumes his new duties September 1.

The Ford Motor Company has begun the erection of a $30,000 addition to its Canadian plant, located just across the river, in Walkerville. When completed this will give 20,000 additional square feet of floor space. Work is also being rushed on the company's new salesroom at Woodward avenue and the Boulevard. The structure, which will be ready for occupancy late next month, is of reinforced concrete, 100 x 100 feet on the ground, and three stories in height, although it is the intention to ultimately increase it to eight. When completed it will be one of the most imposing showrooms in the city.

The Wagenhals Commercial Motor Car Company, of St. Louis, Mo., will shortly locate in Detroit and engage in the manufacture of a three-wheeled light delivery car, which combines many novel features, chief of which, of course, is the elimination of the customary rear axle, differential and other standard parts.

As usual, the automobile is proving a strong factor in the political campaign now being waged throughout the State. Chase S. Osborn, who is seeking the Republican nomination for Governor, has been touring Michigan in a Regal car for some weeks. Other candidates who find the railroads inconvenient are employing similar means of transit, and are covering four and five towns a day, whereas under the old way but two towns could be covered.

The first light delivery cars for the Van Dyke Motor Car Company began coming through the west side factory last week, and it is expected that in a short time the plant will be turning out twenty-five machines a day.

Pending the completion of a magnificent garage at Woodward and Alexandrine avenues, ground for which has just been broken, the Elmore Motor Car Company has established a temporary agency for Michigan and Canada at 295 Jefferson avenue, with M. A. Young in charge. The business here will be conducted under the style of the Elmore Automobile Company and a complete line will be carried.

Some two dozen Cadillac sales agents from all parts of the country organized an association known as "The Old Guard" in Detroit recently. Each member has been in the service of the company at least five years. The association will meet three times a year, in January at New York, in February at Chicago, when the auto shows are on, and in Detroit at the time the new model is ready for the market. G. E. Blakeslee, of Jersey City, the oldest sales agent in the company employ, was elected president. I. M. Uppercu, of New York and Newark, was chosen secretary and treasurer. There are no other officers.

The Lion Motor Sales Company has been organized with a capital of $10,000 to handle the Lion car, made in Adrian, Mich. The officers are: Fred Postal, president and treasurer; Robert L. Fee, vice-president and manager, and Harry Postal, secretary. The same men constitute the Michigan Motor Sales Company, 650 Woodward avenue.

Another Selden Injunction Issued

An injunction has been served by United States Marshal Henkel on C. A. Duerr & Co., of New York, who were formerly agents of the Ford Motor Company in New York, restraining them from making, selling, or using cars infringing the Selden Patent.

Duerr & Co. were defendants in the same suit as that brought against Ford Motor Co., and the injunction now granted against them was served on Charles A. Duerr as president of the company, and Lindsay Russell, as trustee in bankruptcy for the company.

Charles A. Duerr is now New York distributor for a licensed car and the effect of the present action will be to enjoin him from selling anything but cars manufactured under Selden Patent license.

Ready at Elgin

BIG FIELD OF CRACK CARS AND DRIVERS ON HAND FOR THE FOUR BIG RACES

CHICAGO, Aug. 23—Given the same kind of weather as prevails to-day, the national stock road chassis races at Elgin on Friday and Saturday of this week should be the greatest stock car speed carnival that ever has been run on a highway. The Chicago Motor Club, which is putting on the show, has succeeded in getting together a most brilliant field of cars, which are thoroughly representative of the American industry, there being only one foreigner—a Benz in the small car race.

With about all the star drivers in the big race of the meet, the 300-mile Elgin National on Saturday, there should be excitement enough to suit the most fastidious motor enthusiast. The main race of the first day, the Illinois Trophy, has attracted eight entries, which include the National, Falcar, KisselKar, Midland, Marmon and Lexington. In the Kane County there are seven, which takes in the Corbin, Overland, Marmon, Marion, KisselKar and Cino. The Fox River Trophy event, in which the little cars will compete, has eight contenders, three of which are Stavers, two Fords, Warren-Detroit, Cole and Benz. In all, there are thirty-six entries for the four events, representing twenty-two different makes of cars. One that came in at the last minute was the third Staver.

The drawing for numbers took place this morning and the luck of the draw gave No. 1 to Arthur W. Greiner, the Chicago amateur, in the Elgin National event, in which he will pilot a National 40. The National also was fortunate in the Illinois trophy, No. 1 in that event going to Livingstone, the other driver on the team. Joe Matson in the Corbin pulled out the first postion for the Kane County trophy for his car, while the Fox River drawing resulted in Frank Kulick in a Ford drawing first position, although his number is 31. The drawing also showed a switching about of drivers. The Marmon people decided to save Harroun for the last day and put Dawson in the Illinois in Harroun's place, while Louis Heinemann took Dawson's seat in the Kane County. The KisselKar people substituted H. Endicott for Schoeneck in the big race and saved the latter for the Kane County.

While some of the teams have been in camp at Elgin for more than a week, activities in the training line did not start until yesterday because the course was not completed until the latter part of last week. The circuit was in shape for practice on Friday, but it was decided that it would be better to wait until Saturday. However, when Saturday came there was a heavy rain in the morning so that it was deemed best to postpone the practice until Monday. All conditions were favorable yesterday and some fifteen or sixteen cars were out for their first trial. There was no disposition on the part of any of the drivers to go the limit on their first appearance and most of the two hours of practice was taken up in becoming acquainted with the course. However, there were several bursts of speed, and there were several laps at better than 60 miles an hour. Grant, Harroun, Livingstone and Mulford were among those to show the capabilities of the course in this manner. The drivers declared that the circuit was in admirable shape for the racing and the first day at practice proved that the road commissioners had done their work well. The straightaways were hardly disturbed by the cars and not marked up in the least. Two of the corners stood the gaff well, but the turn at Hornbeek's, which is at the southeast corner of the circuit, was cut up some because of the fact that big trees overshadowed the road so the sun cannot get in its best licks. There was more practice to-day despite the fact that during the night there was a heavy thunderstorm. This rain, however, seemingly had no effect upon the course and by 11 o'clock this morning it was in fit shape for practice.

There still remains considerable to do before the race on Friday in the way of completing the racing plant. Workmen still are busy putting in the pits in front of the grandstand, but they are putting up permanent repair depots. Instead of making the pits of wood they are cast in con-


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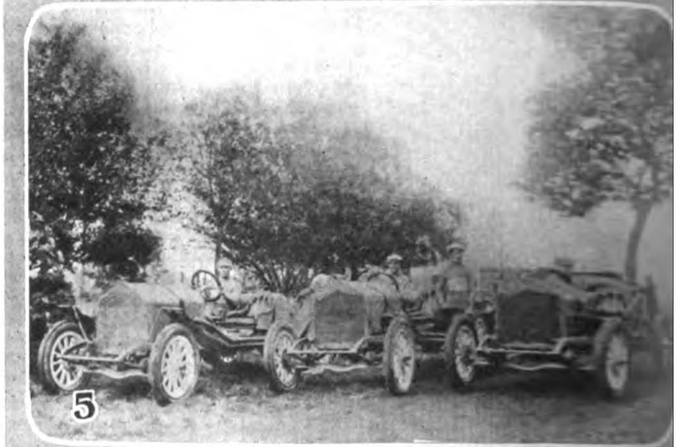

5


7

1—"Crow's-Nest" on top of the garage at the National camp

3—These huge tents furnished ideal sleeping quarters

5—The National team—Seek, Greiner and Livingstone

7—Where the hungry racers do congregate at mealtime crete so that in future years all that will be necessary in order to make them serviceable will be to dig out the dirt which will fill them during the year. The grandstands were completed yesterday; but this is no trick, for the stands are the same that were used during the Masonic doings here in Chicago. They are easily transported and by using them the Elgin association saved considerable money.

In marked contrast with other road races, the Elgin people have made every effort to down extortion. Rooming accommodations can be had in the town for $1 a day, while the storekeepers have shown they possess civic pride by not shoving up their prices. Another thing that will tend to increase the attendance is the fact that popular prices prevail on the course. There is an initial charge of 50 cents for general admission and after that seats may be had in the bleachers for 50 cents, grandstand seats for $1 and box seats for $1.50. Parking spaces are sold for $1 per car, which fact will surprise many who have been accustomed to pay from $10 to $25 for such a privilege. By catering to the masses in this way it is evident that Elgin will draw crowds that will rival the Vanderbilt in size. These crowds will be handled with great facility by the railroads, which plan to run special trains as often as the people fill them.

The course is located within one mile of the heart of Elgin, so that even if the Elgin trolleys which run to the edge of the course cannot accommodate everyone it will be no great hardship to walk. If there isn't a crowd at the races it will not be the fault of the Chicago papers, which have become so interested in the event that they devoted pages to the races last Sunday and are following up this publicity in a manner which cannot fail to bring the speed carnival to the attention of the general public. Already all of the ninety-two boxes have been sold and many reservations have been made in the grandstand.

The Elgin races will not start at daylight, as will the Vanderbilt, for Westerners have not yet been educated to that point, nor can the roads be tied up so early in the morning. Each day's racing will start at 10 o'clock, and the course will be closed by the soldiers at 9 o'clock.

There was a slight change in officials made to-day, when George E. Hunter, of Elgin, was made honorary referee, in place of C. H. Hulburd, president of the Elgin National Watch Co., whose engagements would not permit him to fill the position. Succeeding Mr. Hunter as judge is Walter Egermann, president of the Aurora Automobile Club which presented the Fox River trophy. M. H. Portmer, of New York, will handle the Warner Electrical Timing apparatus that will be used.

Following is a complete list of entries for the four events:

LIST OF ENTRIES FOR THE ELGIN TOURNAMENT

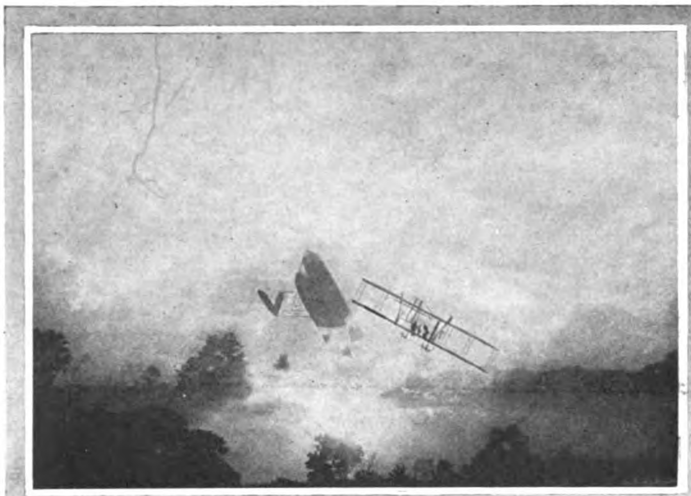
Car	Entrant	Model	No. Cyl.	Bore	Stroke	Driver
Elgin National Trophy						
1. National	A. W. Greiner	1910	4	5	5 11-16	A. W. Greiner
7. National	National Auto. Co.	1910	4	5	5 11-16	A. Livingstone
10. Marmon	N. & M. Co.	1910	4	4½	5	J. Dawson
4. Marmon	N. & M. Co.	1910	4	4½	5	R. Harroun
3. Lozier	Lozier Motor Co.	1911	4	4	5⅝	R. Mulford
11. Matheson	Matheson Auto Co.	1911	6	4½	5	G. Reynolds
6. Alco	American Loco. Co.	1909	6	4 4-5	5 3-5	H. Grant
8. Simplex	L. A. Shadburne	1910	4	5¾	5¾	H. Saynor
9. Kisselkar	H. P. Branstetter	1910	4	4⅞	4¾	H. Endicott
2. Black Crow	Black Mfg. Co.	1910	4	4 5-16	4⅞	F. Stinson
14. Jackson	R. Temple Auto Co.	1910	4	4⅞	4¾	E. F. Schiefler
12. Knox Six	Knox Auto. Co.	1910	6	5	4¾	B. Oldfield
5. Simplex	L. A. Shadburne	1910	4	5¾	5¾	G. Robertson
Illinois Trophy						
7. National	A. W. Greiner	1910	4	5	5 11-16	A. W. Greiner
1. National	National Auto. Co.	1910	4	5	5 11-16	A. Livingstone
6. Marmon	N. & M. Co.	1910	4	4½	5	J. Dawson
2. Falcar	Fal Motor Co.	1910	4	4⅛	5¼	W. H. Pearce
4. Falcar	Fal Motor Co.	1910	4	4⅛	5¼	J. F. Gelnaw
3. Kisselkar	H. P. Branstetter	1910	4	4⅞	4¾	H. Endicott
5. Midland	Midland Motor Co.	1910	4	4½	5	R. Ireland
8. Lexington	Lexi'gt'n M. Car Co.	1911	4	4½	5	R. Drach
Kane County Trophy						
23. Marmon	N. & M. Co.	1910	4	4	4½	L. Heineman
26. Marmon	N. & M. Co.	1910	4	4	4½	D. Buck
27. Cino	Haberer & Co.	1910	4	4⅜	5	W. Fritzsche
22. Overland	Overland Motor Co.	1910	4	4¼	4¼	A. Schillo
25. Kisselkar	H. P. Branstetter	1910	4	4¼	4¼	G. Schoeneck
21. Corbin	Corbin M. V. Corp.	1910	4	4¼	4½	J. Matson
24. Marion	—. —. ———	....	.	.	.	A. Monsen
Fox River Trophy						
31. Ford	Ford Motor Co.	1910	4	3¾	4¼	F. Kulick
38. Ford	Ford Motor Co.	1910	4	3¾	4¼	J. Hatch
33. Cole	Cole M. Car Co.	1910	4	4	4	W. Endicott
32. Staver-Chicago	Staver Car. Co.	1910	4	4	4	C. Cheney
36. Staver-Chicago	Staver Car. Co.	1910	4	4	4	G. Monkmeier
35. Benz	E. A. Hearne	1910	4	3½	5½	E. A. Hearne
34. Staver-Chicago	Staver Car. Co.	1910	4	4	4	A. Crane
37. Warren	—. —. ———	....	.	.	.	A. W. Miller

2—Hurrying work on the pits opposite the grand stand

4—There is always plenty doing at the Midland camp

6—Showing the stretch of road opposite the Corbin camp

8—Part of the National camp, showing the repair pit



The battle in the clouds—a realistic picture caught by the staff photographer during the aviation meet at Asbury Park

Aviator Curtiss and Lieut. Fickle show utility of aeroplane in war at the Asbury Park meet

The Motor in the Air

CONSPICUOUS EVENTS AMONG AVIATORS DURING THE WEEK —WRIGHT MACHINE FREED FROM FRONT INCUMBRANCE PROVES SUPERIORITY OVER OLD TYPE

At Asbury Park, a summer resort on the New Jersey coast near New York City, an aviation meet was opened August 10 and was still in progress August 23, though at first arranged for ten days only. The opening days were made notable by two accidents. Dropping from a height of 2,000 feet a parachute jumper named Prince, whose apparatus failed him for causes which have been explained but still remain unknown, met immediate death. The aviators at the meet were all employed by the Wright corporation. One of them, Walter Brookins, tried to make a landing by spiral descent to a certain narrowly defined spot and fell from a height of about 100 feet into a crowd of onlookers, several of whom were injured. Brookins escaped with severe contusions of his face, and appeared again later at the meet, undaunted. Maurice Garsuch, 18 years old, whose skull was at first supposed to have been fatally fractured, has since filed suit for $15,000 damages, and George Burnett, who suffered concussion and dislocation of the hip, is reported to be preparing to enter suit for a still larger amount. The machine was smashed beyond repair. No indictment was found. To replace the destroyed machine a large new Wright biplane was sent to the meet from Dayton, Ohio, and arrived on August 15. Its construction and performances soon became the sensation of the meet and of world-wide importance. All that remains in front of the biplane proper in this machine is the fore part of the skids, the front elevating planes or tilt rudders having been abandoned, and the up-and-down direction is controlled solely by means of a rear horizontal single-plane rudder, as in monoplanes and Voisin biplanes. The size of the new machine is figured sufficient for carrying six persons. In its performances on Monday, August 22, it proved itself capable of much greater mobility, in the acrobatic evolutions by which it was tested and exhibited, than the older Wright type, and it flew steadier in the straightaway and faster. Unless a bad-weather test should eventually prove its equilibrium to be beyond the aviator's control, in greater degree than for the older type, it will therefore be extensively imitated, being in itself an adaptation from other aviation machines.

John Moissant, a cavalier of fortune hailing from Chicago, but known in many other parts, started from Paris with a French mechanic as passenger Tuesday evening, 5:45 o'clock, August 16, and flew to Amiens, arriving 7:40; started from Amiens, after a gay night with friends, Wednesday morning, 5:45, reached the Channel at 10:50 a. m., continued across and reached Tilmanstone, six miles beyond Dover, just at noon. He said he had steered by a compass suspended in glycerine and placed between his feet, being unable to see anything by reason of foggy weather. Several attempts to get from Tilmanstone to London between August 18 and August 22 came to naught through troubles with the Gnome motor, which the French mechanic could not sufficiently remedy. On August 22, according to Associated Press dispatches, Moissant and his companions, in making a last attempt to reach London, only twenty miles away, despite a contrary wind estimated at thirty miles per hour velocity, were hurled to the ground, and the machine was much damaged, while the aviators escaped unhurt. Before this flight Moissant is reported to have flown only five times.

On August 17 a 488-mile cross-country contest, which was divided into laps and arranged so as to give the participants great latitude in choosing time and weather, was won by Leblanc driving a Blériot machine. Auburn was second, and Legagneux in a Farman biplane was in at the finish, though disqualified on a technical point. Several army officers also finished the circuit, but were prohibited from competing. The number of contestants from the beginning included many of the best-known French aviators.

On August 20 Clifford B. Harmon, of New York, a well-known real estate dealer and amateur aviator who has been practising flights with Farman and Curtiss biplanes at Mineola, L. I., flew in a Curtiss machine from Hempstead, L. I., over the wooded land surrounding Roslyn, across the Sound to near Mamaroneck, landing close to the country seat of his father-in-law, E. C. Benedict, and won the Doubleday prize for the first who crossed the Sound.

Industrial Aeroplanes

(*Continued from page 302.*)

Further, as it is the air resistance itself which places the resilient blades at their working pitch, the reaction of the blades against this deflection must be of equal force, and, as this reaction is delivered against the atmosphere at exactly the same angle and otherwise exactly the same conditions as those governing the thrust due to rotation (of either the rigid or the resilient propeller), the total thrust of the resilient propeller must be exactly twice (minus friction losses) that of the rigid propeller.

Through a chain of reasoning no less cogent than simple mathematics, it is therefore established that a resilient propeller, in which the resiliency has been properly calculated and materialized to equal the resistance against rotation at a desirable pitch, will consume and deliver twice as much power as the rigid propeller of the same desirable pitch and of the same identical dimensions.

This alone places the properly designed resilient propeller in a separate class.

In order to simplify the reasoning it has been assumed here that all of the resistance against rotation is air resistance and that all the air resistance is utilized to deflect the resilient blades. A different assumption simply makes a stronger case for the resilient propeller, reducing the power consumption to be expected of it while maintaining the thrust it delivers as at least twice that of the rigid propeller. The different assumption does, however, affect the spring resistance which should be employed. It should correspond (with allowance for the leverage employed in overcoming it) not to the total resistance against rotation but to that portion thereof which is utilized to cause the deflection. And this is probably equivalent to the portion which is transformed into propulsive thrust by rigid propeller blades. So, the advantages to be gained by means of resilient construction, once its intricacies shall have been mastered, have been rather understated than overstated.

Further consideration of all the factors involved, for which there is no space in this article, leads one to assume that the resilient propeller will eventually do a good deal more than may now be proved for it in words, and especially that the power which it will consume will be taken in practice not from the motor (so as to necessitate an increase of motor power) but from the waste which occurs when motor power is applied to rotate a rigid propeller. No absolutely compelling argumentation can be offered for this contention, but it is known that the thrust produced by the most improved standard propellers nowise corresponds to the power which produced the thrust, coming scarcely within 20 per cent. thereof, and that nevertheless the slip in these propellers is extremely small and perhaps in some cases even negative, so that their efficiency measured by their slip, as customary for marine propellers, approaches 100 per cent. This situation seems to indicate that the rigid propeller, save for what action of a different order may be due to the transverse curvature of the best rigid blades, simply screws itself through the atmosphere but wastes practically all the thrusting capacity which might be gained by adapting the blades to work by "impulsion" as well as by pressure. The importance of impulsion in steam turbine engines being fairly well understood, it would seem rational to attempt to apply a similar principle to atmospheric propellers which act in a medium no less elastic than steam. Bearing in mind the capacity of the resilient propeller for absorbing and delivering a powerful thrust, twice as powerful a thrust as the rigid propeller of the same dimensions can be made to deliver, it may be rash to assume that the resilient construction constitutes the only means for gaining impulsion and a 100 per cent. increase in power economy, but a certain probability is at least established to the effect that the resilient propeller is capable of a highly important practical development. And it is possible to predict, with only one alternative, one of the results, which is the complete abandonment of slip as a measure for the efficiency of atmospheric propulsion (and in fact marine propulsion as well). This follows logically from doubling the thrust of the rigid propeller with a resilient propeller of identical dimensions. The doubled thrust must produce a speedier forward movement, which means a pronounced negative slip. And a negative slip is an absurdity as a basis for measurement. The alternative prediction is that resilient propeller blades will be found to work most effectively at double the pitch used for rigid ones.

The skids in the described aeroplane machine are intended for use with the practically developed resilient propeller.

Thomas Dealers Convene at Buffalo

Buffalo, Aug. 20—The E. R. Thomas Motor Company's Dealers' Convention closed a three-days' program of business and pleasure with a smoker at German-American Hall this evening. There were speeches made by President E. R. Thomas and other officers, and a vaudeville entertainment was enjoyed by about 90 guests of the company.

Thursday afternoon at 1:30 the dealers took dinner at the factory. After a short business session, they were entertained with a beefsteak supper at the Hotel Lafayette. The dinner was enlivened with bits of comedy contributed by the officers and visitors. This was followed by a theater party.

The business session on Friday morning had for its principal feature an engineering talk by H. G. McComb, chief engineer of the company, dwelling upon the various functions of the chassis and motor, and expatiating upon the new Thomas Flyer.

The afternoon session was taken up with a demonstration of the 1911 models, together with a talk on body construction by A. W. Woodruff.

Mack Wins in Its Class in Truck Roadability Run

The entry of Shave Brothers & Wilson, the Mack, driven by E. Turgeon, has been announced as the tenth winner in the recent roadability run for motor trucks conducted by the Philadelphia *North American* and the Quaker City Motor Club. This was in the class for mammoth trucks (gasoline) above five tons, which was not decided by the contest committee at its meeting last week.

Group photograph of the convention of Thomas Flyer dealers at Buffalo last week

Communications

THE LOGIC OF THE PROPOSITION AS HANDLED BY A MAN FROM NEVADA AND OTHER TERSE COMMUNICATIONS DISCUSSING THE MERITS OF THE AUTOMOBILE FROM AN ECONOMIC POINT OF VIEW

The Logic of the Proposition.—"And there is no new thing under the sun," Ecclesiastes, 1:9. In the words of our text the inspired writer foretold the coming of those prophets of evil, who see peril to our country in the automobile. From the wireless telegraph back to the day when Eve first decided to wear a fig leaf, victims of mental strabismus have shied at every step in the world's progress.

In 1673, just after the introduction of stage coaches, a book entitled, "The Grand Concern of England, etc.," denounced them as among the greatest evils that ever happened to the Kingdom. It alleged that "traveling by coach was calculated to destroy the breed of horses and make men careless of good horsemanship; that it hindered the training of watermen, and seamen, and interfered with the public resources; that those who were accustomed to traveling in coaches became weary and listless when they rode a few miles and unwilling to get on horseback, not being able to endure frost, snow or rain, or to lodge in the fields; that to save their clothes and keep themselves clean and dry, people rode in coaches and thus contracted an idle habit of body; that this was ruinous to trade, for the reason that most gentlemen, before the days of coaches, were wont to ride with swords, belts, pistols, holsters, portmanteaus and hat-cases, which, in the coaches, they have little or no occasion for; for when they rode on horseback they always carried along an extra suit for change at the journey's end or by the way; but in coaches they would ride with a silk suit, an Indian gown with sash, silk stockings, and beaver hat, and carry no other along, because they escaped the wet and dirt which on horseback they could not avoid; whereas, in two or three journeys on horseback these clothes and hats were wont to be spoiled; which done, they were forced to purchase new, and that increased the consumption of manufactures and the employment of the manufacturers, which traveling in coaches doth in no way do."

The logic of the proposition is unanswerable, and the style of reasoning singularly familiar. With slight paraphrasing, it would present, even more convincingly than the most lurid pipe dream, the necessity for aborting the automobile industry.

A friend of mine has just come from Iowa, where he has for many years done business in a large way, and come to know the State and its conditions thoroughly. He tells me that this latest "bugs-in-the-attic" malady is epidemic in that State, and that many of the bankers have it in so virulent a form as to seriously embarrass the farming industry. He further tells me that the increase in actual values in that State within the past ten years, due to the motor vehicle alone, is, on a most conservative estimate, not less than half a billion dollars.

One phase of this subject which I haven't seen referred to is that the present universal, insistent demand for improved highways throughout the length and breadth of this country has come principally because of the motor car. Without it we would not have reached where we are now for the next twenty-five years. As this is a continuous and increasing national asset, it can be measured only as capital, upon which the money value of one year's economic benefit due to the motor vehicle's part of road improvement would be, say, 5 per cent.

Wonder when Ike Partington will give his mother a hunch to cut out the attempt to sweep back the Atlantic Ocean with her broom, and beat it?—James W. Abbott, late special agent U. S. Highway Department, Piocke, Nevada.

A Quandary Which Is Still Quandering—His wife wanted an automobile, just a little one with seats for two and a dog, but he could not quite "see it." There were so many other things he had in mind and knew he would want some time. But now she had finally tucked away $800 out of her own personal savings. It was all in nice clean yellowbacks in a box downtown. The little scoundrel had been knitting fashionable sweaters, while he was at his office, and had sold them regularly to "Francoise," the ladies' outfitter. It was getting hard to resist so much ambition and persistence, hard to tell her about cost of "upkeep" and the valuable time spent in gadding about, interest lost when they did not use "it," garage charges if they stored "it" and insurance troubles if they built a shed for "it" in the backyard. He had taken Tony home with him this evening to stave off argument. Tony was his lawyer friend, a smart, resourceful chap and a nice fellow, though diplomatic to the backbone.

It did not work out as calculated. There is a tide in the affairs of women when a barrier does not stop them, but only invites them to leap. Chauffeuse-to-be appealed direct to Tony. But Tony was prepared and did not need to glance from one to the other. "Yes, it would be nice, of course. What car had you thought of buying?" He said it with the grace that comes so much easier to the proxy than to the principal. Tom looked doubtful. Was Tony going back on him?

"Well, if you have not really made up your minds yet, I should advise you to take an automobile paper for a while," Tony resumed after explanations. "I have a friend who tells me that it is astonishing how much real information seeps out between the lines of one of those papers when you read it regularly for three or four months. They simply cannot hold it back, much as they try." Tom saw the light. Here was at least delay. But after that, what? It might come out worse than ever. She might get the impression that nothing less than a $2,000 car would be worth while.

"Ha, ha, ha, I had you scared, Tom. Don't deny it." Tom was following his friend to the street car line, and they had just turned the corner safely. "What, you old stylite, where have you been these years? Don't you know how that paper game works? They are just for men. There is not a woman who can read one of them without getting disgusted and all mixed up. All you have to do now, Tom, is to get your wife to read it regularly, bless her innocent soul. But look out for yourself, it is apt to work the other way around with you." "I guess you meant all right, Tony," Tom said briefly, "and I suppose I shall have to chance it, but——well, good night, Tony."

The Motor Car Not an Extravagance—It is argued that many people cannot afford to own motor cars. The answer to this argument is that the ownership of a motor car so increases the radius of the owner's activity, and has such a pronounced influence on his efficiency and health, that he is able to earn an income that will enable him to support a motor car. Of course, there are exceptions to prove this rule, just as there are exceptions in all other lines. It can be admitted, without prejudice to the industry, that some persons may have purchased motor cars at a cost and of a type not adapted to their requirements. This does not prove that this class of persons cannot afford to own motor cars. It must not be assumed that just because it is a motor car, that it is an unnecessary expense or extravagance. The use of the motor car does not distract its owner's attention from his business. On the contrary, its use enables him to do more business, with less effort, in the same hours, by shortening the time of his errands and business calls. At the same time it affords opportunity for healthful recreation for himself and family and saves many expenses which were common before its use began.—C. C. Hanch, Treasurer of the Nordyke & Marmon Company.

Award of Trophies in Brooklyn Dealers' Run

A. R. Pardington, referee in the recent two-day reliability contest of the Brooklyn Motor Vehicle Dealers' Association on Long Island, has announced the winners of the eight handsome trophies contested for in the two sections of the contest as follows:

Martin-Evans trophy, division 1A, cars that sell for $800 and under, won by No. 14 Hupmobile, driven by D. M. Bellman.

Brooklyn *Daily Times* trophy, division 2A, cars that sell for $801 to $1,200, won by No. 4 Hudson, driven by W. H. A. Bruns.

Standard Union trophy, division 3A, cars that sell for $1,201 to $1,600, won by No. 26 Crawford, driven by W. J. Houldcroft.

The Julius Bindrim prize, offered as a second trophy in division 3A, was won by No. 8 Maxwell, driven by E. T. Bloxam.

The Kingsley Swan trophy, divisions 4A, 5A, 6A and 7A, for touring cars that sell for $1,601 and over, won by No. 21 Columbia. driven by G. M. Wagner.

The Brooklyn *Life* trophy, competed for in divisions 4A, 5A, 6A and 7A, open for runabouts that sell for $1,601 and over, won by I. C. Kirkman, who drove No. 1 Columbia car.

In the tourist section the most consistent running time was made by the Ford, No. 50, to which is awarded the Brooklyn *Daily Eagle* trophy.

The next best running time in the tourist division was made by No. 52 Cadillac, driven by H. G. Woodworth, who wins the Long Island Automobile Club trophy.

Auto Mail Delivery Efficiency Test

PHILADELPHIA, Aug. 22—The first United States mail automobile efficiency trial, to be held under the auspices of the Quaker City Motor Club, will take place during the week of August 29 to September 3. Each day two cars will start from a point selected by the post office authorities, the object being to reduce the time of delivering the early morning mail. The time en route is to be strictly noted and the car finishing delivery in the quickest time will be awarded a sterling silver trophy. So far the following entries have been received:

Louis J. Bergdoll Motor Car Company, Bergdoll, August 29; Oxford Automobile Company, Brush car, August 29; Philadelphia K. M. F. Company, Hudson car, August 30; Olds-Oakland Company, Oakland, August 30; W. J. Sprankle, Overland, August 31; Harvey Ringler, Chalmers-Detroit, August 31; H. C. K. Motor Car Company, Kline-Kar, September 1; Longstreth Motor Car Company, Pullman, September 1; Prescott-Adamson, Reo, September 2; Continental Motor Car Company, Parry, September 2; Penn Motor Car Company, Mitchell, September 3; Johnson Motor Car Company, Al La Roche, September 3.

Catskill Reliability Run and Hill Climb

Entry blanks are out for the two-day Catskill Reliability Contest and Hill Climb September 10 and 12. The tour will start from New York on Saturday morning, September 10, at 7:30 o'clock, but the cars will not check out until assembled in line at Edgewater, N. J. The tourists will rest on Sunday in the Catskills and on Monday the hill climb will take place on Kaaterskill Clove. A fine program has been arranged for the hill climb. The classification will be by price and piston displacement in cubic inches. The events are as follows:

No. 1—Gasoline stock cars, $800 or under.
No. 2—Gasoline stock cars, $801 to $1,200.
No. 3—Gasoline stock cars, $1,201 to $1,600.
No. 4—Gasoline stock cars, $1,601 to $2,000.
No. 5—Gasoline stock cars, $2,001 to $3,000.
No. 6—Gasoline stock cars, $3,001 to $4,000.
No. 7—Gasoline stock cars, $4,001 and over.
No. 8—Open to amateurs. Limited to cars owned by residents of Catskill and a radius of fifteen miles from Kaaterskill Clove Mountain. Handicap according to price.
No. 9—Gasoline stock chassis between 161 to 300 cubic inches piston displacement.
No. 10—Gasoline stock chassis between 301 to 450 cubic inches piston displacement.
No. 11—Gasoline stock chassis between 451 to 500 cubic inches piston displacement.

Society of Automobile Engineers Growing Rapidly

The following members and associates of the Society of Automobile Engineers were elected this week: Frederick W. Blanchard, Faulkner-Blanchard Motor Car Co., Detroit, Michigan; Henry L. Barton, Metal Products Company, Detroit, Michigan; Edward W. Curtis, Jr., Studebaker Bros. Mfg. Company, Chicago, Ill.; DeWitt Clinton Cookingham, Rauch & Lang Company, Cleveland, Ohio; Geo. W. Cooke, Pierce-Arrow Motor Car Company, Buffalo, New York; T. P. Chase, Chalmers Motor Company, Detroit, Michigan; Wm. Morris Davis, E. R. Thomas Motor Company, Buffalo, New York; Edward Dixon, Thos. B. Jeffery & Co., Kenosha, Wisconsin; Frank E. Ferris, Brush Runabout Company, Detroit, Michigan; H. W. Gillett, Aluminum Castings Company, Detroit, Michigan; Starling Henry Humphrey, Brush Runabout Company, Detroit, Michigan; Geo. N. Hickey, Van Dyke Motor Car Company, Detroit, Michigan; Wm. H. Hogle, Brush Runabout Company, Detroit, Michigan; Harold H. Kennedy, The Waverley Company, Indianapolis, Indiana; Fritz Loeffler, Mannheim, Waldorf, Germany; Ralph L. Morgan, Ralph L. Morgan Company, Worcester, Mass.; Horace Henley Newson, McCord Manufacturing Company, Detroit, Michigan; George L. Norris, American Vanadium Company, Pittsburg, Pa.; Chas. B. Rose, Velie Motor Vehicle Company, Moline, Ill.; Wm. H. Reddig, Chalmers Motor Company, Detroit, Michigan; Charles R. Short, G. & E. Power Company, Philadelphia, Pa.; Nicholas Shamroy, Landau & Golden Company, New York City; Clyde W. Stringer, Brush Runabout Company, Detroit, Michigan; Geo. A. Weidely, Premier Motor Mfg. Company, Indianapolis, Indiana; Frank E. Couch, 316 Hudson Street, New York City; Charles F. Case, Oliver Motor Car Company, Detroit, Michigan; Clyde E. Dickey, Denman & Davis, New York City; Wellington F. Evans, Metal Products Company, Detroit, Michigan; Henry May, Pierce-Arrow Motor Car Company, Buffalo, New York; George S. Morrow, Stepney Spare Wheel Company, Chicago, Ill.; Albert F. Rockwell, New Departure Mfg. Company, Bristol, Conn.; Winfield DeWitt Rheutan, The White Company, Cleveland, Ohio; R. A. Radle, Clark Sales Company, Detroit, Michigan; Thomas Towne, Ideal Opening Die Company, New York City; Walter Webster Totman, Whitney Mfg. Company, Hartford, Conn.

Westerners Contemplating Secession from A. A. A.

SEATTLE, WASH., Aug. 22—Convinced that the West, and particularly the Pacific Coast, will never derive any benefit from either the A. A. A. or the A. C. A., Frank M. Fretwell, a prominent member of the Automobile Club of Seattle, and Clifford Harrison, assistant secretary of the Portland Automobile Club, have issued a call for a meeting to be held in Seattle, September 4th, to discuss plans for the formation of a Western Automobile Association. The plan embraces every club in Washington, Oregon, California and British Columbia.

At that time the Portland, Ore., and Vancouver, B. C., clubs will attend in a body as guests of the Seattle Automobile Club. The delegates attending the meeting will be asked to bring a certified statement of the membership of the club they represent, as the voting will be on the basis of the club membership.

It is also Harrison's idea to publish a substantial periodical in connection with the association and to make the annual dues large enough to cover the cost of sending copies to each member, the book to be similar to the one published by the A. A. A.

George S. Patterson to Be President

Having resigned his position as general manager of the Gaeth Automobile Company, of Cleveland, Ohio, George S. Patterson is now in the East on a mission of more than the usual importance. It is whispered about that he is to be the president of one of the important companies and that he is on a "still hunt" for men and material with which to put the finishing touches on his already successful career in the automobile field.

Perfect Scores in Munsey

(*Continued from page 297.*)

of Rhode Island and those of Southern Connecticut. They remained in practically the same condition as he left them until within the past ten years, when the coming of the automobile gave road building a decided impetus.

From New London to Westerly there could be considerable improvement, but from that point to Narragansett Pier and from the Pier for 25 miles toward Providence, the roads leave nothing to be desired. The route to Boston was over the chief line of communication between the earliest colonies in New England. Governor Winthrop laid out most of the roads, and traces of ancient earthworks erected by him to protect the road during Indian troubles are still visible.

Historically the roads were interesting. Leaving the Thames, the way led past the school house in which Captain Nathan Hale taught when he received the call to arms that meant shameful death and immortal fame for him. Fort Griswold, that ill-fated stronghold that was overwhelmed by a British force, next attracted attention. The story of Colonel Ledyard's foul murder and the massacre of the handful of defenders of the fort were remembered while the cars whirled by.

The end of the day's run at Boston, with all the thrilling memories of that city, was an enthusiastic finale to a day of mixed feelings. The city of Providence was generally censured for the position assumed by the authorities against the tourists and not a voice was raised in behalf of the action.

One of the features of the night stop at New London was an informal reception at the exclusive Thames Club, at which Mr. Doolittle, of the editorial staff of THE AUTOMOBILE, was a guest of honor. After being presented to all present Mr. Doolittle was asked to speak, and in a somewhat detailed address he treated of the mission of the motor, particularly applied to conditions in the State of Connecticut, pointing out the vast increase in real estate valuation that has resulted by reason of the effect of the automobile in making great tracts of barren land valuable for the bungalow sites of rich men living in New York and other centres of business. He also outlined the purpose of the Munsey Historic Tour.

Fourth Day

PORTLAND, ME., Aug. 19—In a driving rainstorm the Munsey tourists started the fourth day of the run from in front of the Hotel Lenox. Boston is a difficult place to get out of, and several of the cars managed to get lost before reaching the city limits. The first few miles were through territory rich in historic incident. The place from which Paul Revere started his famous ride; the scene of the glorious defeat of Bunker Hill and a dozen other events treasured in the history of the nation, were passed in getting started on the great Atlantic Boulevard leading to Portland. This road was built early in the last century as an outlet for the rum and sugar manufactured at the Maine metropolis from the cane syrup and molasses imported in the holds of the numerous ships that plied between that port and the West Indies. Naturally there was other freight to be moved over it, as the country developed, and at one time the travel from Boston, and even farther south and west, was comparatively heavy. But in the interim that followed the decay of the rum and sugar trade, and before the fish industry of this section became a commanding factor, the road fell into disuse to a large extent and only within the last few years has it been rehabilitated. In places it is about as fine as anything so far traversed by the tourists, but in others the work of straightening, smoothing and hardening is still in the early progressive stage.

Maine is taking a vast interest in State roads, and in no fewer than four spots of to-day's route the caravan passed road-making gangs. In New Hampshire the highways were in uniformly good condition. One of the pleasant things about the run through Massachusetts was the hearty reception accorded the travelers at Gloucester, Mass., the ancient seaport, whose ships once sailed on each of the seven seas. Gloucester is not resting on the memory of a glorious past. It is a lively little place and its citizens realize the commercial importance of the automobile even better than several of the avowed centers of motoring. When the tour passed through to-day, the Board of Trade of Gloucester was on hand with a welcome that prejudiced every member of the touring column in favor of the city. Interesting booklets descriptive of the city, its past, present and possible future, were given to everybody in the procession with a hearty expression of good-will toward the automobile.

Beverly, the summer home of President Taft, was another object of curiosity to the caravan.

In Maine the route followed the coast practically all the way to this city, and at the numerous summer resorts big crowds of pretty girls cheered the progress of the tour. No conflict with the authorities was reported to-day, which was a welcome change from the Rhode Island experience.

The Staver-Chicago, No. 23, was the only car that lost its chance to secure a perfect score as a result of the day's run. This car damaged a bearing in the differential on Wednesday, but was not so seriously hurt as to be put out of the running on account of that mishap. But when the car had proceeded two and a half hours out of Boston one of the rear springs gave way and it required 2 hours and 27 minutes of repair work before the car could move on. This caused the Staver-Chicago to be 42 minutes late at noon control and the total penalty assessed by the technical committee was 169 points.

The Inter-State also earned some additional penalties, as some more loose metal, including a bit of phosphor bronze, turned up in the gear case. Mr. Dill decided to accept the penalization now, rather than to wait until later in the run, when he might get much more, and after a thorough examination of the transmission, which occupied 62 minutes, he announced that the car was again in good shape. The penalty imposed to-day was 62 points, making the total against the Inter-State 111.

The score stands at the end of the day with 21 cars still in the list of perfect records.

Fifth Day

BETHLEHEM, N. H., Aug. 20—Across the State of Maine and half way through New Hampshire was the course of the fifth day's running of the Munsey Tour. The roads were smooth enough practically all the way, but the grades and turns proved too much for several of the cars and accomplished the complete downfall of one of them.

It was the Maxwell runabout that succumbed just after passing through Crawford's Notch and with nothing like a real obstacle between the car and the night control. The camshaft broke on the exhaust side, stripping the gears and messing up the mechanism of the car so that it was withdrawn from competition, the penalty assessed being 1,000 points.

The Elmore, privately owned, also met with its first set-back during the day. A broken terminal in the ignition required three minutes' work to fix, and the motor was stopped during that time. The net result was 6 demerits.

The Staver-Chicago suffered further penalty when the upper half of the left rear spring gave way. The penalty was fixed at 73 points.

The Moon car also added a single point to its score, when the jarring and swinging necessary to make 20 miles an hour rendered one minute's repair work necessary on the rear fender. This gives the Moon a total of 2 points.

One of the Fords is in trouble with a loose motor base. The Columbia and Pierce-Racine still have clean scores, despite loose connecting rods in one and ignition trouble in the other.

The wounded Maxwell car was towed away to the Mount Washington garage by the Brush Runabout, used as the photographer's car. All the cars not specially mentioned are apparently in as good condition as when they started.

The Thomas Press car that met with mishap near West Point last Tuesday was repaired by driver George Miller and was rushed over the course to join the caravan at Boston. This the Thomas was able to do, and has been in a prominent position in the line ever since.

The tour proved to be particularly popular in Maine, and clear to the Western boundary, wherever there was a hamlet, crowds gathered to cheer the procession.

The course in New Hampshire, through the heart of the Bretton Woods and the White Mountains, was by far the most picturesque of any so far. The level of the highway rises constantly from the State boundary until the course lies between solemn-looking cliffs, clad in summer verdure and rising precipitously from the road, which is fully 2,000 feet above the level of Casco Bay at its highest point. The way passes through what is called Crowford's Notch, a gash in the mountain, which has been cut down materially so as to make a passable wagon trail.

From the Notch to Bethlehem the roads were excellent, and the 27 cars left in the contest had no difficulty in reaching control within the time limit.

When the city of Portland was the main seaport for this part of the United States and a large part of Quebec, the traffic toward the seaboard and back again was conducted over the old international highway. Long before that road occupied its present direction and position it was one of the most heavily-used highways in this part of the country. When it was first laid out to Quebec from Portland it made a wide detour, skirting the southern foothills of the White Mountains. As far back as 1772 a hunter, Thomas Nash by name, discovered a pass through the mountains that he reported as available to shorten the road distance to Canada. The story, as told to-day, is that Nash, while out hunting near Mount Washington, then an unnamed peak in the wilderness, lost his bearings, and in trying to discover some peak that was known to him, he climbed a tree, and in that elevated position saw that there existed a narrow gorge between two of the giant hills.

The outbreak of the war for independence caused Nash to forget his discovery for the time being, but after peace had been restored he made a formal presentation of the facts to the State government and received an offer of a large land grant if he could demonstrate the feasibility of the route by leading a horse through the Notch. In 1803 Nash made the attempt and succeeded in getting through. Just how much land was given him as a result of his boldness is debatable, but descendants of the Nash family in the vicinity are accounted among the most prosperous of the local citizenship.

The result of finding the pass in the hills was to cut off at least 100 miles from the former route, and inasmuch as it facilitated trade, it was recognized as a good work even in that early day. To-day the road that follows the course laid out by the hunter is as nearly a perfect specimen of what a mountain road should be as can be imagined.

While the inland wagon trade of Portland has dwindled to nothing and the road is no longer used to bring in freight to be shipped in American vessels, it is of wide importance. For local traffic it is remarkably adequate, and as an automobile highway it answers its purpose admirably.

Sixth Day

Burlington, Vt., Aug. 22—The State of Vermont appreciates the automobile. From one side of Vermont to the other, the heartiest greetings of the tour were extended to the Munsey tourists to-day. No cross-roads were too significant and no city too large to welcome the travelers and the route of the sixth day of the tour, from Bethlehem to the shores of Lake Champlain, was the scene of a continuous ovation.

Vermont is well justified in her favorable position toward the motor car for to that expression of development the whole transverse road system of the State is undoubtedly due.

It was automobile day at Montpelier and the capital was decked out in bunting when the head of the caravan pushed itself over the last hill and entered the city. The business houses closed at noon in honor of the tour and the Automobile Club of Vermont, one of the most active State organizations of its size in the country, arranged for its annual parade through the streets of the capital to take place while the Munseyites were in midday control.

At Montpelier the tour was welcomed by the Governor and other dignitaries and the Automobile Club of Vermont held open house in half a dozen places. After the parade of local automobiles, the run of the afternoon to Burlington was commenced and night control was reached at about 4 o'clock.

The first real mixup of the tour occurred at Burlington. The day's run for Tuesday had been scheduled at 202 miles, but it was found that the time required to ferry over all the cars to Chazy, at the northern end of Lake Champlain, would require over six hours and that boats were not available to do the work at night. Therefore, Referee Ferguson decided to have the cars ferried to Plattsburg and to start the run from that place, making the road distance 137 miles for the day. After preliminary arrangements had been made to do this it was found that only fifteen cars could cross during the night and these were ferried over, the rest being obliged to wait until morning.

Great Western car No. 18 was badly wrecked this afternoon not far from Burlington. The cause of the accident was a careless pedestrian, a woman who stood idly in the path of the car and made no effort to escape, forcing the driver to swing out suddenly. The place was just at the entrance to a covered bridge and there was not sufficient room for the car to pass. It struck the abutment of the bridge and wrapped its front wheels and axle about the timbers. Washington car No. 5 also had some hard luck.

Five miles out of Bethlehem, it was discovered that the radiator was dry and water had to be taken on. Mr. Carter explained to the referee that the car had been filled up in control but that probably some mischievous or careless person had turned the cock and let the water escape. As the car did not leak after being filled, this view of the case was officially accepted and no penalty was imposed.

The Crawford, No. 27, lost its perfect score when it burned out a main bearing on its shaft somewhere east of Montpelier and was late at noon control by 435 minutes. For the resulting trouble to transmission and rear axle, a technical penalty of 432 points was also given. The car was able to join the procession again, and is apparently working smoothly.

The Ford 30 was given eight demerits for work on a loose strut rod bracket, thus taking the car out of the clean score class.

The wrecked Great Western was drawn to a nearby blacksmith shop and the smith labored over it until late in the night. He practically made a new wheel, straightened the bent axle and it was reported that the car would check out to-morrow.

Seventh Day

Saratoga, Aug. 23—The route to-day was materially shortened by shipping the cars across the lake to Plattsburg and starting the run from Bluff Point instead of going clear up to Chazy. It was found that to follow the originally planned route would require ferrying the cars a longer distance in smaller steamers and that it would take at least six hours to do so. Therefore, part of the cars were shipped across the Lake last night and the remainder this morning. The start was made at 11 o'clock, and the run through the Adirondacks, touching Elizabethtown and finishing at Saratoga, was uneventful. The Glide car came to grief during the morning run. This car reported by telegraph that it would withdraw on account of trouble with a main bearing, and loosened connecting rods.

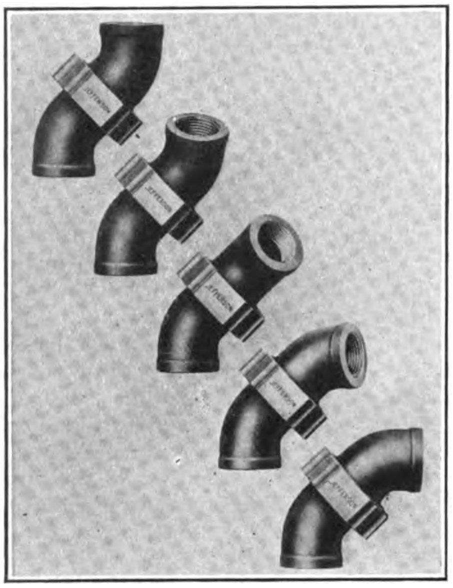
The Elmore is also out of commission because of the failure of the factory to file a stock-car certificate. The entry of the car was made subject to such action by the manufacturers. It is continuing as a non-contestant.

The penalty on the Great Western has not yet been fixed.

Prominent Automobile Accessories

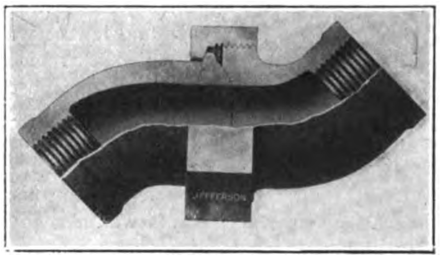
A NEW SWING PIPE UNION

In the accompanying illustration is shown the new swing union which is being made by the Jefferson Union Co., of Lexington, Mass. It consists of two 45° elbow parts with a spherical iron-to-iron seat ground to a perfect fit, the two ends being connected by a nut of either brass or malleable iron. At slightly additional cost these unions can be made with the company's regular brass-to-iron seat, which consists of a narrow brass ring of wrought metal sunk in a channel in which it fits tightly. A lip of iron protects the brass ring from contact with the fluid, and also from injury, should the pipe be screwed in too far. For close work this union can be equipped with a special notched nut which can be set up with a bar of iron and a hammer.



Showing Jefferson Swing Union in various positions

One of the pictures shows the union in various positions from that in which it will connect parallel pipes slightly off-set to the other extreme of connecting two pipes in the same plane at 90°. In the intermediate positions it is possible to make connections between pipes at a great variety of angles, the joint always being perfectly tight regardless of the angle of connection due to the perfectly ground spherical seat. By using the combination of one end of the swing union in connection with regular parts, it is applicable to so many kinds of odd connections that it may almost be considered a universal union.

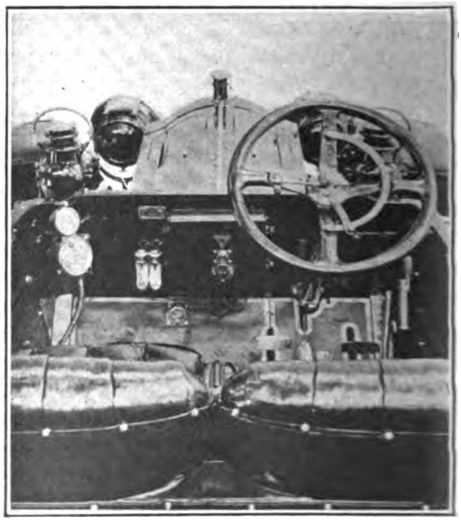


Sectional view of Jefferson Swing Union

SPEEDOMETER AT LEFT SIDE OF DASH

It has been demonstrated that the left side of the dash is a good place for the speedometer, and the Packard Motor Car Company has arranged to attach them on that side of its 1911 models if desired. The accompanying illustration shows the speedometer in that position, which permits of an easy reading of the instrument by both the driver and the occupant of the left front seat. When the speedometer is on the right side the passenger on the left seat cannot see it at all, and often it is difficult for the driver to see through the spokes of the steering wheel when driving at speed.

The left side position also saves the driver from answering the questions of the curious and the nervous. Any speedometer may be attached in this position, because the different speedometer manufacturers are prepared to supply instruments driven from the left front wheel.



Speedometer at left side of dash

THE LARGEST TIRE IN THE WORLD

There is shown herewith an exact reproduction of the famous Morgan & Wright Nobby Tread Tire, which was used for display purposes during the recent Elks' convention at Detroit. According to standard tire sizes, it would be a 96 x 12-inch tire. It is so large that a man can stand upright comfortably inside the rim.

The largest tire in the world

SPECIAL TIRES FOR AEROPLANES

The Diamond Rubber Company, of Akron, O., is in the market with a special aeroplane tire. The tire shown here with a tread of chrome leather has aroused considerable interest among aviators.

Leather-tread tire for aeroplanes

Most types of aeroplanes use from two to four rubber-tired wheels for running along the ground in starting and also for stopping. In the latter case a spoon brake like the old bicycle type, braking directly on the tire itself, is used. On all rubber tires the action of the brake is somewhat destructive to the tread. It is for the purpose of obviating the wear of the spoon brake that this aeroplane tire is made with the tread of chrome leather. It is of the single tube type.

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THE AUTOMOBILE

MUNSEY TOUR FINISHED

COVERED with the dust of ten States through which they had passed, the contesting column of automobiles in the Munsey Historic Tour of 1910 that started from Philadelphia, August 16, paraded through the streets of Washington, D. C., late Saturday afternoon, escorted by nearly 100 flag-decked and spotless machines belonging in the capital city. There were two absentees, the Glide entry, which could not be repaired in time to reach Washington on account of the distance from which the spare parts had to be shipped, and the Elmore.

The K-R-I-T, Maxwell runabout and Regal cars, which withdrew at various places along the route and continued as non-contestants, were all in line and running smoothly. The Elmore, owned and entered by Frank Hardart of

Escort Into Washington

At Bluff Point near Plattsburg

At the control at Montpelier, Vt.

Selden pilot car near Tunkhannock

Great Western waiting for the brake test

Brush made a brave showing despite tire trouble

Philadelphia, which was disqualified by reason of the failure of the factory management to file its stock certificate covering the car, broke a spring near Harrisburg and could not finish. The Great Western, Crawford and Staver-Chicago, which were heavily penalized on the road, finished the tour with a fine showing of power and running quality.

The two contesting Brush runabouts, three Fords, Warren-Detroit, Maxwell touring car, Moon, two Washingtons, Pierce-Racine, Enger, Ohio, Inter-State, Columbia, Corbin, Cino, Stoddard-Dayton, Kline-Kar and Matheson, seven of which had earned some sort of a penalty, constituted the main division of the tour and were given ovations all along the line.

The official cars were also accorded their full share of the honors. The diminutive Brush runabout, which carried the official photographer and which unofficially came through with a clean road and mechanical score; the powerful Selden, which carried confetti from one end of the route to the other without skip of any kind, under the guidance of J. D. Murphy; the two E-M-F's, which acted respectively as pilot and press cars and which monopolized all the real accidents of the tour outside of the mishap to the Great Western; the starter's car, an Ohio, which had better luck on the road than its team mate in the contesting division, having a spotless record; the Washington car, which carried part of the press representatives and which was driven by Jack Welsh without even a semblance of tire trouble; Referee Ferguson's carriage, a Columbia, which made the run without unofficial penalization, and the giant Thomas Flyer, guided by the hand of George R. Miller, the same engineer who steered the three-ton machine when it won the famous race from New York to Paris, were all repeatedly cheered on the way to their resting place in the official garage.

At the finish of the road work thirteen cars had perfect scores, according to final announcement. These were: Columbia, two Washingtons, two Fords, Corbin, Brush, Enger, Cino, Stoddard-Dayton, Maxwell, Kline and Matheson.

Four cars were penalized for the last day's work as follows: Warren-Detroit, 11 points for work on stay rod and magneto, bringing its total to 15 points. Great Western, 66 points for lateness at noon control and work in repairing a spring, a total of 2,229 points. The Ohio, 3 points for work on a rod, giving this car a total of 79 points. The Moon also earned one more demerit for motor stop, making its total 3 points for its work on the road.

At the conclusion of the run the cars were turned over to the technical committee for a most searching examination. It was estimated that it would require an average of 45 minutes' work on each car to determine its exact condition as compared with its shape when commencing the tour.

The Regal entry's trouble was a broken spring, the accident happening near Bloomsbury. The repair work was accomplished so quickly that much regret was expressed that the car did not continue in the contesting division, as the penalization would have been much lighter than the 1,000 points charged for its withdrawal.

The technical committee, consisting of E. L. Ferguson, James Hemstreet and Joseph Tracy, went to work immediately on the cars and following the spirit that has actuated the officials since the beginning of the run, they announced that the final standing would be ready for publication on Tuesday.

It was a delightful affair from start to finish. Referee Ferguson was on the job every minute, formulating his rulings with refreshing promptness and keeping up to the minute with his tabulations. As a general thing, the score for each day's run was formed and posted ten minutes after the last car arrived, if it arrived within its schedule. If a contestant was late, Mr. Ferguson usually knew why long before the car arrived, and consequently there were none of the exasperating delays that have marked the administration of other tours. Arthur Newmeyer, starter; Mr. Hemstreet of the technical committee, and Francis J. Byrne, the official press representative, are deserving of special commendation for their work, as is also T. C. Willis, the advance man who was belabored at times by all hands, but who performed his duties in a peculiarly effective and efficient manner, arranging for the entertainment of the party along the route. Everybody else who had any official connection with the party did his duty conscientiously and well.

There was no real kicking. Occasionally when a penalty was imposed the sufferer muttered a few things, but in a short time he realized that a tour of this kind is a battle and the unfortunates who fall because they choose to do a gallant deed or through accident where the other fellow is to blame, are just as dead as those who are shot down for running away.

There was a spirit of do or die that characterized the driving of all the cars. Not that it was reckless or foolhardy, but each driver seemed to have resolved upon setting out that he would take his car through without penalty if possible—but he would take her through.

Speaking of the drivers of the contesting cars, the following incident was amusing and illuminative. When the cars drew into Bethlehem, N. H., and the tired drivers and crews alighted and were being assigned to rooms in the Sinclair House, a New York butter and egg operator who is said to be close to the front in that line edged up to the representative of THE AUTOMOBILE and said:

"I see a dozen fellows among those drivers who have exceptional faces; clean-cut brows and firm chins. They show in their appearance that they have the possibilities of taking and holding much higher positions than the mere driving of automobiles. I should say that all of those men there (indicating a group of the drivers) might become first-rate butter and egg salesmen if they showed a willingness to work hard."

The men included in the group pointed out by the butter and egg man were: A. G. Carter, of the Carter Motor Car Company, who had three machines in the tour; Leo Shaab, president of the L. H. Shaab Auto Distributing Company of Baltimore; I. W. Dill, of the Inter-State Automobile Company of Harrisburg; W. S. Mercer, a director of the Great Western Automobile Company of Peru, Ind., and Charles E. Miller, of Charles E. Miller & Brother.

Each of the gentlemen mentioned probably could school himself to sell butter and eggs successfully if he found that selling and making of automobiles was not so profitable as the other line of industry.

All of which shows that keen observation and the ability to pick out real successful men is not lacking among the Summer visitors.

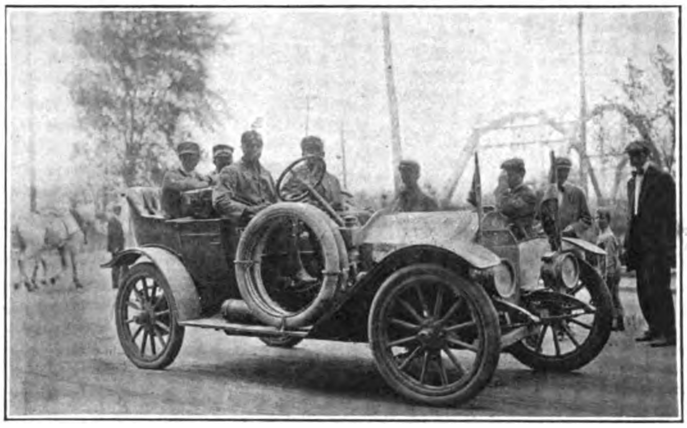
After the technical committee had finished its searching labors at the official garage in Washington, which continued over three days, not a single clean score remained among the contesting division of the Munsey Tour.

Not that the cars were wrecked by their long journey, for most of them could negotiate the route again without radical repairs, but it is hardly in reason to suppose that any automobile could go through such a test as was propounded to the cars of this tour without loosening bolts, sagging springs and other minor and unavoidable troubles.

The Maxwell touring car, No. 25, with a clean road score and penalized 3 points on final technical examination for the loss of a fan belt, was the winner of the sweepstakes prize. The car was driven with masterly skill and care throughout the contest and did not show a semblance of trouble until the committee got to work.

The winners in the various classes were: Brush 14, which had a perfect score on the road, but which was penalized 26 points by the committee; Ford 34, with a perfect road score and a technical penalty of 7 points; the Maxwell touring car as noted; the Washington roadster No. 6, which was penalized 12 points in the brake test and 8 points on final technical examination; the Stoddard-Dayton, No. 24, with a clean road score and a final penalty of 12 points and the Matheson 32, which was penalized 102 points on the brake test and 20 points on final technical.

Among the non-winners Brush 13, Ford 8 and Ford 30, Warren-

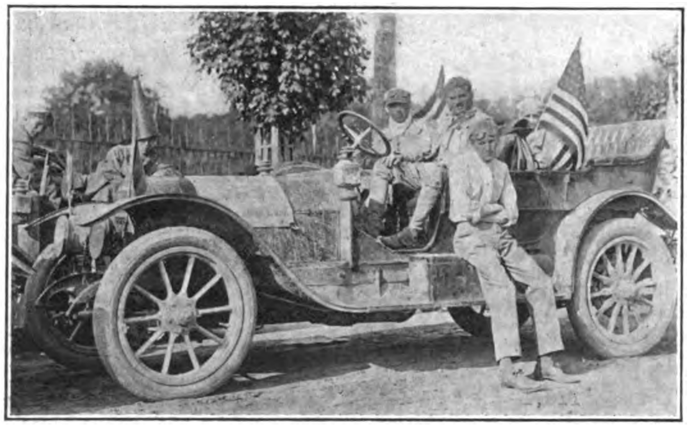


Staver-Chicago at Wilkes-Barre

Warren-Detroit went merrily along the road

Washington, near Harrisburg, performing splendidly

The cavalcade crossed the bridge at Otego, N. Y.



Matheson paused to be photographed for "The Automobile"

Regal, the "Plugger," makes light of sandy roads

Pierce-Racine going up one of the hills at Wilkes-Barre

Detroit 10, Washington 5, Enger 17, Corbin 11, Columbia 2. Cino 22, and Kline 31, only missed their classes by narrow margins.

No clutch, transmission nor motor trouble was discovered in any of the contestants by the technical committee, a remarkable showing. Several of the highly penalized cars deserve special mention. This is particularly true of Great Western 18 which was wrecked outside of noon control near Montpelier, Vt. La Mar, the driver of the car, was approaching an iron bridge when a woman suddenly turned into his course. Two paths lay open to him. He could either take a chance of injuring the woman or he could shoot his car into the iron girders and supports of the bridge. Like a good sportsman he chose the latter course and as a result his car was wrecked.

With his front axle in the shape of a letter S and with one wheel in fragments, the driver set to work to make repairs. A country blacksmith worked with the crew until after midnight and amid the cheers of those who knew the true facts in the case, the car joined the procession at the next control and finished the trip. Its penalty was 2284 demerits.

The Regal, which broke a spring in the last stages of the tour, had an unsmirched record up to that unfortunate moment. The unspeakable chuck-holes of the Pennsylvania highways were the cause. Why in the ordinary course of human events anybody should wish ever to ride over such roads in a motor car is inexplicable. The wonder is not that the Regal broke a spring, but that the more fortunate contestants did not do so.

FINAL SCORES OF CONTESTANTS IN MUNSEY RUN

		Final Examination					
No. Car	Road Pen.	Brakes	Clutch	Trans.	Motor	Fin. Technic	Total
Division 1A—$800 and under							
14—Brush	0	0	0	0	0	26	26
13—Brush	3	0	0	0	0	30	33
19—Krit	1000—withdrawn as contestant						
Division 2A—From $801 to $1,200							
34—Ford	0	0	0	0	0	7	7
8—Ford	0	6	0	0	0	29	35
30—Ford	8	1	0	0	0	27	33
Division 3A—From $1,201 to $1,600							
25—Maxwell	0	0	0	0	0	3	3
10—Warren-Detroit	15	0	0	0	0	4	19
32—Moon	3	29	0	0	0	168	200
23—Staver-Chicago	242	0	0	0	0	7	249
27—Crawford	867	7	0	0	0	17	891
15—Regal Plugger	1000—withdrawn as contestant						
26—Maxwell	1000—withdrawn as contestant						
18—Great Western	2229	38	0	0	0	17	2284
Division 4A—From $1,601 to $2,000							
6—Washington	0	12	0	0	0	8	20
5—Washington	0	2	0	0	0	24	26
17—Enger	0	32	0	0	0	20	52
21—Ohio	71	15	0	0	0	17	103
29—Inter-State	111	7	0	0	0	13	131
16—Pierce-Racine	42	0	0	0	0	106	148
Division 5A—From $2,001 to $3,000							
24—Stoddard-Dayton	0	0	0	0	0	12	12
11—Corbin	0	11	0	0	0	5	16
2—Columbia	0	14	0	0	0	26	40
22—Cino	0	39	0	0	0	7	46
31—Kline	0	21	0	0	0	29	50
28—Glide	1000—withdrawn as contestant						
Division 6A—From $3,001 to $4,000							
33—Matheson	0	102	0	0	0	20	122

The K-R-I-T and Maxwell runabout, which were withdrawn on account of mishaps, one on account of a broken wheel and the other as the result of a broken bearing which caused a lot of trouble, finished the tour with a dash that belied the fact that they were declared out of the contest.

The Inter-State entry suffered the worst luck of the tour. But for the presence of a handfull of scrap metal in its gear case at the outset of the journey, the record of this car proves that it would have been tied with the winner of its class for the cup and the chances are that the difficulty experienced by this car at the start may have had some effect upon the brake and final technical penalties imposed. Of course, an entry in a great contest should be inspected with exceeding care before the flag falls, but the entrants of the car were generally accorded warm sympathy for the strange mishap that cost them a more prominent place in the final result.

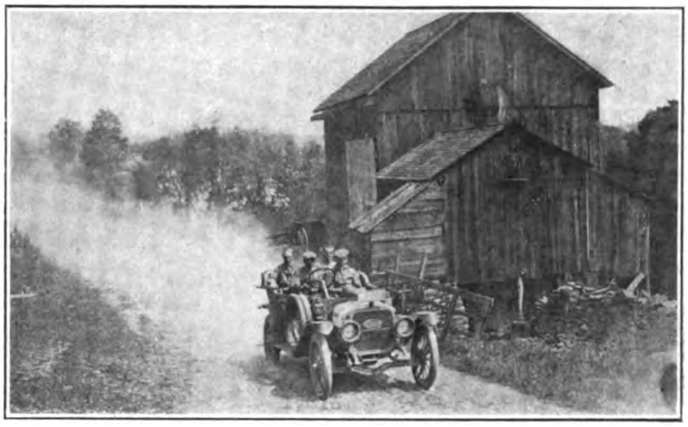
The Moon, Staver-Chicago and Crawford entries received considerable penalties of one kind and another, the Moon breaking a spring leaf, the Staver experiencing trouble with a bearing and the Crawford having similar but more serious trouble. All three finished in style despite the vicious Pennsylvania and Maryland roads.

The Matheson had real tough luck. The car had run along with perfect score until turning for home, when, after following the pacemaker and starter on a wrong trail which led to a hillside road covered with rolling gravel, there was some error in signaling and the Matheson, when within three car lengths of the official cars, was forced to put on brakes. The rolling gravel would not hold the car and despite everything that could be done the car struck the Ohio roadster occupied by the starter and

Stoddard-Dayton scampered along the road at Wilkes-Barre

Selden leading across the bridge at the Susquehanna

sprung a spindle and bent a side member. While its score on the road was clean, the brake test showed what had happened.



Corbin, just beyond Saratoga, on the State road

WASHINGTON, D. C., Aug. 27.—The last day of the long grind was in some ways the hardest of the tour. The Pennsylvania roads to Gettysburg were rough in spots, and the long fine drive over Confederate avenue, where the Army of Northern Virginia was stationed during the great battle of the Civil War, came as a welcome relief after the terrific jolting the cars received between the starting point at Harrisburg and the battlefield. Pennsylvania has more than an abundance of road-making material at hand, and the condition of the roads is inexplicable save on the hypothesis of neglect.

After crossing into Maryland, a very different story is to be told. Going into Frederick, for miles the roads are conducted as toll-roads. Where they are not criminally neglected, they are so filled with big water breaks that riding with any comfort, at a greater speed than ten miles an hour, is preposterous. It takes a lot of nerve to charge real money for the privilege of riding over such disgraceful highways, but the word was passed around that running a toll-gate in Maryland was practically a capital offense, and the keepers of the gates added to the impression.

Honors Divided at Elgin

LOZIER WINS THE ELGIN TROPHY, NATIONAL CAPTURES THE ILLINOIS, MARMON ANNEXES THE KANE COUNTY AND THE BENZ THE FOX RIVER TROPHY

ELGIN, ILL., Aug. 27—Under the auspices of the Chicago Motor Club, the most ambitious programme of long-distance road racing events ever promoted in this country was brought to a successful conclusion to-day when the Lozier, driven by Ralph Mulford, swept over the line a winner in the big event of the carnival—the Elgin trophy race.

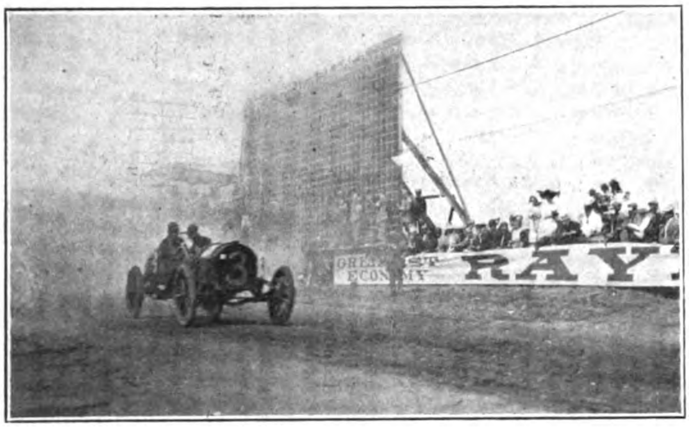
Yesterday saw the National, driven by Livingstone, win out in the Illinois trophy race; the Marmon, with Buck at the wheel, capture the Kane County trophy, and the Benz, with Hearne up, lead the field to the wire in the race for the Fox River cup.

The victory of the four-cylinder 1911 Lozier to-day was from as brilliant a field as ever faced the starter in an American stock chassis road race. The average pace maintained was within a fraction of that made by the Alco in the last Vanderbilt, the rating being 62.5 miles per hour for 305 miles, whereas the Alco did 62.8 for 276 miles in the Vanderbilt. As in the case of the National in the Illinois and the Benz in the Fox River, the Lozier went the entire distance without a tire change. But one stop was made, and that to take on supplies at 203 miles.

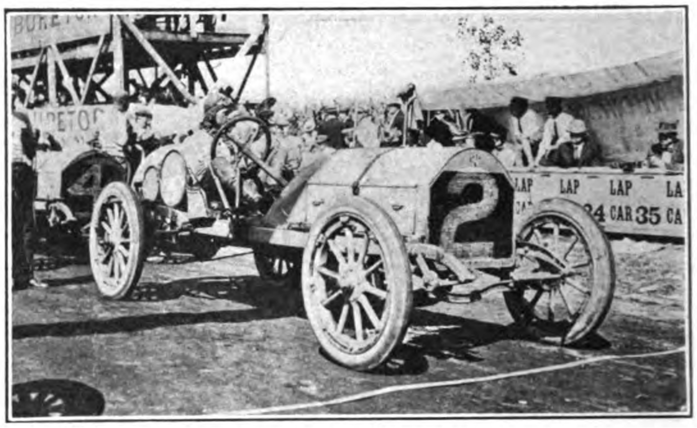
The big white Lozier with its white-garbed driver and mechanic made a great impression upon the 75,000 spectators by the steadiness of its running. With the regularity of an express train and at a speed fully as great, lap after lap was made with great consistency. The fastest circuit was the twenty-second, in 7:54, while the slowest was the twenty-fifth, when the watches showed 9:46. This included the time occupied at the pit in taking on supplies. The Lozier was not pushed during the latter portion of the race and Mulford played safe. He had a lap and a half at the finish over the National, the Illinois trophy winner.

Besides the four cars that finished, there started in the big race at 10 o'clock this morning a Black Crow, driven by Stinson; a Marmon, with Harroun at the wheel; an Alco, driven by Grant; a Simplex, with Saynor up; a Kissel-kar, with Harry Endicott in the seat; the Dawson-Marmon; the Matheson, handled by Basle; the Knox, with Oldfield driving, and Schiefler's Jackson—surely a most brilliant field. Undoubtedly had it not been for accidents early in the race the contest would have resulted in the greatest road battle ever fought on American highways. The Alco's career was brought to an end by a twisted clutch which put it out of the race at a time when its chances looked bright.

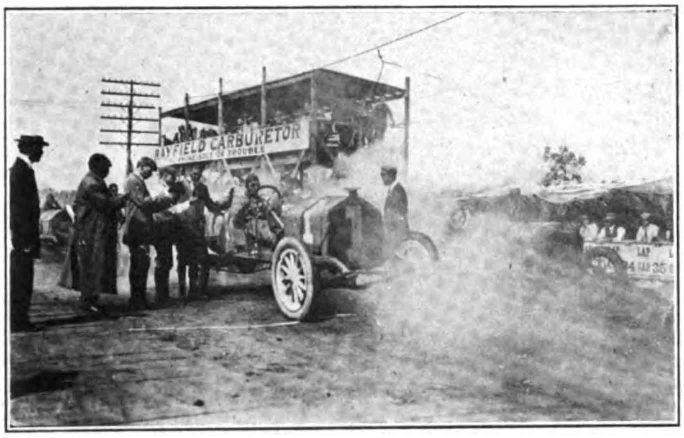
Marmon No. 4 was also put out on the same round by a frozen piston that eliminated the yellow car. Then Simplex No. 5 began to have tire trouble, which eventually put it out of the running—it stuck to the finish, however. With its most dreaded rivals eliminated, the Lozier settled down to a steady grind that landed the cup without much trouble.



Lozier winning the Elgin trophy



Falcar lined up at the tape



National, a great performer and winner, at the tape

National No. 1 Wins the Illinois Trophy

No. 1 National, a demonstrating car entered by the Chicago agents and converted into a racer by stripping it of the body, yesterday won the Illinois trophy for cars of from 301-450 cubic inches piston displacement and removed all doubts as to the speed of the Elgin course. The winner averaged 60.6 miles per hour for 203 miles and went the entire distance without a single stop, its large fuel capacity enabling it to hold out to the end, while its tires went through without a mishap. From the outset the National never left the result in doubt, leading from start to finish and at times showing some remarkable bursts of speed. Second to the National was No. 2 Falcar, which averaged 57.2 for the distance, while third was No. 6 Marmon, which made 56.9 miles per hour. There were just 4 seconds difference between third and fourth, the Midland having the advantage over No. 7

KANE COUNTY TROPHY FOR CARS FRO

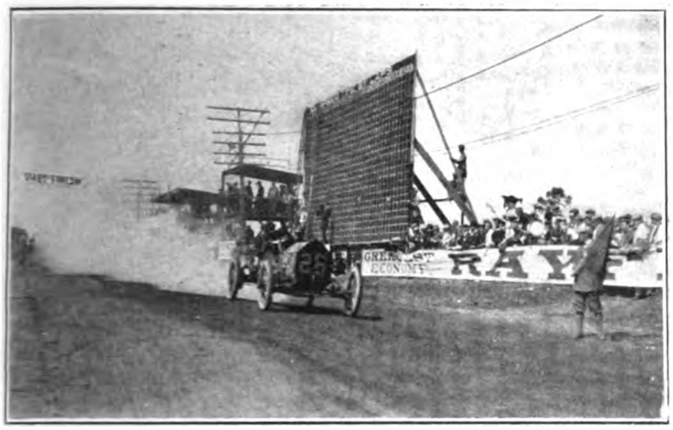
Car and Driver	Laps—	1	2	3	4	5	6	7	8
MARMON	Elap. Time	10:24	19:20	27:52	36:29	45:14	53:57	62:42	71:56
D. Buck	Lap Time	10:24	8:56	8:32	8:37	8:45	8:43	8:45	9:14
MARION	Elap. Time	9:27	18:36	27:38	36:41	45:46	54:51	63:52	72:50
A. Monsen	Lap Time	9:27	9:09	9:02	9:03	9:05	9:05	9:01	8:58
MARMON	Elap. Time	10:11	18:53	27:35	36:24	45:10	54:34	63:51	73:14
L. Heinemann	Lap Time	10:11	8:40	8:42	8:49	8:46	9:24	9:17	9:23
OVERLAND	Elap. Time	11:12	22:24	33:30	44:30	55:18	65:58	77:20	89:36
A. Schillo	Lap Time	11:12	11:12	11:06	11:00	10:48	10:40	11:22	12:16
CORBIN	Elap. Time	8:39	25:06	33:35	42:24	50:57	67:15	76:03	84:53
J. Matson	Lap Time	8:39	16:27	8:39	8:49	8:33	16:18	8:48	8:50
KISSELKAR	Elap. Time	10:24	20:48	30:40	40:34	50:18	60:02	69:52	79:47
G. Schoeneck	Lap Time	10:24	10:24	9:52	9:54	9:44	9:44	9:50	9:55
CINO	Elap. Time	9:44							
W. Fritzschke	Lap Time	9:44							

ILLINOIS TROPHY FOR CARS OF FROM 301 TO 450 CUBIC INCHES DISPLACEMENT

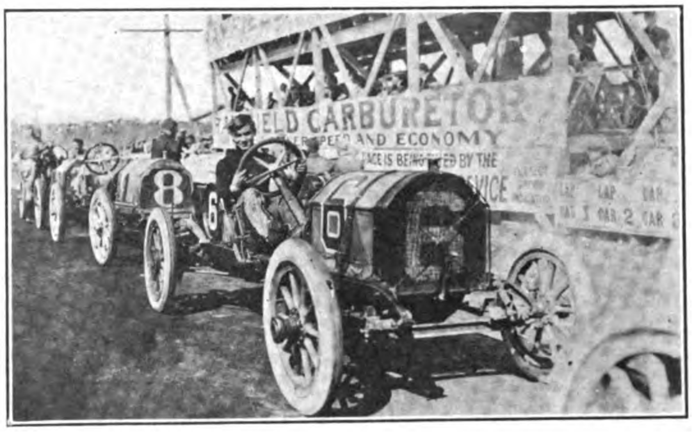
Car and Driver	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
NATIONAL	8:14	16:06	24:00	31:55	39:52	47:58	55:58	64:03	72:14	80:20	88:30	96:34	104:55	113:02	121:58	130:43	139:31	148:26	156:49	165:12
A. Livingstone ...	8:14	7:52	7:54	7:55	7:57	8:06	8:00	8:05	8:11	8:06	8:10	8:04	8.21	8:07	8:56	8:45	8:48	8:55	8:23	8:23
FALCAR	11:43	20:10	28:41	37:11	45:31	53:59	62:58	71:10	79:54	90:38	99:29	108:42	117:37	126:12	134:40	143:12	151:40	160:05	168:36	177:13
W. H. Pearce	11:43	8:27	8:31	8:30	8:20	8:28	8:59	8:12	8:44	10:44	8:51	9:13	8:55	8:36	8:28	8:32	8:28	8:25	8:31	8:37
MARMON	16:15	24:42	33:03	41:13	49:19	57:47	65:53	73:59	82:00	90:03	98:09	106:29	116:23	124:58	133:27	141:54	150:16	162:25	170:55	179:08
J. Dawson	16:15	8:27	8:21	8:10	8:06	8:28	8:06	8:06	8:01	8:03	8:06	8:20	9:54	8:35	8:29	8:27	8:22	12:09	8:30	8:13
NATIONAL	8:44	17:34	26:33	35:19	44:18	53:24	62:24	71:23	79:58	90:10	98:27	120:13	130:52	139:06	147:22	155:40	163:57	172:13	180:36	188:57
A. W. Greiner ...	8:44	8:50	8:59	8:46	8:59	9:06	9:00	8:59	8:35	10:12	8:17	21:46	10:39	8:14	8:16	8:18	8:17	8:16	8:23	8:21
MIDLAND	9:15	18:19	27:37	36:52	46:08	55:24	64:37	73:48	83:00	92:16	101:25	110:28	119:33	128:38	137:43	146:52	157:09	166:34	175:48	185:11
R. Ireland	9:15	9:04	9:18	9:15	9:16	9:16	9:13	9:11	9:12	9:16	9:09	9:03	9:05	9:05	9:05	9:09	10:17	9:25	9:14	9:23
FALCAR	9:10	18:05	27:09	36:03	44:52	53:52	63:20	72:12	81:03	89:46	98:35	107:21	130:52	139:36	148:23	157:07	165:05	179:22	204:21	213:11
J. F. Gelnaw......	9:10	8:55	9:04	8:54	8:49	9:00	9:28	8:52	8:51	8:43	8:49	8:46	23:31	8:44	8:47	8:44	8:43	13:32	24:59	8:50
LEXINGTON	11:29	23:29	34:46	45:53	56:59	68:03	79:07	90:05	101:01	111:55	122:58	133:55	144:57	156:01	167:01	178:03	195:00	201:53	212:54	224:00
R. Drach	11:29	11:30	11:17	11:07	11:06	11:04	11:04	9:58	10:56	10:54	11:03	10:57	11:02	11:04	11:00	11:02	12:47	11:03	11:01	11:06
KISSELKAR	9:57	19:44	29:34	39:02	49:15	58:59	68:34	77:59	87:28	96:46	Radiator trouble.									
H. Endicott	9:57	9:47	9:50	9:28	10:13	9:44	9:35	9:25	9:29	9:18										

ELGIN NATIONAL TROPHY FOR CAR

Car and Driver	Laps—	1	2	3	4	5	6	7	8	9	10	11	12	13	14
LOZIER	Elapsed time	8:18	16:18	24:18	32:25	40:37	48:44	56:53	64:57	73:03	81:09	89:10	97:10	105:05	113:04
R. Mulford	Lap time	8:18	8:00	8:00	8:07	8:12	8:07	8:09	8:04	8:06	8:06	8:01	8:00	7:55	7:59
NATIONAL	Elapsed time	8:24	16:26	24:28	32:36	42:09	50:23	58:24	66:19	74:27	82:29	90:32	98:35	106:45	114:53
A. Livingstone	Lap time	8:24	8:03	8:02	7:58	9:43	8:14	8:01	7:55	8:08	8:02	8:03	8:03	8:10	8:08
NATIONAL	Elapsed time	8:26	16:32	24:38	33:01	42:50	51:23	61:07	69:17	77:37	85:56	94:13	102:30	111:00	119:19
A. W. Greiner	Lap time	8:26	8:06	8:06	8:23	9:49	8:33	9:44	8:10	8:20	8:19	8:17	8:17	8:30	8:19
SIMPLEX	Elapsed time	8:20	16:26	24:33	32:36	40:41	48:44	56:51	64:55	73:00	89:21	97:36	109:23	117:45	129:52
G. Robertson	Lap time	8:20	8:06	8:07	8:03	8:05	8:03	8:07	8:04	8:05	16:21	8:15	11:47	8:22	12:07
SIMPLEX	Elapsed time	13:57	22:51	32:01	46:25	56:15	66:28	79:51	91:13	110:10	120:03	129:29	138:54	148:46	158:00
H. Saynor	Lap time	13:57	8:54	9:10	14:24	9:50	10:13	13:23	11:22	18:57	9:53	9:26	9:25	9:52	9:14
KNOX	Elapsed time	8:32	20:37	28:40	37:18	46:00	57:41	69:05	82:49	93:44	103:35	112:34	121:25	130:04	143:00
B. Oldfield	Lap time	8:32	12:05	8:03	8:38	8:42	11:41	11:24	13:44	9:55	9:51	8:59	8:51	8:39	12:56
MARMON	Elapsed time	8:51	17:21	25:50	34:21	42:50	51:16	59:43	68:10	76:37	85:04	93:29	101:45	110:05	118:29
J. Dawson	Lap time	8:51	8:30	8:29	8:31	8:29	8:16	8:27	8:27	8:27	8:27	8:25	8:16	8:20	8:24
BLACK CROW	Elapsed time	9:55	19:32	29:01	40:13	49:38	59:08	68:40	88:26	97:58	108:50	124:03	133:50	142:44	153:29
C. Stinson	Lap time	9:55	9:37	9:40	11:02	9:25	9:30	9:32	19:46	9:32	10:52	15:18	9:42	8:54	11:25
JACKSON	Elapsed time	9:00	20:09	31:40	40:24	53:42	62:19	70:50	79:25	88:01	96:27	105:00	113:32	122:03	
E. Schiefler	Lap time	9:00	11:09	11:31	8:44	13:18	8:37	8:31	8:35	8:36	8:26	8:33	8:32	8:31	
MATHESON	Elapsed time	8:48	17:20	25:54	34:34	43:11	51:58	60:44	69:48	78:09	87:24	95:50	Broken wheel.		
C. Basle	Lap time	8:48	8.32	8:34	8:40	8:37	8:47	8:46	9:04	8:21	9:15	8:26			
KISSELKAR	Elapsed time	9:38	18:49	28:07	37:23	46:41	55:58	65:03	76:23	85:52	94:56	133:58	Broken radiator.		
H. Endicott	Lap time	9:38	9:11	9:18	9:16	9:18	9:17	9:05	11:20	9:29	9:04	38:57			
ALCO	Elapsed time	8:12	Twisted clutch.												
H. Grant	Lap time	8:12													
MARMON	Elapsed time	8:48	Frozen piston.												
R. Harroun	Lap time	8:48													


Marmon cutting away from the tape in a mad dash


Winning Benz in the foreground just before the battle


Alco, No. 6, in foreground; No. 8 Simplex behind

National, the former car averaging 54.7 and the latter 54.6. The race attracted a field of eight starters, of which five finished, while two of the others were running when the flags dropped for the final time. Only one car was put out of commission, that being the KisselKar, which went out after the tenth round because of radiator trouble. Besides the cars mentioned the other starters were No. 4 Falcar and No. 8 Lexington.

From the outset the two Nationals started to make a runaway of it, and for a time it looked as if they would accomplish their purpose. No. 7, being the first away, started to beat it from the beginning, and while No. 1 kept as close as possible it never was really dangerous after No. 7 had put in its four remarkably fast laps in the second, third, fourth and fifth rounds, in which it was clocked in 7:52, 7:54, 7:55 and 7:57.

231 TO 300 CUBIC INCHES DISPLACEMENT

10	11	12	13	14	15	16	17	18	19	20
90:11	99:04	115:11	125:05	133:33	141:57	150:36	159:09	167:30	175:57	184:45.79
8:56	8:53	16:07	9:54	8:28	8:24	8:39	8:33	8:21	8:27	8:48
1:06	123:10	112:26	121:51	130:44	139:58	149:13	158:29	169:32	178:38	187:52.65
9:02	12:04	9:16	9:25	8:53	9:14	9:15	9:16	11:03	9:06	9:14
91:22	114:22	126:17	137:23	146:05	154:39	163:10	172:42	181:20	190:16	199:20.27
8:45	23:00	11:55	11:06	8:42	8:34	8:31	9:32	8:38	8:56	9:04
110:00	120:32	131:00	142:16	156:53	167:18	177:54	188:37	199:05	209:40	220:04.15
10:12	10:23	10:28	11:16	14:37	10:25	10:36	10:43	10:28	10:35	10:24

22	23	24
183:20	192:22	201:08.53
8:43	9:02	8:46.53
194:26	202:58	211:19.22
8:35	8:32	8:21.22
198:10	206:05	214:09.62
8:00	7:55	8:04.62
205:34	213:52	222:15.30
8:09	8:18	9:23.30
204:03	213:12	222:30.10
9:23	9:09	9:08.10

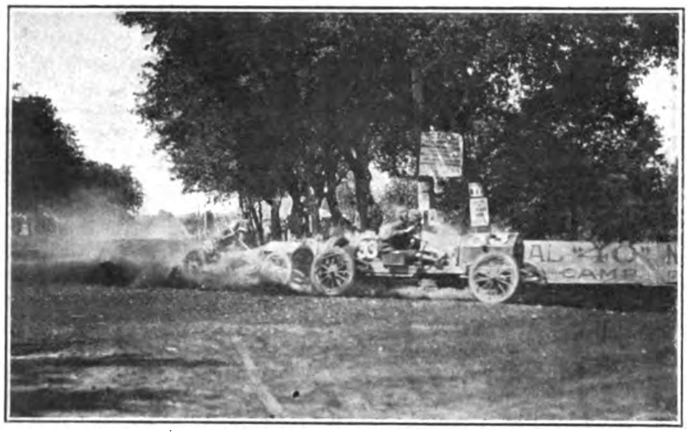
FOX RIVER TROPHY FOR CARS OF FROM 161 TO 230 CUBIC INCHES DISPLACEMENT

Car and Driver	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
BENZ	9:31	18:41	27:55	37:12	46:50	56:41	65:52	75:06	84:23	93:52	103:22	112:41	122:05	131:25	141:01	150:40
E. Hearne	9:31	9:10	9:14	9:17	9:38	9:51	9:11	9:14	9:17	9:27	9:30	9:19	9:24	9:20	9:36	9:39
WARREN-DETROIT.	10:24	20:47	31:52	42:20	52:47	64:14	74:19	85:17	95:38	105:36	115:36	125:14	135:07	146:24	162:27	176:11.62
A. W. Miller........	10:24	10:23	11:05	10:28	10:27	11:27	10:05	10:58	10:21	9:58	10:00	9:38	9:53	11:17	16:03	13:44
STAVER	10:59	37:36	46:48	56:45	66:35	76:27	87:55	98:53	108:32	118:17	129:04	140:53	150:06	160:51	171:05	181:05.57
G. Monckmeier	10:59	26:37	9:12	9:57	9:50	9:52	11:28	10:58	9:36	9:45	10:47	11:49	9:13	10:45	10:14	10:00
STAVER	10:34	20:52	31:18	41:43	52:09	62:43	73:18	83:33	93:56	104:22	114:32	128:39	139:48	150:10	160:40	
N. Crane	10:34	10:18	10:26	10:25	10:26	10:34	10:35	10:15	10:23	10:26	10:10	14:07	11:09	10:22	10:30	
COLE	10:22	20:10	29:43	39:26	49:10	58:47	68:19	78:02	87:38	97:17	106:57	116:40	126:19			
W. Endicott	10:22	9:48	9:33	9:43	9:44	9:37	9:32	9:43	9:36	9:39	9:40	9:43	9:39			
STAVER	9:58	21:26	31:12	46:07	67:08											
C. Cheney	9:58	11:28	9:46	14:55	21:01											

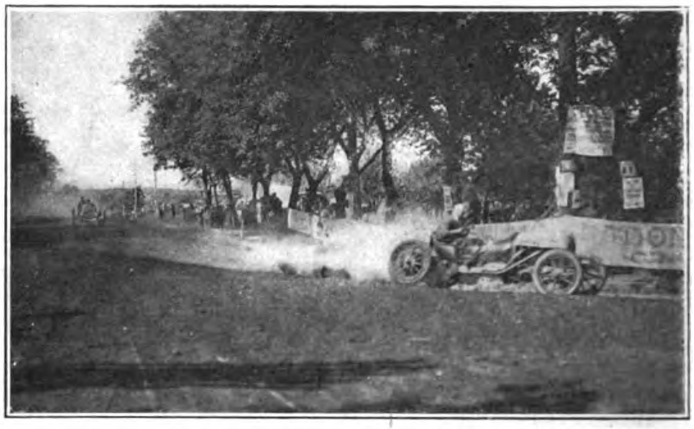
*Each lap measures 8 miles, 2499 feet.

UNDER 600 CUBIC INCHES DISPLACEMENT

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
129:08	137:09	145:09	153:10	161:09	169:05	176:59	184:55	193:13	202:59	211:05	219:14	227:24	235:29	243:31	251:40	259:47	268:01	276:16	284:24	292:29.84
8:01	8:01	8:00	8:01	7:59	7:56	7:54	7:56	8:18	9:46	8:06	8:09	8:10	8:05	8:03	8:09	8:07	8:14	8:15	8:08	8:05.84
131:39	140:06	148:24	156:37	169:19	177:43	186:00	194:15	202:24	210:33	218:47	227:05	235:26	243:55	252:28	260:59	269:39	278:10	286:50	295:32	304:10.90
8:31	8:27	8:18	8:13	12:42	8:24	8:17	8:15	8:09	8:09	8:14	8:18	8:21	8:29	8:33	8:31	8:33	8:38	8:40	8:42	8:38.90
136:12	144:35	153:01	161:30	169:52	178:12	186:21	197:05	205:25	213:48	222:42	231:20	240:02	249:00	257:56	266:54	275:50	284:46	293:54	303:24	313:23.30
8:27	8:23	8:26	8:29	8:22	8:20	8:09	10:44	8:20	8:23	8:53	8:38	8:42	8:58	8:56	8:58	8:56	8:56	9:08	8:30	8:59.30
146:08	159:34	167:47	179:14	187:28	198:53	207:02	215:01	223:00	230:57	239:10	252:30	260:46	268:52	276:49	285:46	298:26	306:53	315:02	324:04	332:20.18
8:45	13:26	8:13	11:27	8:14	11:25	8:09	7:59	7:59	7:57	8:13	13:20	8:16	8:06	7:57	8:57	12:43	8:24	8:09	9:02	8:16.98
177:27	186:39	196:02	205:24	214:32	224:16	233:44	243:12	252:50	262:16	271:48	281:27	293:10	303:40	312:07	321:49	Stopped				
9:25	9:12	9:23	9:22	9:08	9:44	9:28	9:28	9:38	9:26	9:32	9:39	11:47	9:30	9:24	9:42					
160:41	169:34	178:25	187:06	201:04	209:54	218:57	227:33	236:22	244:19	256:20	265:08	283:07	297:38	Engine trouble.						
8:51	8:53	8:51	8:41	13:58	8:50	9:03	8:36	8:49	7:57	12:01	8:48	17:59	14:01							
135:08	143:25	151:43	159:58	168:17	181:26	192:33	200:56	209:00	217:09	225:14	Broken frame.									
8:33	8:17	8:18	8:15	8:19	13:09	11:07	8:23	8:04	8:09	8:05										
173:31	189:26	199:48	222:01	237:17	247:38	257:57	Broken wheel.													
10:16	15:55	10:22	23:53	15:16	10:11	10:19														
Broken steering gear.																				



Cole, performing like a veteran, cutting in ahead



Staver-Chicago doing a turn like a whirlwind

Comparing the times of National No. 7 in the Illinois and the Lozier in the Elgin National, the tables show that the former went faster for twelve laps on Friday than did the latter in the big race to-day. There wasn't much difference, however, the National figures being 96:34, as against 97:10 for the Lozier. At the end of the fifteenth round the National still had the advantage by 52 seconds, but from this point on the Lozier had the advantage. A comparison of times of the two races for twenty-four laps, the distance of the Illinois cup event, shows that the National did 201:08.53 for his twenty-four laps, while the Lozier did 193:13.

Kane County Trophy Goes to the Marmon

Marmon No. 26 after a heart-breaking 169-mile race yesterday won the Kane County trophy event, in which seven cars of the 231-300 class competed. The Marmon's performance was a most noteworthy one, its average for the distance being 55.1 miles per hour. It won by a margin of 3 minutes 7 seconds over the Marion. The other Marmon, No. 23, was placed third and an Overland got fourth. The Marion averaged 54.2 miles per hour, Marmon No. 23 51.9 and the Overland 46.2.

The three cars that failed to go the distance were the Corbin, the KisselKar and the Cino, which met with mishaps before half the race had been run. The Corbin went nine laps before a broken frame caused its retirement; the KisselKar went eight and then pulled out because of a broken piston rod punching a hole in the crankcase, while on his second time around the Cino hit a telegraph pole at McQueen and was down and out.

The Cino accident was the first of the race. It had made a good getaway and at the end of the first lap was third to Corbin's first and the Marion's second. At the McQueen turn the Cino was running with two other cars, one of which was the Overland. These three were bunched approaching the turn and driver Fritzsch claimed he got the sign from the Overland mechanic to come ahead. But the Overland did not swing over, he asserts, and this left the Cino pilot the choice of going into the ditch or hitting the Overland. He chose the former, and hit a telegraph pole, bouncing from that into a barbed-wire fence. The Cino was so damaged in the mix-up that the radiator was put out of commission and it was declared out. The driver and his mechanic also were cut up some by the barbed wire, but neither was seriously injured.

The Kane County trophy race was the most interesting of the day from one viewpoint, that being the uncertainty that attended the running of the contest. It was no walkaway for any of them, five of the seven cars holding the lead at one time or other.

Fox River Trophy Goes to the Benz

With but one chance out of 34, Europe made good yesterday when a 30-horsepower Benz, a car of German manufacture, won the Fox River trophy which was offered in the small car race at 135 miles in which the eligibility line ranged from 161 to 230 cubic inches piston displacement. The Benz was the one foreign car entered in any one of the four events, and from the start it divided favoritism with the Cole. But the final results showed that for once the public had not sized up the situation properly for the Benz never left the result in doubt, leading from start to finish and beating the second car, a Warren-Detroit, by nearly 26 minutes. Of the six that started in the event only three finished, the Staver No. 36 sliding into third place. The Benz averaged 54.1 miles per hour for the distance, the Warren-Detroit did 46.1 and the Staver showed 44.9.

Originally there were eight cars entered in the event, but the weighing in yesterday afternoon resulted in the technical committee refusing to pass the two Fords, which had been entered by the Ford Motor Company. This decision was caused by the failure of the two cars to come up to the minimum weight of 1,400 pounds, which had been set for the 161-230 class. There was no question as to their eligibility as a stock car proposition, but No. 38 Ford hit the beam at 1,075 pounds, while the other Ford was even lighter, 950 pounds. Henry Ford positively refused to permit of bringing either one of his cars up to weight by the fitting of extra heavy seats, which might have enabled them to reach the coveted mark. Mr. Ford declaring that the Fords he had offered were stock cars and that it would be going directly against his principles of light-weight construction if he added extra weight in this manner. The decision of the technical committee was appealed by Thomas J. Hay, manager of the Chicago Ford branch, but the referee refused to reverse the technical committee's finding which ended the Ford incident.

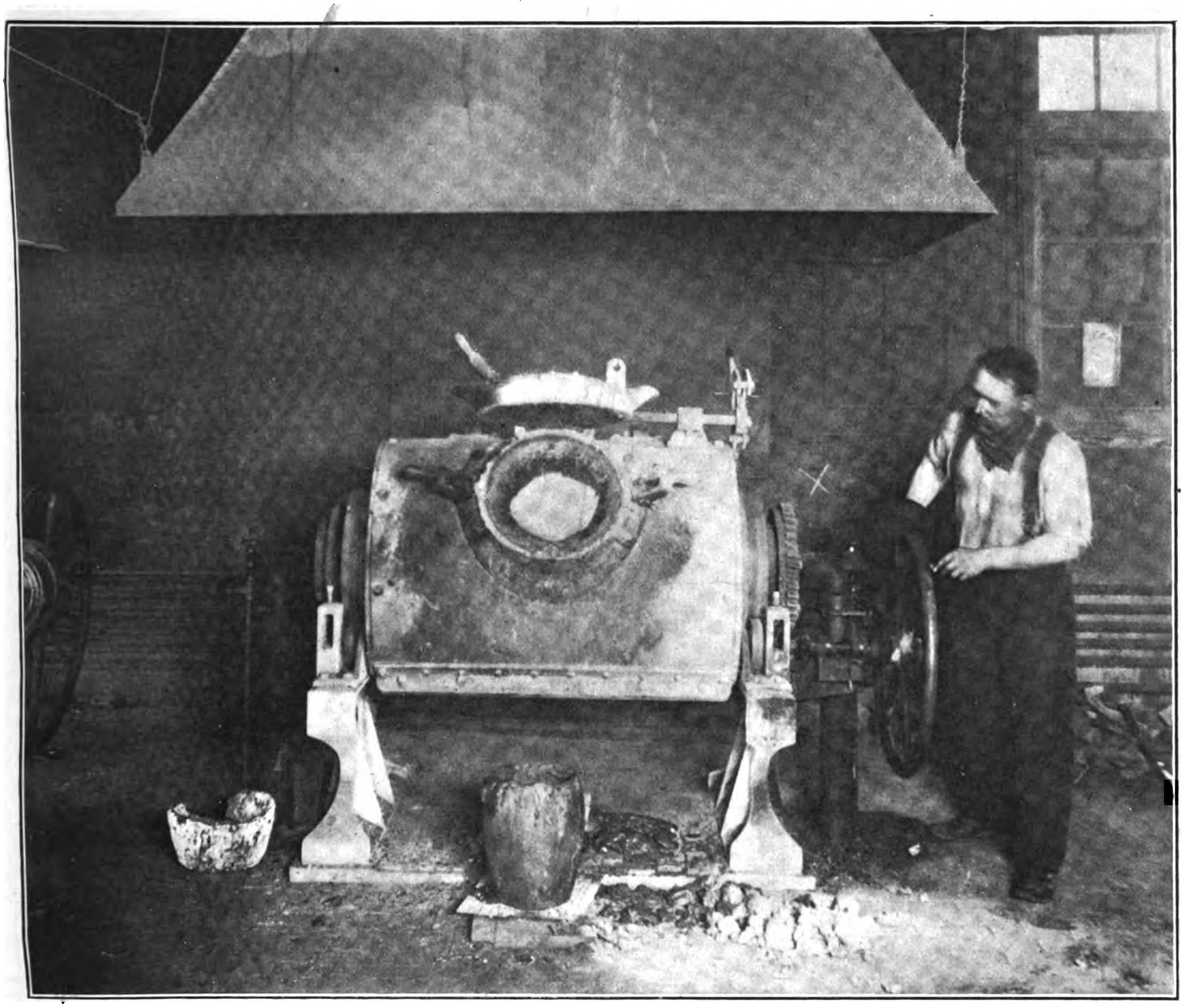
The Chicago Motor Club brought about an innovation in the starting of three races which were to be run simultaneously. Instead of starting the Fox River first, and then following with the other two, as if all three were in one field, the 301-450 class was sent away at 30-second intervals followed immediately after by the Kane County cars. Then there was an intermission of 20 minutes before No. 32 Staver in the Fox River got away. The idea in this was to have as many cars running at the finish as possible and thus add to the interest. The scheme worked out well and all three of these races came to an end at almost the same time.

The following table shows the fastest laps made in the various events:

Car	Driver	Time	H. P.	Race	Lap No.
National No. 7	Livingstone	7:52	64.5	Illinois	2
National No. 7	Livingstone	7:54	64.3	Illinois	3
Lozier	Mulford	7:54	64.3	Elgin	22
Lozier	Mulford	7:55	64.1	Elgin	13
Marmon	Dawson	7:55	64.1	Illinois	23
National No. 7	Livingstone	7:55	64.1	Illinois	4
National No. 7	Livingstone	7:55	64.1	Elgin	8
Lozier	Mulford	7:56	64.0	Elgin	21
Lozier	Mulford	7:56	64.0	Elgin	23
National No. 7	Livingstone	7:57	63.8	Illinois	5
Simplex No. 5	Robertson	7:57	63.8	Elgin	25
Simplex No. 5	Robertson	7:57	63.8	Elgin	30
Knox	Oldfield	7:57	63.8	Elgin	25
National No. 7	Livingstone	7:58	63.7	Elgin	4
Lozier	Mulford	7:59	63.6	Elgin	14
Lozier	Mulford	7:59	63.6	Elgin	20
Simplex No. 5	Robertson	7:59	63.6	Elgin	23
Simplex No. 5	Robertson	7:59	63.6	Elgin	24

Engineering Section

DEVOTED TO THE DISCUSSION OF ENGINEERING PHASES OF AUTOMOBILING, INCLUDING DESIGNING AND CONSTRUCTION FEATURES OF PRODUCTS, AND INFORMATION TO AUTOISTS



EXAMPLE OF ADVANCED FOUNDRY PRACTICE IN AUTOMOBILE PLANTS—TAKEN FROM THE MAXWELL

SIMPLICITY is worth more than every other feature combined, not only in an automobile, but in every other character of machine that has to be run by man. Confining this question to automobiles, there is more to be said for simplicity than there is when the same term is applied to a locomotive or a ship. The automobile is operated, for the most part, by men who know almost nothing about mechanical contrivances, nor is it possible for most of them to grasp the principles involved except in a vague sort of a way.

On account of the difficulty involved in getting the owners of automobiles to appreciate the things that they ought to know something about, and to eliminate the situations that can be of no great value, it is quite easy to foist upon the industry a considerable number of things that no longer adhere to the older arts. It is possible for men who know very little themselves to invent complication and find a ready market for it. But is it easy for the men who invent simplicity to make a living in this field? Supposing a man were to propose to show how it would be feasible to do without 1,000 of the 9,000 kinds of parts that are used in the average automobile, how much would he be able to sell the plan for? Nothing. Let some other man design a complication and offer it for sale; how many autoists are there who would refrain from trying it out? Very few.

In defining simplicity as it refers to automobile work, let us not be deceived; leaving off half of the essentials will scarcely serve for the purpose; making a carbureter do half of the work that a carbureter is supposed to do is not the proper course; a carbureter, for illustration, is better able to do this work than a cylinder of a motor. In a word, confine the carbureter to its proper function; keep the cylinders doing their share, make the magneto do ignition work only. Be sure that the spark plugs are capable of holding up their end. Such is simplicity in automobile work.

Likewise, throughout an automobile, if the units and the components thereof are so designed that they will do the work for which they are intended, the chance of failure at any point will be much reduced. But if the magneto, for illustration, is defeated by spark plugs that are incapable of standing the wave of electromotive force that the magneto is capable of impressing the result is complication.

As an indication of the ills that follow complication of this sort, it is only necessary to point out that the motor will perform badly, if at all; the carbureter will apparently function badly, and the autoist, no matter how much experience he may have, will be much puzzled.

In trying to get out of trouble in the face of this complication, the autoist will soon have the car in a state of bad repair; the carbureter will be out of adjustment; the magneto will be out of time, and the whole situation will be in just the state that a doctor finds a man when he is troubled with several disorders, no one of which will respond to treatment—impoverished blood is the real disorder.

As another instance of the definition of simplicity, some designers prefer to make one bolt do two things; other designers use a bolt for one purpose only. Which is the nearer to right from the point of view of simplicity? Certainly one bolt doing two jobs disposes of a part. On the other hand, is it in the interest of simplicity? When an owner of a car finds that repairing is necessary, is he so likely to understand a complicated situation, and is it not true that the mechanism is complicated when one bolt is used to hold two parts in place? Does it not assume the proportions of a mechanical puzzle? The repairman receives a certain amount of money per hour for his time. Is he likely to take more time solving a mechanical puzzle than he will occupy if he merely removes two bolts instead of one? When one bolt is placed to do two kinds of work it is possible that it may be subjected to two kinds of stresses, and the strength of the bolt may not be equal to the occasion. At all events, when this question of simplicity is solved, it will take into account all of these matters, and it is quite possible that the end will be different from that which the average man pictures in his mind.

Safe Handling of Gasoline

TELLING OF THE DANGERS, AND ILLUSTRATING SOME OF THE METHODS THAT ARE EMPLOYED AS SANCTIONED BY LIBERAL EXPERIENCE.

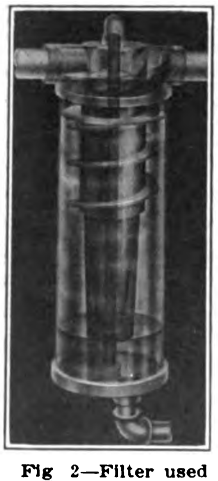


Fig 2—Filter used on Bowser gasoline storage tanks

UTILITY, as it resides in the automobile as a mode of transportation, depends quite as much upon the fuel available as it does upon the excellence of the mechanism. If, then, the fuel must be taken advantage of, certainly it must be stored in sufficient quantity to enable one to draw upon the supply as the occasion requires, without at the same time feeling that it is a source of too great responsibility to have it in hand in quantity sufficient to represent a fire hazard. It may not be generally appreciated, but even coal, when it is stored, must be carefully provided for to keep it from becoming ignited; spontaneous combustion is likely to set in unless it is properly ventilated.

The list of fuels available in the world include coal, wood, peat, hydrocarbons (in liquid form), alcohol, composite mixtures (made up of hydrocarbons, alcohol, nitrate of ammonia, picric acid, acetone, benzol, etc.), and if the matter is carried to its final conclusion, nitro-glycerine, gun-cotton, gunpowder and other explosives may be placed in the category of fuel.

Glancing at the fuel situation with a view to a further and more intimate acquaintance with it leads up to the question of the real dangers involved in the manipulation of the various grades and generic types of the same. Energy, of which there is a fixed amount in the universe according to the present belief, may be classified, referring to its various places of abode, as follows:

(a) Energy of position, that is to say, the energy that is stored in a mass, as a brick in an elevated position on the wall of a building, or a rocking boulder in the highest peak of a far-off mountain.
(b) Muscular energy of animals.
(c) Energy of the wind.
(d) Energy of vegetation.
(e) Energy of water.
(f) Energy of coal.
(g) Energy of liquid fuel.
(h) Energy of fuel in gas form.
(i) Energy of explosives.
(j) Chemical energy.
(k) Electrical energy.
(l) Energy of the sun's rays.
(m) Energy of impact.
(n) Energy of recoil.

What is energy? Briefly, it is a capacity for doing work.

What is work? It is the overcoming of resistance through distance. Another way to define work is to say, it is the product of moving force into distance.

When energy is expended work must be done; time is taken to do the work. The difference between energy and work, then, is the difference between the capacity for doing work and the doing of it. All energy that is not active resides in static form, as energy of position; that is to say, the energy is potential, ready to be freed, when, in time, it will perform work.

The energy as it resides in the various classes of fuel is measured in heat units and it has a mechanical equivalent.

Remembering that the measure of energy called the heat unit is the amount of heat that will raise the temperature of one pound of water one degree Fahrenheit (taking pure water at the point of its maximum density), it is a further step in the right direction to also remember that Joule's equivalent, the mechanical

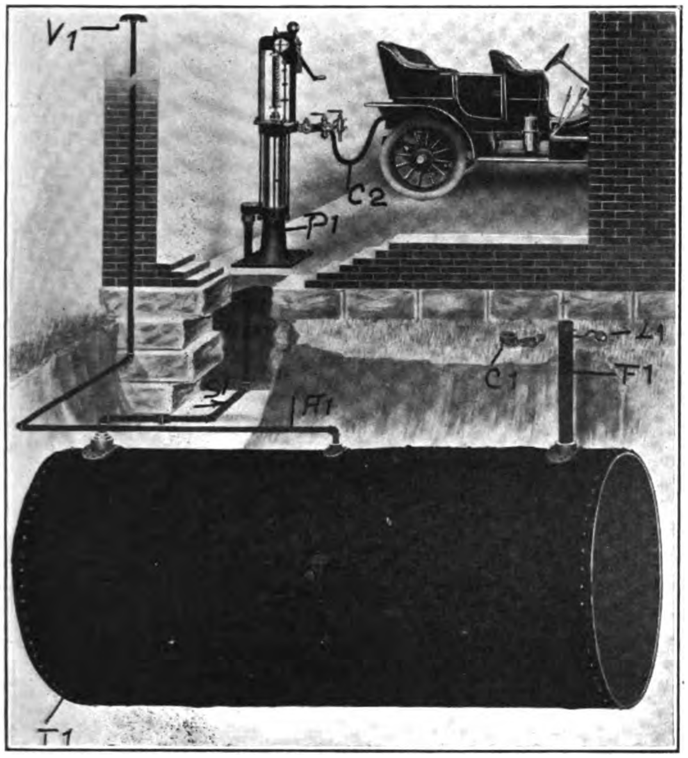


Fig. 1—Illustrating the most approved method of placing a storage tank of steel under ground near a garage

equivalent of heat. is equal to 142.4 foot-pounds. From this point on it is easy to frame a measure for power, as horsepower, so called, since it is stated that 33,000 foot-pounds equal one horsepower.

The Great Point of Difference to Remember

In the further discussion of the fuel problem, if it is the aim to properly differentiate, account must be taken of the time required to convert the energy that resides in the several generic types of fuel into useful work. The difference between the use of nitro-glycerine and coal, as a fuel, is largely in the difference in time required to abstract the energy from the respective forms. It takes quite a little time to abstract energy from coal; it requires but an instant to wring the energy out of nitro-glycerine.

Let us look into one other phase of this problem before striking the main road of the discussion. The most commercial way to abstract energy from coal is to burn it. The best way to burn coal is to set it on fire in the presence of enough oxygen to form carbonic acid and water. There are substantially 14,000 heat units in a pound of good coal; the energy may be abstracted from the same if the coal is completely burned in the presence of enough atmospheric air to supply the requisite amount of oxygen. The reason why the energy cannot be abstracted from coal as quickly as it can be from nitro-glycerine is because the oxygen of the air cannot be quickly combined with the carbon and hydrogen in the coal. The reason why nitro-glycerine gives up its energy so quickly is because the oxygen is combined in the mixture in more acceptable form, or the ingredients for freeing oxygen in the process of burning are in a better position than when atmospheric air is relied upon as the storehouse of the necessary oxygen.

As an illustration of what happens when explosives are not properly contrived, it is only necessary to remember that ordinary black powder, as used in blasting, etc., is far from smokeless; the smoke is due to incomplete combustion, the amount of oxygen present in acceptable form being less than that which would be required for complete combustion.

To sum up, remembering that time is an important factor when energy is displayed in the process of doing work, coal is better for fuel under a steam boiler than nitro-glycerine, because it burns fast enough to accomplish the commercial purpose of its being, whereas nitro-glycerine would introduce a monstrous hazard, and eliminate the germ of commercialism—disaster would be the normal expectation instead. When it is desired to destroy, as in war, nitro-glycerine and other explosives are preferred, the reasons being sufficiently clear to render further elucidation futile.

But if coal is too slow-burning to serve for purposes of war, and explosives are too vigorous to work advantageously under a steam boiler, it follows that in other walks, as when internal-combustion motors are to be used to furnish the power for automobiles, some other form of matter holding energy may be a better selection.

The internal-combustion motor has no need for a boiler because the fuel is burned directly in the presence of the mechanism that translates the energy. Any residuum, as ash, would clog up the machinery, and coal would deliver an abundance of ash. Liquid fuel, while it is composed of over 83 per cent. carbon (a form of coal), seems to be suitable for the purpose for two reasons, *i.e.* (a) the residuum, as ash, is relatively a mere trace, and (b) the fuel is more acceptable from the point of view of the combining of the requisite amount of oxygen to burn the fuel to complete combustion.

It is in the hydrocarbon series of fuels that reliance is placed, for the present, as fuel for automobile motors, referring to just the hydrocarbon compounds that are normal as liquid, but of which it may be said, the volatility is relatively high. Some hydrocarbons are normal in gas form, others may be found in solid form. Let it be understood right here, that all the hydrocarbons, before they will suitably mingle with oxygen of the air, must be vaporized; that is to say, they must be changed in their state of aggregation from solid and liquid forms to the gas form; even in the gas form, before they will burn, they must be combined with oxygen.

These hydrocarbons differ from all forms of explosives to the extent that they do not hold in their make-up the quantity of oxygen necessary to support combustion; indeed, there is very little oxygen in the hydrocarbons that survive in liquid form.

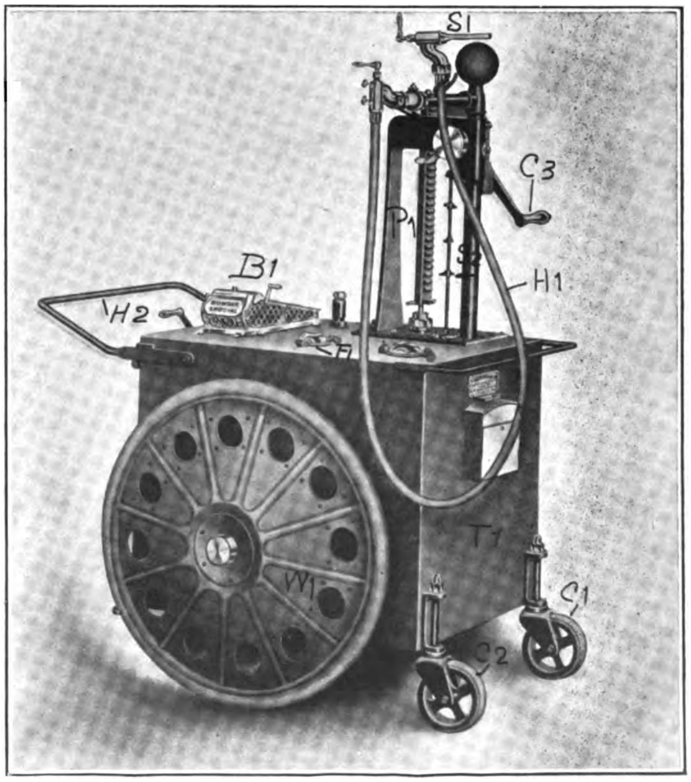


Fig. 3—Garage portable tank and pump, with facilities for noting and keeping track of the gasoline taken out of the tank

The most acceptable form of liquid fuel, then, may be regarded as holding qualities as follows:

(A) It should hold the maximum possible amount of energy in it per pound.

(B) The specific gravity of the fuel should be as high as possible in order that the amount of room that will be taken by it per thousand heat units will be low.

(C) It should be so volatile that it will vaporize within the available time.

(D) The boiling point (temperature of ebullition) should be as near the temperature of the surrounding atmosphere as possible.

(E) It should be capable of abstracting its oxygen from the air, nor should the compression or temperature have to be beyond that which is readily procured by simple mechanisms.

(F) It should deliver up its energy so readily that it will make for efficiency under normal working conditions.

(G) It should not, under any circumstances, deliver up its energy faster than the same can be disposed of safely.

Automobile gasoline answers to this description to a marked degree.

The Problem of Proper Storage Remains

Knowing all the requirements of the fuel and having one that responds to the needs, all that remains is to learn how to store and keep the same. Perishable substances, as eggs, beef and gun-cotton, must be stored in such a way as to preserve them. The fact that eatables will spoil if they are not properly kept is well appreciated; it is worth noting that gun-cotton will also spoil if it is not properly stored; but when it does spoil, unlike beef, it explodes.

Unless automobile gasoline is properly stored, it, too, will spoil, but, unlike gun-cotton, it will not explode. Instead of becoming more explosive as the result of spoiling in storage, automobile gasoline becomes less so, and in one sense this is a fortunate circumstance.

The only thing that can happen to automobile gasoline if it is not properly stored is that it will fail to serve for its purpose.

Of course, if automobile gasoline is allowed to leak out of storage and mingle in the atmosphere in the right proportion, it will, in the presence of a flame, burn. The force of this quick release of so much energy is enough to set fire to the surroundings and do quite a little damage of one sort or another.

Being sufficiently volatile for the purpose for which it is stored and ultimately used, it must be locked up much more securely than water for illustration. Extremely volatile hydrocarbons will penetrate the pores of a glass bottle; automobile gasoline holds in its make-up very little of the extremely volatile constitutent; but it is composed of a series of distillates, some of which are sufficiently volatile to penetrate the walls of a poor storage tank. To keep the gasoline intact it is necessary to provide a tank the walls of which are so dense that the more volatile portion of the fuel will remain, and in this way the autoist is assured of the fact that the fuel will not deteriorate while on storage, and he will also abort the chance of a fire.

How This Process Is Worked Out in Practice

If an autoist wants to run his car with the greatest measure of economy, the first thing to consider is the purchase of the fuel in packages large enough to afford to him the lowest price that can be negotiated.

(*Continued on page* 377.)

Letters

ANSWERS TO INQUIRIES WHICH WILL THROW SOME LIGHT ON THE METHOD OF DETERMINING THE SPECIFIC GRAVITY OF GASOLINE; REMAGNETIZING PERMANENT MAGNETS; THE REFRIGERATING EFFECT OF GASOLINE; THE USE OF MANOGRAPH CARDS, ETC.

Might as Well Determine S. G. of Peaches and Pears

Editor THE AUTOMOBILE:

[2,347]—I have been told that the specific gravity method of determining the quality of gasoline is not now used; please tell me why. I am sure that there are others who would like to know more about this matter. Permit me to say that I have learned a great deal about the fuel problem in THE AUTOMOBILE. It is to be hoped that you will continue the effort that you are making.

Grand Rapids, Mich. P. E. F.

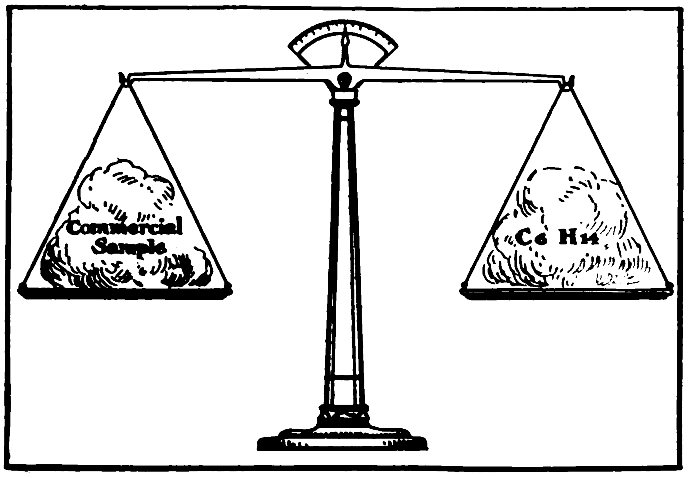


Fig. 1—Illustrating the weighing of true gasoline in comparison with automobile gasoline

When gasoline proper was being sold and used, which was several years ago, the specific gravity method of determining as to the general suitability of the fuel was satisfactory. Gasoline at that time was a close distillate lying between chymogene and benzine C. As it is at present the composition of automobile gasoline (which is not gasoline technically speaking) includes chymogene, benzine C, benzine B and benzine A, with, perhaps, a little kerosene. Hydrometers are used to determine the specific gravity of some one fluid, but it is obvious that such instruments are incapable of determining the specific gravity of an aggregation of fluids. Just to help the understanding, refer to the balance as indicated in Fig. 1; the pan at the right is filled with hexane (C_6H_{14}), which is the principal constituent of true gasoline; the pan at the left is filled with proportions of pentane, hexane, heptane and octane, with, perhaps, nonane and decane. Supposing

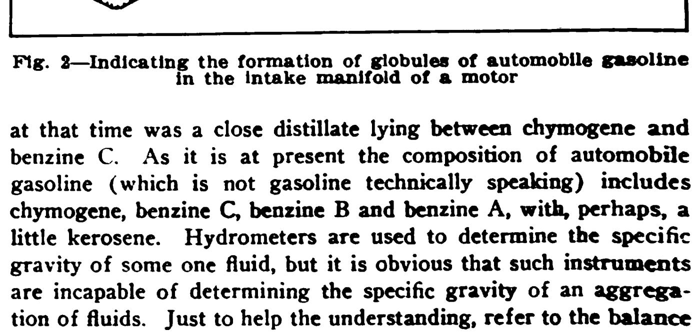


Fig. 2—Indicating the formation of globules of automobile gasoline in the intake manifold of a motor

the scales do balance, the volume of liquid may not then be the same in each of the pans, and what is equally to the point the fuel value of the two fluids would not be the same. True, the thermal value of hexane is not very different from the same value of the other constituents, but the other (less volatile) distillates would not be in such acceptable form as hexane, that is so readily burned to carbonic acid and water.

Refrigerating Effect of Gasoline Is the Cause

Editor The Automobile:

[2,348]—Why is it that the manifold on the intake side of my motor frosts up for a considerable distance from the carbureter? At times the carbureter also shows this same difficulty, if such it might be called. I will be glad to have you state in what way this frosting trouble interferes with the motor performance. Is there any way to overcome it?

Chicago, Ill. L. S. Childs.

When gasoline is changed from a liquid to a gas the volume of the gas is very much greater than the volume of the liquid for a given weight. Expansion takes place, and in expanding the gasoline gives about as much heat as is represented by the heat of compression. Ammonia, in the anhydrous state, is used for refrigerating work on account of the great change in temperature that takes place when the liquid is expanded to form ammonia gas. Gasoline is not nearly as good a refrigerating medium as ammonia, but it possesses enough of this property to do what you claim happens in your case. Remembering that the latent heat of evaporation must be overcome when gasoline is evaporated, which latent heat is equal to about the amount of heat that is required to raise 8 ounces of water 1 degree Fahrenheit, it remains to supply this heat before the liquid will evaporate. If it is not supplied at a sufficiently rapid rate the temperature will be lowered, and, as in your case, the temperature falls to that of the frosting point.

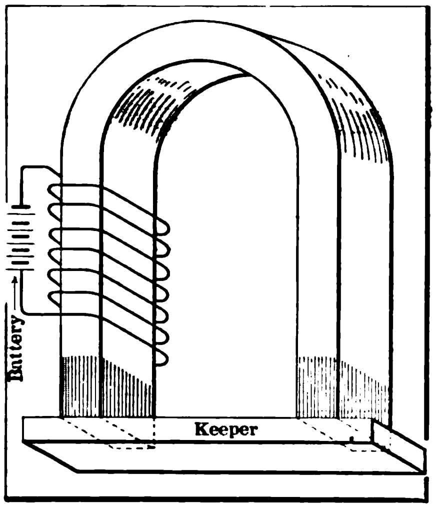


Fig. 4—Showing how permanent magnets are remagnetized

What really takes place is: Globules of liquid gasoline pass up into the manifold as shown in Fig. 2, and the heat necessary for the vaporization of these globules of liquid must pass from the manifold to the liquid; it does not transfer at a rate sufficient to satisfy the thermal conditions with the result that the temperature lowers.

One way to overcome this trouble, for such it is, is represented in Fig. 3, which is a cross-section of the float bowl of a carbureter. In this example the surfaces around the bowl are water-jacketed and it is the idea to circulate hot water in this jacket for the purpose of helping to supply the heat necessary to overcome the latent heat of evaporation of the liquid.

There are material objections to this plan; the heat should be supplied to the liquid as it oozes out of the nozzle, which is the point of vantage. The reason why it may not be the best plan to heat the liquid is that it may boil in the bowl, in which event the "steam" (vapor of gasoline) will rush out through the vent hole of the float bowl, and besides representing a considerable loss of fuel, it is likely to add to the fire hazard.

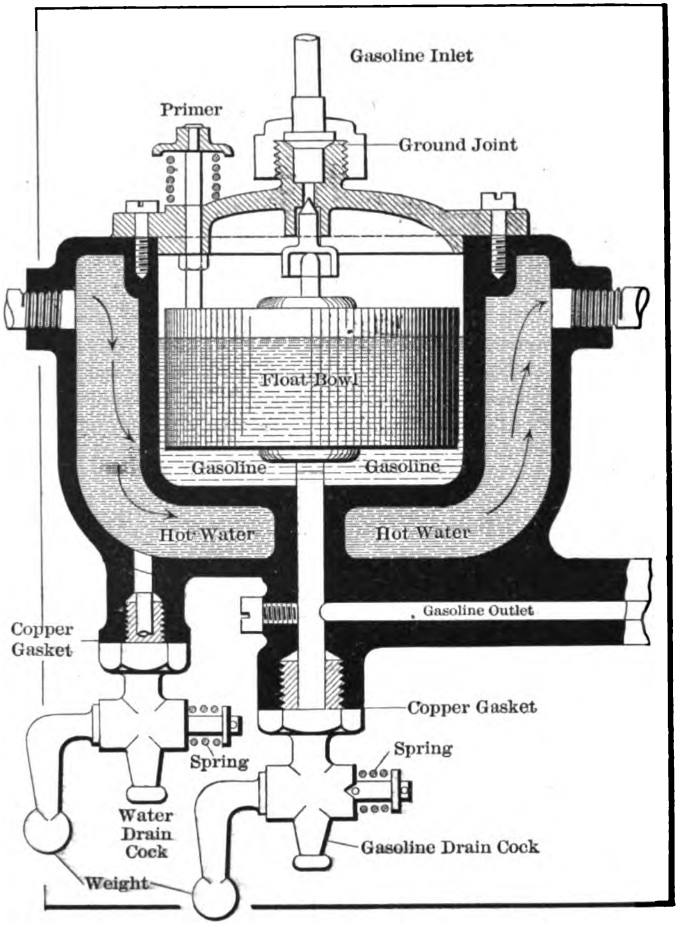


Fig. 3—Section of the float bowl of a carbureter indicating the water jacket placed for the purpose of supplying heat

The remaining two ways to supply heat to the liquid are: (a) By heating the air as it enters the depression chamber of the carbureter and (b) waterjacket the carbureter around the depression chamber; the depression chamber of a carbureter is the space in which the nozzle is housed.

Wants to Remagnetize Permanent Magnets

Editor The Automobile:

[2,349]—I am convinced that the permanent magnets of my magneto are so demagnetized that they are not now suitable for the service that I should get out of them; can you tell me how to remagnetize them? I receive so much benefit from your "Letters" that I am loath to miss a single number of The Automobile.

South Bend, Ind. G. E. Alberts.

Referring to Fig. 4 of the permanent magnets of a magneto, it shows that the magnets are separated from the other parts

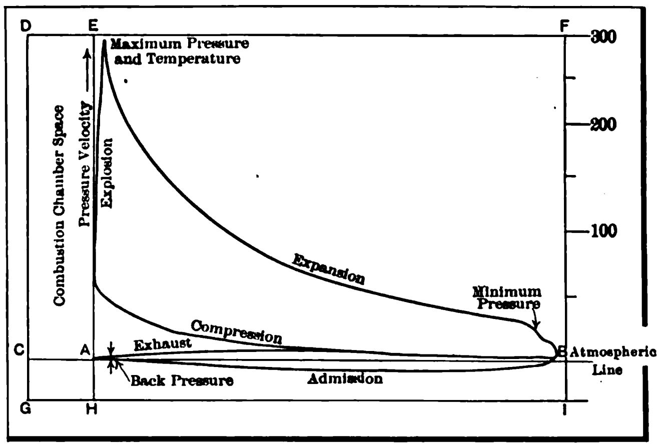


Fig. 5—Manograph card from a motor depicting the waves of pressure during the four cycles

(polar horns) of the magneto, and a few turns of insulated wire are wound around the metal above one of the extremities. A keeper of soft iron is also placed across the ends to complete the magnetic circuit. The two ends of the winding are connected to the terminals of a storage battery (the ignition battery, if it is of the storage type, will do) and the current is permitted to circulate in the windings (coil). The best way to accomplish the purpose is to allow the circuit to remain closed for, say, five minutes, regulating the flow by a variable resistance as a rheostat. In opening the circuit the current should be allowed to die out; after the operation is completed it will be proper to let the magnets rest for a few hours and then give a second dose of the charging current, repeating the performance as in the first place. If this charging process is repeated several times the magnets will become more saturated than if it is done only once, but even one charge will bring them up to probably 80 per cent. of the maximum possible charge that they are capable of holding.

Wants to Know More About Manograph Cards

Editor The Automobile:

[2,350]—A friend of mine, who seems to know quite a little about automobile motors, tells me that the manograph card is of the greatest value in determining how well a motor is performing. I am fairly well acquainted with indicator cards as they are used in steam-engine work and what I want to know is, what is the difference between a manograph card and an indicator card as it is taken on an indicator of the regular type?

Dundee, Ill. Reader.

The manograph, like the indicator, traces the pressures in the cylinder of the motor. The indicator, on account of inertia of parts, lost motion and the lack of responsiveness of the spring, fails to do accurate work when it is used in high-speed gasoline motor work, and the manograph is used in preference. The reason why the manograph is more suited to the work is due to the fact that a beam of light is utilized photographically to trace the line of pressure, thus eliminating the necessity of using a spring and a stylus or other equivalent as a pencil in a finger-like arrangement. Fig. 5 is a reproduction of a card taken by a manograph, in which the cyclic relations are clearly shown. The suction stroke is represented by the "admission" line, the compression stroke is indicated by the "compression" line, ignition takes place during the dwell of the piston at the top end of the stroke and is here represented by the "explosion" line. The power stroke is depicted by the expansion line, exhaust beginning at the point marked minimum pressure, *i. e.*, showing the terminal pressure. This card is not shown for the purpose of pointing out how good it is; indeed, it is not a good one. Were a motor to perform as depicted on this card the volumetric efficiency would be very low and the back pressure would be far too high. If the volumetric efficiency of a motor is low it is assured that the power will be below the requirement and the thermal result will be poor. In reading the cards taken by a manograph it is necessary to be fairly well acquainted with the characteristics of motors, and, while there is quite a difference between steam practice in this regard as compared with the best practice in internal-combustion motor work, the fact remains that there is a certain need for "horse sense" in both cases.

The Company Will No Doubt Make the Change

Editor The Automobile:

[2,351]—I have been a reader of The Automobile for five years and would like an answer to the following question: I have a 1907 machine equipped with make-and-break Bosch low-tension magneto. I would like to change this to the new Bosch magnetic plug, using the same Bosch low-tension magneto and distribute the spark to the magnetic plug with a timer. Could this be done with success?

Allentown, Pa. Charles W. Grammes.

Questions That Arise

CONCERNING THE LIMITED USE OF THE METRIC SYSTEM BY AMERICAN BUILDERS; EMPLOYING MAGNETOS FOR LIGHTING; PERTINENT POINTS ABOUT VALVES

[215]—What is the reason why the metric system is so little used by American builders of automobiles?

There are many reasons. To begin with, the metric system is not an American idea. This has more bearing upon the subject than might be supposed. The metric system has much in its favor, but that fact has no bearing upon the quality of automobiles, whether they be made according to English or metric measurements. If a workman is trained into thinking in English, so to speak, it is highly improbable that he can drop that habit and take up with a new one without making quite a number of mistakes. But even if he does not commit errors he will, at least, be compelled to go slow.

The potential force of habit is well recognized. If a man becomes accustomed to indulging in strong drink, or if he has a penchant for opium, it is a well-recognized fact that he is booked for life. A very few men have sufficient strength of character or bias of mind to shake off such habits and conduct themselves normally. The force of habit is just the same, whether or not the habit is that of eating opium, drinking rum, or measuring parts on a 24-inch gauge.

That the English method of measuring is thoroughly good in every practical way is shown by the excellence of the work that is done under its sway. The real English unit of measurement in the shops that are devoted to the building of automobiles is the thousandth of an inch, and fractions of this unit are taken on a decimal basis. True, there are a great number of persons who labor under the impression that a carpenter's rule is used in sizing the parts of automobiles, but they would undertake a considerable contract in telling how artisans would be enabled to locate an error of 0.0002 of an inch in the diameter of a ball, for instance, by any such method.

The great complaint that is made about the English system of measuring is that it is not provided with a scientific foundation. These critics point out that the metric system has a scientific basis for its being. Ancestry is to be lauded; practice makes perfect. In the meantime what is the significance of the respective foundations for linear measurements to the man who wields the rule? The authorized standards of the two foundations of linear measurement are as follows:

The International standard meter is derived from the Metre des Archives and its length is defined as the distance between two lines at 0 degree Centigrade.

In the English system (which is the same as the United States standard) the Troughton scale is the standard.

This information is all that the machinist would be able to procure as a practical statement of the facts, and in the long run he would be compelled to go to a maker of measuring instruments and purchase one that he would be able to use.

From the cost point of view, there are many other reasons why makers should go slow about adopting new standards of measurement. Take the centering of gears in a transmission system; if noise is to be aborted the centers between the prime and lay shafts must be true within 0.0005 inch. This accuracy is assured, not by depending upon artisans to scale closely, but by the use of gigs; is it the use of any system of measurement that governs this? No. The distance is fixed by the pair of gears used. The number and pitch of the teeth of the pair of gears disposes of this matter.

The inter-relation of the members in the make-up of the automobile are fixed independently of the system of measurement for the most part, and it is highly improbable that such matters can be readily shifted. Men must be permitted to speak the language that they understand, or they will fail to grasp the situations that confront them. There are other reasons why the metric system is not being rapidly absorbed in this country, but they have been exploited from time to time and at great length in some of the cases.

[216]—Is it not possible to employ magnetos for lighting as well as for ignition work?

Barely possible. It must be remembered, however, that the magnetic field of a system of permanent magnets is very weak as compared with the magnet field that is afforded when the magnets are of soft iron and wire-wound. The electromotive force generated by an armature rotating in a magnetic field is determined as follows:

$$\text{Va} = \frac{\text{Ia} \times \text{sa} \times \Phi}{10^8} = \text{electromotive force impressed on the armature windings.}$$

$$\text{Ia} = \frac{10^8 \times \text{Va}}{\text{sa} \times \Phi} = \text{number of the inductors wound on the armature.}$$

$$\Phi = \frac{10^8 \times \text{Va}}{\text{sa} \times \text{Ia}} = \text{total flux of the magnetic force emanating from one pole of the magnet.}$$

$$\text{sa} = \frac{10^8 \times \text{Va}}{\text{Ia} \times \Phi} = \text{speed of the armature in revolutions per second.}$$

It will be seen that the voltage depends upon the total flux emanating from one pole, all other things fixed, and this property of permanent magnets is relatively very low. It is, of course, possible to increase the speed to a certain extent, but even this choice is limited, partly on account of possible mechanical trouble. and to quite some extent on account of heat losses; they increase materially with speed due to hysteresis and Focault currents, quite apart from bearing trouble and the effects of centrifugal force.

[217]—Is it not possible to increase the diameter of the rotor and in this way add to the ability of the magneto to deliver enough current to supply the lamps as well as the ignition system?

No. Increasing the diameter of the armature does not add to the ability of the permanent magnets. The peripheral velocity of the armature can not be increased beyond a certain point in any case, and this velocity can be obtained with a small diameter rotor running at a high rotative speed just as well as it can with a large diameter rotor, which would have to be run at a lower rotative speed.

[218]—Would it not be possible to add to the number of turns of wire on the rotor and in this way make up for the lack of strength of the permanent magnets?

No. The internal losses would increase so much as to reduce the output of the armature to a point too low to serve for the stated purpose. The question of commercial efficiency, so called, is not a point worthy of serious consideration, it being the case that the total power required is so low as not to introduce a serious loss. The point is that the armature would have an internal loss so great, in proportion to the output, that it would probably be destroyed by heat.

[219]—What is the lift of valves in well-made motors?

About 8 millimeters.

[220]—Is it good practice to make the lift of both inlet and exhaust valves the same?

Very likely.

[221]—Do some designers make a distinction between inlet and exhaust valves in this regard?

Yes. The Mercedes, in one type of motor, established a lift of 8 mm. for exhaust and 7 1-2 mm. for inlet valves.

[222]—What is the most prolific cause of knocking in a motor, assuming that the bearings are properly taken up and the mechanism proper is in reasonably good working order?

Every other knock would have to be of a thermic character. If it may be assumed that there is not a growth of carbon it still remains to observe if there is a projecting fin or a pocket of some character in which carbon may settle and insulate the metal from the cooling influence of the water in the jacket.

Columbia Is Ready

MARK 85 IS THE LATEST FROM THIS PLANT; VESTIBULE TYPE OF BODY IS A DISTINGUISHING FEATURE; ALL MODELS REFINED AND AMPLIFIED

IN connection with the announcement of its 1911 models it is interesting to note that the Columbia Motor Car Company has incorporated therein not a few refinements and several novel features, as has been its custom in each of the sixteen years it has been engaged in the building of automobiles. For the coming season two gasoline cars are announced. The well-known Mark 48, which first saw the light in 1905, is continued, with some refinements and a few changes, but will be known as "Mark 48, Lot 5." In addition, there will be a new model, denominated as "Mark 85." It is with the latter that this article will more particularly deal.

Among the body designs offered in the Mark 85 are four- and six-passenger vestibuled roadsters, seven-passenger vestibuled touring car, limousine and landaulet bodies. The four-passenger roadster bodies practically follow the 1910 lines, with the fore-door feature that has emphasized the company's body designs for the past two years. The season's novelty along these lines, however, is the six-passenger vestibuled roadster—an original straight-line body, somewhat resembling the four-passenger vestibuled roadster, but longer, and provided with two extra seats. These seats may be removed, making a very attractive four-passenger roadster with added carrying space.

The seven-passenger touring body is also enclosed with vestibule door. The location of the doors and gear-shifting and brake levers does not necessitate an awkward leg movement in the operation of the foot pedals. The interior of all touring bodies has been taken advantage of to supply all seating and touring comforts. The door panels are fitted upon their inner faces with deep leather pockets, with small but secure locks.

One of the most appreciated features of the Mark 85 is the enclosure of the running-board brackets. Instead of having the sheet-metal work follow the conformation of step irons, this work extends outward from the top of the frame section to a point directly over the inner edge of the running board, which it drops to meet. Into this housing is built the tool box, and behind it is placed the Prest-o-Lite tank for the headlights, and auxiliary ignition battery, etc., thus giving the running board an absolutely clean and light appearance, and preserving the long lines of the car.

All bodies are of metal, reinforced with wood, and all open

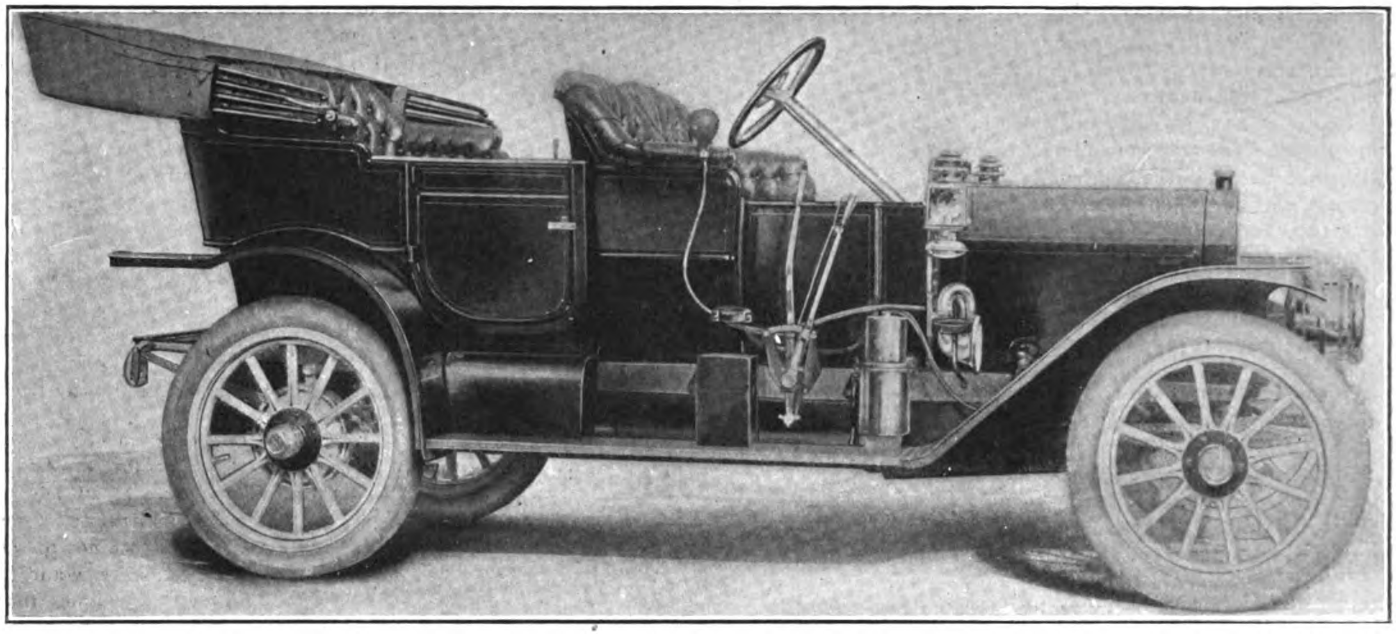


Fig. 1—Vestibule type of body that distinguishes the Columbia automobiles for 1911

bodies are trimmed with the best quality of hand-buffed leather with curled hair and coil spring upholstery, there being a wide choice allowed purchasers in upholstering and trimming of coach bodies. The front seats are individual. Mark 85 open bodies carry four, six or seven passengers, all the closed bodies being designed to carry seven. In Mark 48 the passenger capacity of closed-body designs is four, five and seven; closed bodies, five.

The motor of Mark 85 develops 35 horsepower, A. L. A. M. rating, that of Mark 48 being rated at 32.4. The former's wheelbase is 120 inches, as against 115 inches in the older model—the tread in all instances being 56 inches, with a road clearance of 11 inches.

Wood artillery wheels with forged-steel hubs feature all this year's models, demountable quick-detachable rims being included in Mark 85, and Universal quick-detachable in Mark 48. All brakes act on rear wheel drums, foot brakes being of the contracting, band type and the emergency of internal-expanding shoe type.

Four- and six-passenger open cars of the Mark 85 model are equipped with 36 x 4 tires, front and rear; seven-passenger open and closed cars, 36 x 4½ front and rear. Quick-detachable clincher tires are standard on all Mark 48 cars—four- and five-passenger, 34 x 4 front and rear; seven-passenger and closed bodies, 34 x 4 front, and 34 x 4½ rear are the standard tire dimensions.

There is a wide option in Mark 85 color schemes. In open cars: green body, gray gear; blue body, gray gear; green body, green gear; blue body, blue gear; Wedgwood green body and gear. Limousines and landaulets: green, blue or maroon. In Mark 48, Columbia blue body and cream gear or Columbia green body and cream gear are optional.

SPECIFICATIONS FOR COLUMBI

MODELS	Price	H.P., A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		Lubrication
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	
Mark 85........	$3300	38	R'ster..	4	4	4⅞	5½	Pairs..	Cellular .	Cent'f'l..	Bosch...	Exide...	Pu
Mark 85........	3400	38	R'ster...	6	4	4⅞	5½	Pairs..	Cellular .	Cent'f'l...	Bosch...	Exide..	Pu
Mark 85........	3500	38	Tour'g..	7	4	4⅞	5½	Pairs..	Cellular..	Cent'f'l .	Bosch...	Exide...	Pu
Mark 85........	4800	38	Limous.	7	4	4⅞	5½	Pairs..	Cellular .	Cent'f'l...	Bosch...	Exide...	Pu
Mark 85........	4900	38	Land't..	7	4	4⅞	5½	Pairs..	Cellular .	Cent'f'l...	Bosch...	Exide...	Pu
M. 48 Lot 5.....	2750	32.4	Tour'g..	5	4	4½	4 7/16	Pairs..	Cellular .	Cent'f'l...	Bosch...	Exide...	Spl
M. 48 Lot 5......	2750	32.4	R'ster*.	4	4	4½	4 7/16	Pairs..	Cellular..	Cent'f'l..	Bosch...	Exide...	Spla

* Vestibul

Principal Mechanical Features of the Mark 85

The motor is of the four-cylinder "T-head" type, with cylinders cast in pairs, having a bore of 4⅞ inches and stroke 5½ inches. The water jackets are cast integral with the cylinders. The valves are of large diameter, the intake and exhaust valves being on opposite sides of the motor, with large water circulation areas around the valve seats and valve stems. The design of the cylinders includes a polished plate top, which may be removed for inspection.

The ignition is the new Bosch double system, using eight plugs. There is an independent battery system and an independent magneto system. One or the other, or both systems in common may be used. In no way is this to be confounded with the previous Bosch dual system with two sources of supply and a single scheme of distribution. The new Bosch double system includes two absolutely independent sources of current and means of distribution.

The two systems are controlled from a single switch mounted upon the dash, which switch is operated by hand or foot, and a rotating barrel with stops for battery or magneto contacts or at a midway stop when all eight plugs are used in firing. The switch handle is fitted with a locking device and the switch cannot be removed from the "off" position without the key is properly inserted in the switch handle. This feature will make

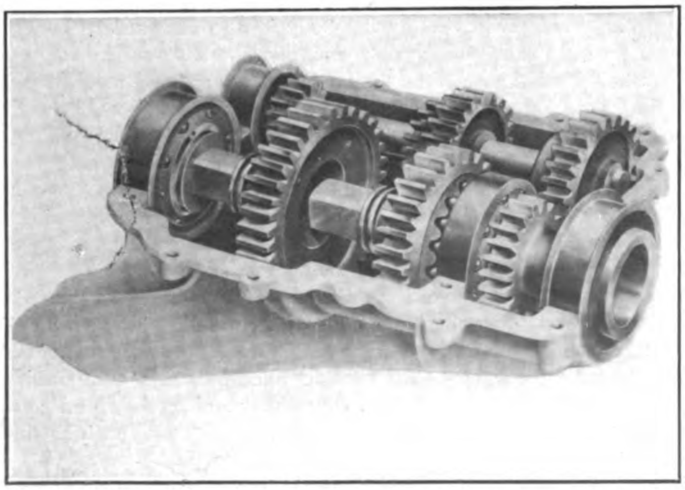


Fig. 2—Transmission gear of the Mark 85 car, showing short shafts, Hess-Bright ball bearings, and using fine materials

the tampering with or unwarranted use of cars difficult of accomplishing if not absolutely impossible.

The crankshaft is of generous proportions, with large bearings and webs, and the connecting rods are drop forged. The engine bearings are of special-alloy white metal. The motor is suspended through four hollow square legs and through which extend standpipes, gauze covered, to provide for crankcase ventilation.

The lubrication plan includes a powerful gear pump of 15 pounds pressure capacity. This pump circulates oil from a reservoir in the crank case through a conduit cast within the middle section of the motor and from which there are diverse pipe leads to all bearings. The system includes a sight-feed indicator, located upon the dash, that the circulation of oil may be noted at all times. The front timing gears are included in the lubricating system, and there is poured from the top continually upon the engaging surfaces of these timing gears a powerful stream of oil. This oil, in falling, is strained and returned to the reservoir to be again forced through the main and secondary leads. This is a lubricating method used in previous Columbias, and in some few other high-powered cars.

Radiation and cooling are insured by a powerful centrifugal pump keeping water in continuous circulation. A modish cooler of ample size and fine design with high peak, behind which is located a belt-driven, ball-bearing and eccentrically mounted fan, cools the circulating water. The water connections are of spun brass and of graduated diameter to allow for even distribution.

The clutch is of the cone type. The facing, however, is a commercial packing, a product obtainable anywhere, and being an admixture of asbestos and other elements. This provides a clutch capable of finding and maintaining its own seat, and further, it is impossible to burn out. The clutching action, too, is arrived at through a powerful leverage, so that the clutch is easy of operation. The pedals are adjustable, suitable for any leg length, and are of the disappearing type, leaving a clear floor board.

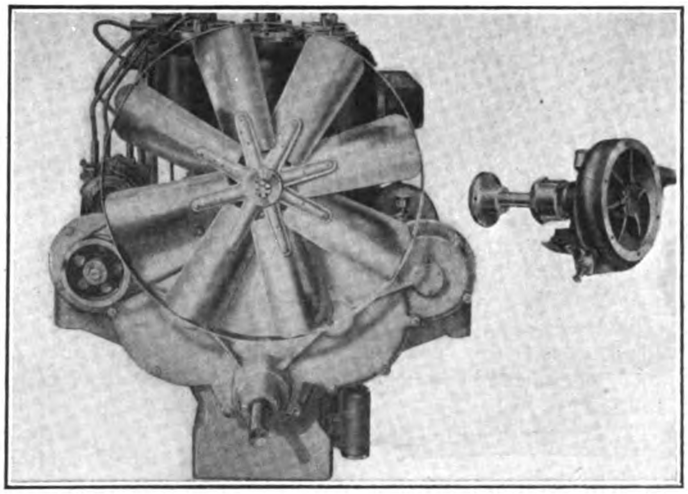


Fig. 3—Front end view of the Mark 85 motor, presenting a large fan and a neat appearance

CARS AS OFFERED FOR 1911

	TRANSMISSION							BEARINGS				TIRES	
Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Trans-mis'n	Axle	Weight	Front	Rear
Cone	Selecti'e.	3	Unit	Shaft	120	56	P. Steel	Plain	Ball	Roller	....	36x4	36x4
Cone	Selecti'e.	3	Unit	Shaft	120	56	P. Steel	Plain	Ball	Roller	....	36x4	36x4
Cone	Selecti'e.	3	Unit	Shaft	120	56	P. Steel	Plain	Ball	Roller	....	36x4½	36x4½
Cone	Selecti'e.	3	Unit	Shaft	120	56	P. Steel	Plain	Ball	Roller	....	36x4½	36x4½
Cone	Selecti'e.	3	Unit	Shaft	120	56	P. Steel	Plain	Ball	Roller	....	36x4½	36x4½
Cone	Selecti'e.	3	Sep. Un.	Shaft	115	56	P. Steel	Plain	Ball	Roller	....	34x4	34x4
Cone	Selecti'e.	3	Sep. Un.	Shaft	115	56	P. Steel	Palin	Ball	Roller	....	34x4	34x4

Roadster

The transmission is similar to those used in Columbia cars since 1903. In this transmission there is a very short length of shaft left unsupported. Both the main and secondary shafts are equipped with Hess-Bright ball bearings. Operation is through a selective grid iron gate by a single lever within the driver's easy reach.

The rear axle is of the full-floating type, with side torsion rods. The torsional strains of the axle are taken by the torsional bars, and there is no interference with the free action of the spring. The driving pinion is mounted within a cage upon short series Timken roller bearings, and is bodily removable, while the bevel gear is mounted directly to the differental housing, making a unit with this mechanism.

The live axles are of large diameter and extend through the wheel hubs and may be removed without raising the road wheels from the ground. The drive is accomplished through dove-tail hub flanges.

The frame is of pressed steel with a drop at the rear allowing for practically a straight-line drive, and the propeller shaft is

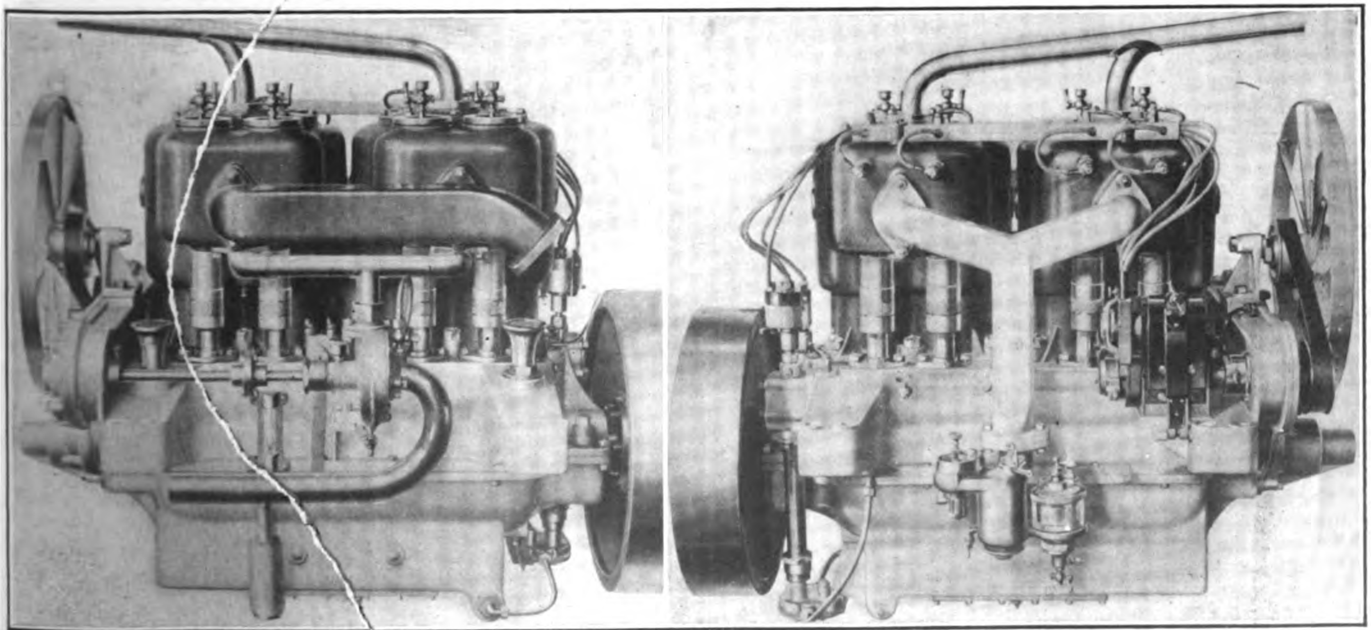


Fig. 4—Two views of the Mark 85 Columbia motor, showing the magneto and carburetor on the right-hand side and the water pump on the left

mounted in encased universal joints of ample capacity for the load, and which joints are subjected to practically no wear. Both front and rear springs are generous in number of leaves, and are of semi-elliptical type. These springs have been especially designed and selected for their resiliency and capability of accepting both light and heavy loads, thus adjusting themselves to all carried weights. The wheel hubs are drop forged and the front axle is a solid forging of I-beam type, and with integral spring seats. The steering gear is of the worm and sector type and irreversible, and is contained within an aluminum housing which is mounted directly upon the top of the side frame member.

The trimming of Mark 85 touring car and roadster is of hand-buffed black leather, while the limousine and landaulet are of green, blue or maroon broadcloth or leather. Mark 48 trimming is uniformly of hand-buffed black leather.

The equipment of Mark 85 cars is most complete. A spare carrying rim is included, so that tire changes may be easily made. The spare tire irons are fitted into the frame brackets and the fenders, which are new and without visor caps, and are strongly supported with dove-tail irons. Proper suspension and protection for springs is safeguarded with the inclusion of a full set of four shock absorbers. Bosch high-tension magneto and Exide storage sparking battery of six volts capacity are standard equipment, as is a Prest-o-Lite tank. There are two large and powerful gas headlights, and three oil-burning lamps on this car.

The side oil lights are mounted upon brackets forged integral with the dash irons, and the headlights are stayed against the possibility of vibration. The taillight is mounted out of the path of dust and where the lightrays fall directly upon the registration number. The solidly anchored trunk rack is large enough to accommodate large touring trunks. Foot-rest, robe rail and horn, are within easy reach of passengers and driver. A full complement of usual and special tools is contained within a leather-bound canvas roll, with leather strap and tie buckle. Beneath the rear seat is placed a tray so proportioned as to accommodate the top side curtains without breaking the celluloid windows. Muffler cut-out, operated with heel press, and connected with bell cranks and rods, is supplied with all cars, as is a storage locker of large carrying capacity. A plunger pump self-contained hand oiler of large capacity is located beneath the motor bonnet, and is spring held against the chance of falling.

The Columbia price proposition is sufficiently varied to appeal to all classes of buyers: Mark 85, four-passenger roadster, $3,300; six-passenger roadster, $3,400; seven-passenger touring, $3,500; seven-passenger limousine, $4,800; seven-passenger landaulet, $4,900. Mark 48, Lot 5, five-passenger touring, $2,750; four-passenger roadster (vestibuled body), $2,750.

New Continental Rim

NEW IDEA IN DEMOUNTABLE RIMS; A PLURALITY OF BAYONET JOINTS ARE TAKEN ADVANTAGE OF IN FASTENING THE TWO MEMBERS OF THE RIM; LIGHT CONSTRUCTION AND EASE OF OPERATION ARE DOMINANT FEATURES

EXPERIENCE teaches that road wheels are subjected to more abuse than any other part of an automobile, and the cost of road-wheel upkeep is higher than the cost of gasoline or even the wages of the chauffeur. This being so, it becomes necessary to examine into this situation at frequent intervals with the hope, perchance, that some way will be found for reducing the largest factor that influences for a high up-keep. Many autoists find that it is one thing to save up enough extra money to purchase an automobile, but if the car is kept in constant service after it is received the cost of road-wheel upkeep assumes proportions that merit attention. This is not a matter that should be complained of on the assumption that the cost is out of all bounds; the point is that the largest item is the one that should be worked upon with the expectation of reducing it if possible.

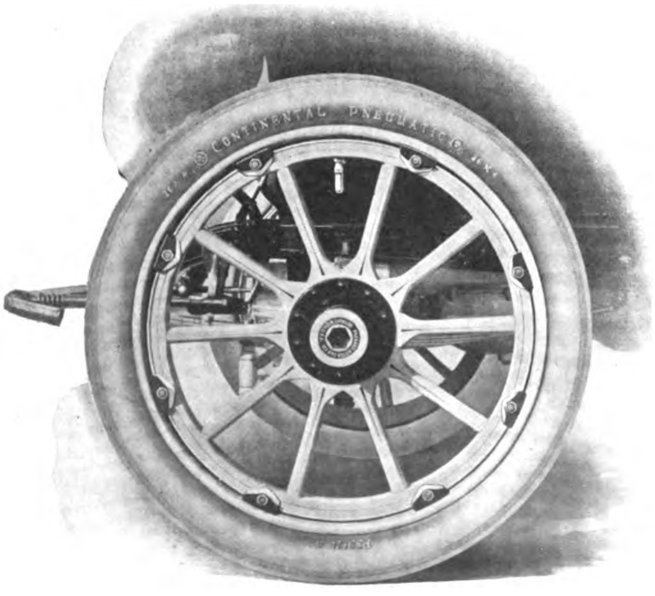


Fig. 1—Showing the work completed—ready to proceed

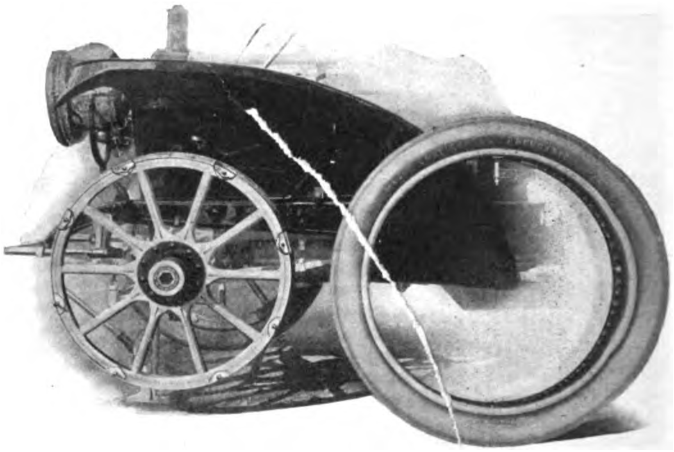


Fig. 2—The stripped wheel, with rim and tire ready for adjustment

This question of road-wheel upkeep has several angles; it is well understood, or it should be, at any rate, that tires will last over twice as long if they are removed and repaired promptly than they will if the little wounds are allowed to fester.

But the removal of tires is an undertaking that the average autoist does not take kindly to—the work is too hard. Under the circumstances the greatest stride in the direction of a low cost of upkeep is to provide rims that will save labor and coax the owner of the car to examine the tires at frequent intervals.

That tire-makers appreciate this phase of the situation must be manifest if account is taken of the strenuous efforts they are continually making to improve rims, it being the idea to so facilitate the work that tires may be removed and replaced with but slight effort, not only upon the road when a puncture has to be coped with, but in the garage, with a view to reducing tire depreciation by the only known way, *i. e.,* keeping the wounds healed up so that mildew will not creep in and pursue its ravenous course.

The latest effort along advanced lines is being made by the Continental Caoutchouc Company, New York City. The new rim is here illustrated in various ways with a view to clearly depicting the plan of design, general construction and the proper method of use.

How the Rim is Made and Used

The character of the material used in the new Continental rim is of such high grade that it responds to the dies so readily as to make it possible to form a series of "bayonet" joints between the two members, as shown in Fig. 3. By this arrangement the two parts are joined or disjointed readily, and the security offered by this form of joint is adequate for the most exacting need in this service. When the parts are slipped into place, as a further inducement for security, a locking mechanism is set With a view to showing how the locking is done reference may be had to Fig. 5, of the operation of placing the outer rim, and to Fig. 6, depicting the locking operation; this is also the position that the tire is placed in when it is desired to unlock the rim prior to removing the tire.

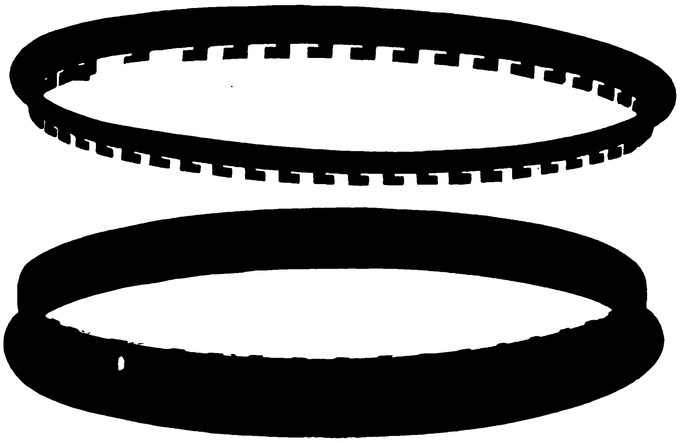


Fig. 3—Showing the rim and the series of bayonet joints between the two members

The wheel, with the new rim removed, is presented in Fig. 2, and the rim with the tire in place is stood up just in front of the stripped wheel. When the tire is placed in the rim the complete unit is slipped into place over the security rim on the felloe of the wheel, and when all is properly adjusted the locking operation is done in the manner as indicated in Fig. 4. The finished undertaking is pictured in Fig. 1.

The new product is known as the Gilbert type of "Detachable Demountable" rims, and among the points of advantage are numbered the fastening devices, utilizing the principle of the wedge, there being six fasteners, with specially contrived locking nuts, the latter being so designed that they cannot be detached from the wedge; hence the autoist, in making a repair on the road at night when it is dark, is not likely to have to make a fruitless search for missing nuts.

The method of securing the wedges is so nicely contrived that there is no tendency of the rim to "freeze," which is a character of trouble that has proved the undoing of many of the earlier efforts in this direction.

One other matter that has been cared for in this rim lies in the design, which is so contrived that the bolts are not subjected to bending moments; this is extremely important, it being true that the bolts would scarcely hold out against the force of continued service were they so placed that they would have to take the work as cantilevers.

In the matter of weight the design lends facility, and the material reduction in weight that the company has been enabled to make in this, over all its previous efforts, is to be commended.

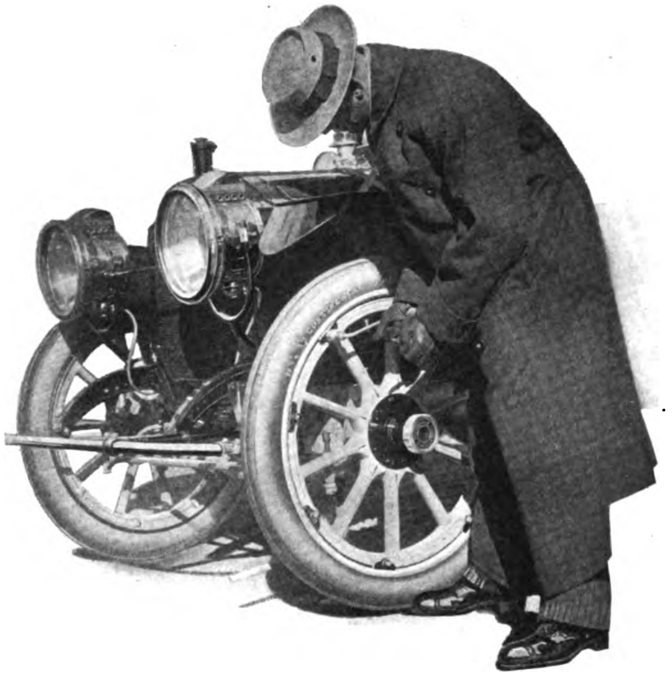


Fig. 4—The final operation—locking the attaching device

The bayonet joint method of securing the two numbers of the rim is responsible for this particular improvement, due to the fact that strength is imparted by utilizing many such joints rather than to have accumulations of metal at a few points around the periphery. The rims are formed in dies, avoiding the necessity of making the mass of material enough for the purpose of joining parts, or affording thicknesses of sections such as could be recommended in work that has to be riveted.

The lowered weight counts for economy of operation in that the flywheel effect is reduced to a low ebb; difficulty in steering will therefore be less, and the wear on tires, due to gyroscopic action, will fall to the low limit. It is, of course, difficult to appreciate that flywheel effect is a factor in this work, but those who know the good qualities of a large mass in the flywheel of the motor will most readily understand that it is a real force; if this actual force is so placed that it can do damage instead of good it stands to reason that the less of it there is, the better.

The idea of having an inflated tire along is catered to in this example, and since the tire may be mounted on an extra rim ready for instant use the amount of trouble the autoist will be put to on the road is minimized. Then, too, tires depreciate unless they are properly stored. With a tire mounted on a rim and somewhat inflated, provided it is covered to keep out light and dust, it is in a position of vantage.

The rim will take either clincher, quick detachable or Dunlop style tires. One of the parts of the rim comprises one clincher and substantially the whole of the base; the other the second clincher. The former is provided with a series of rectangular projections on the under side of the base all around the edge; the latter, with mating members, engage with the projections on the former. When the two parts are put together the extending feet first

Fig. 5—Putting the outer rim in place

Fig. 6—Locking (or unlocking) the rim

pass between the projections, and by means of a special tool one part is then rotated slightly with respect to the other so as to cause the projections and the mates to interlock. The two parts are securely held in this position by a hinged spring pressed key or lock fitting between one pair of the horizontal locking devices. The device is readily unlocked.

The tool furnished with the rim consists of a base plate which is slotted to pass over the square part through which the valve stem passes. The sides of the extension and of the slot are inclined so the tool can be passed over, only from the side, and not from the top. To this base plate is pivoted a lever arm which, when the base is slipped in place, engages behind one of the extensions and a twist on the lever arm then shifts the loose clincher until the bayonet joints are firmly interlocked. When a tire is to be placed on the rim, the sequence of operations is as follows: The tire is first placed on the wider part of the rim lying on the floor, and in case quick detachable tires are used, care must be taken to see that the tube is properly placed under the flap; then the smaller part of the rim is placed in position, care being taken that the flap does not prevent it from seating properly. The tool is then placed in position and the lever is drawn to the right to close the rim. When Dunlop tires are used on these rims, rubber bead fillers must be placed in each clinch of the rim. The regular flaps are used in the case of both types of clincher covers, and valve spreaders on tubes with all types of quick detachable tires. The operations in removing the tire from the rim are the reverse of those necessary in applying.

Digest

EXTRACTS ON TECHNICAL LINES FROM 50 BEST FOREIGN PAPERS—EXAMPLES SHOWING INFLUENCE OF WEIGHT AND GEAR RATIO ON CONVENIENCE IN OPERATION—VALUE OF TWO DIRECT DRIVES

The travelling qualities which will be produced by fitting a certain body to a certain chassis, or by selecting a transmission gear with three gear speeds instead of four, or with a new ratio between the different gear speeds instead of one which has already been tried, may be more economically figured out in advance than it may be ascertained by trials at the factory or by purchasers of the vehicle in practice. And the same applies to the number of seats with which the automobile is provided and the load with which it; therefore, may be expected to be operated in daily use. The various resistances which a motor must overcome are: (1) the rolling friction, which may be taken as equaling about 13 kilos per ton (28 3-5 pounds per 2204 pounds) on good, hard roads; (2) the resistance to penetration of the atmosphere, which is about 6.5 grammes per square meter of front projection of the vehicle for a forward speed of one kilometer per hour (author says 1 meter per second, but this is a slip) and growing with the square of the speed. On hills there should be added to this about 10 kilos per ton (22.04 pounds per 2204 pounds) multiplied by the percentage figure of the incline. If the vehicle weighs 1 ton this makes a resistance of 50 kilos on a 5 per cent. hill. Assuming that a vehicle weighing 1,000 kilos and with a front-projected area of 1 square meter travels 84 kilometers on a level road, the power developed by its motor may be calculated approximately by means of those figures. The road resistance is 13 kilos; the air resistance is 84 squared multiplied by 6.5 grammes, which equals 45.85 kilos and makes the total resistance 58.85 kilos. This is overcome at the rate of 84 kilometers per hour, or 23.3 meters per second, and 58.85 kilos multiplied by 23.3 meters per second makes 1,373 kilogramme-meter-seconds, which equals 18.3 horsepower, since 1 horsepower equals 75 kilogramme-meter-seconds. The horsepower at the wheel rim must, therefore, be more than 18 horsepower. If the vehicle is supposed to be in direct drive with an efficiency of transmission of 72 per cent. at the wheel rim, the motor must then develop 25.4 horsepower.

If the vehicle weighed 2 tons instead of one, a 30-horsepower motor would be necessary in order to reach the same speed on a level road; or, with the same motor of 25.4 horsepower, the 2-ton vehicle could reach a speed of 71 kilometers per hour, a speed reduction of 15 per cent. due to increase of weight. If, instead of increasing the weight, we increase only the front-projected area, as by attaching a wind shield, making the area 2 square meters instead of 1, the vehicle can only reach 68 kilometers per hour, meaning a speed reduction of 19 per cent.

Let us now compare the running of two vehicles, one weighing 1,000 kilos with a projected area of 1 square meter, the body being, for example, that of a runabout or a torpedo shape, the other a limousine with 2-square meter resistance-area. Both are supposed to have a motor of a maximum power of 28 effective horsepower at 1,200 r.p.m., and an efficiency at the wheel rim of 72 per cent. so that the power at the rim will be about 20 horsepower for each vehicle. The transmission ratio is supposed to be such that the light vehicle A will make 84 kilometers per hour on direct drive when the motor turns at 1,200 r.p.m., and the second vehicle B will make 66 kilometers per hour at the same motor speed.

A 3-per cent. hill is encountered. Vehicle A could scale it at 73 kilometers per hour, and vehicle B at 48 kilometers, if it were possible to maintain the motor speed at 1,200 r.p.m. But the connection between the motor and the wheels is supposed to be rigid. At 73 kilometers the motor vehicle A will give only 19.6 horsepower, and at 48 kilometers the motor of vehicle B will give only about 16 horsepower. The speed of these two vehicles will, therefore, go on diminishing on this hill of 3 per cent. until a state of equilibrium is reached—that is, until the resistances are equalled by the power available at the wheel rim. And this state of equilibrium is sure to be reached, because the power of the motor diminishes less rapidly than the resistances. Everything lies in knowing whether the equilibrium will be reached before the motor gets down to its lowest number of revolutions, say 400. It will, in fact. A calculation which is elementary, though somewhat lengthy, since it implies the solution of equations of the third degree, shows that equilibrium is reached at 70 kilometers per hour for vehicle A, the motor turning at 1,000 r.p.m. and developing 19 horsepower, and at 40 kilometers for vehicle B, the motor at 580 r.p.m. and developing 13.5 horsepower. In scaling the 3 per cent. hill, on the direct drive, vehicle A thus loses 15 per cent. of its speed, while B loses 26 per cent. What is the maximum gradient which these two vehicles can climb without changing gear? This must be the gradient which they can climb at 400 r.p.m. when the motor develops 9 horsepower at the rim, (If this statement seems doubtful, it measures at least the best which the very competent author can say on the subject; he evidently takes 400 r.p.m. as the minimum admissible for calculations.) Vehicle A will then run at 28 kilometers per hour and will scale a gradient of about 7 per cent., while vehicle B will run at 22 kilometers per hour and will not climb a grade of more than 3.9 per cent. Similarly, a 5 per cent. hill may be scaled by vehicle A without change of gear at 58 kilometers per hour, with the motor producing about 17.5 horsepower. Vehicle B, on the other hand, will have to change gear, in which case two possibilities of construction are at hand. Either there is only one direct drive and the next gear below implies gearing down in the transmission box; or the transmission box has two direct drives, the speed next to the highest being also direct. Let us take, for example, a box with four speeds, of which one is direct, and the four gears in the following ratios: first to second as 0.46 to 1; second to third as 0.65 to 1; third to fourth as 0.77 to 1. This gives for vehicle B at 1,200 r.p.m. 66 kilometers per hour on fourth speed, 50 kilometers on third, 32 on second speed and 14 on low.

With this box, vehicle B will not be able to mount the 5 per cent. hill; neither on the fourth speed, as just referred to, nor even on the third speed. The efficiency of the transmission, which was 72 per cent. on direct drive, has, indeed, fallen to 50 per cent. by the gear reduction and the maximum power available at the rim will be 14 horsepower instead of 20—a loss of 6 horsepower due to the intervening reduction gear. Equilibrium would not result until near the vehicle speed of 12 kilometers per hour, at which the motor would turn at 250 r.p.m., which has been supposed to be impossible, the minimum assumed being 400. It must then be necessary to take the second speed, which will permit vehicle B to ascend the grade at 28 kilometers per hour with the motor developing 18.3 horsepower. The influence of the carriage body makes itself strongly felt. If it was not noticeable on the level road and was not enormous on a 3 per cent. hill, it becomes preponderant on a 5 per cent. hill. Vehicle A takes this on the direct drive and vehicle B cannot even take it on the third speed. No speed lever is touched on vehicle A, while the lever is manipulated four times on vehicle B.

The transmission with two direct drives gives different results. —By C. Faroux in *La Vie Automobile,* to be concluded.

Ability to vary the compression of a motor at will and the value of provisions aimed at he establishment of this feature in motor operation, are discussed. Actually one contracts or enlarges the admission port in order to slow up or accelerate a motor. This method of regulation has an inconvenience, because in throttling the admission, one reduces the compression. And ignition of the mixture which, thanks to the carbureter, remains of about the same composition becomes precarious below a certain pressure, the safe limit being about 2 kilos per square centimeter. If the compression could be maintained constant, such as by varying the volume of the compression chamber or of the stroke, extraordinary reductions of motor speed would become practicable, especially with ignition from a storage battery and coil. A vehicle could then be run through the streets of Paris on the high gear at the speed of a man's walk. Moreover, the fuel consumption per horsepower hour would be no greater for operation under the throttle than for full power, and this would be of the highest economical importance for the traffic in big cities, the same object being sought in taxicabs by using motors of small power. Outside of the cities it would become practicable to travel over level ground with low compression and poor mixtures and to increase the richness of the mixture where more power was required. Such a motor would consume little fuel on level roads, because it would be possible to adjust the compression and the mixture most suitably to one another for each motor speed. Whether these advantages would compensate for the complication involved in securing them is mainly a question of adroit construction.—*La Vie Automobile,* August 6.

To clean a honeycomb radiator of sediment the following method is recommended in preference to the use of a jet of steam. Prepare a 10 per cent. solution of potash. Heat it. When the boiling point is just reached, pour it into the radiator after closing the pipes which in service lead to and from the motor. Stir every hour for twelve hours by turning the radiator upside down. Pour the solution out by way of the same opening at which it was poured in. Screw a hose with water under pressure into the opening at the opposite end and run a stream through for a few minutes.—*La Pratique Automobile,* July 25.

Carbureters vs. Steam Boilers

DISCUSSING RELATIONS OF CARBURETERS TO INTERNAL COMBUSTION MOTORS; HOW THEY TAKE THE PLACE OF STEAM BOILERS

WHILE improvements have been made in automobile motors proper to a large extent, the fact remains that the thermal side of the situation has been a laggard more or less, partly on account of the question of ignition, and largely in view of the ever-changing gasoline problem, demanding always better carbureters; that is to say, devices that are capable of interpreting the thermal value of relatively non-volatile hydrocarbon fuel. In the early days it was easy enough to design a carbureter to handle the regular grade of "true" gasoline, the reason being that it was so volatile it would evaporate with great rapidity. As the demand grew more pressing it became necessary to add the more heavy distillates in greater or less proportion, and carbureter problems advanced to the first rank.

In the meantime the patrons of the industry found out by experience that the difference between a well-performing motor and a poor one was largely a matter of carburetion, remembering, of course, that the inter-relating problem involved the several questions of ignition. This version of the value of equipment influenced the situation until some of the carbureters that were utilized on motors from abroad were large and complicated devices; so pretentious, in fine, that they partook of the dignity of units rather than holding the less conspicuous position of accessories to the motors.

Considering that a carbureter must serve in precisely the same capacity as a steam boiler does in a steam power plant, it is not far astray to regard the carbureter in the light of an important unit rather than as a mere accessory.

In a steam plant the boiler is fed with water and by means of heat the water is turned into steam; the carbureter is fed with gasoline instead of steam, and the function of the carbureter is to turn the gasoline into vapor. Both steam and vapor of gasoline hold identical positions in a general way, considering the matter broadly (there are some differences), it being the case that steam is the vapor of water and vaporized gasoline

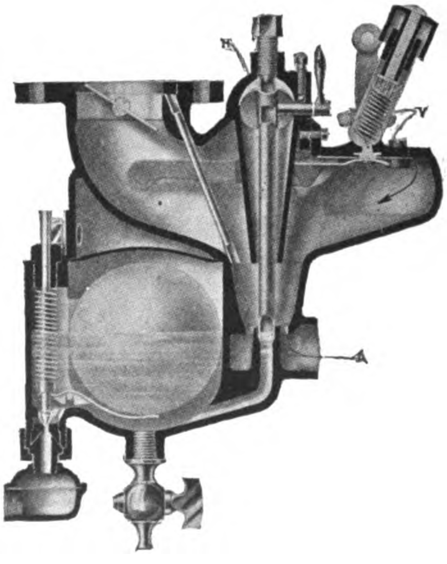


Fig. 1—Section showing functional relations

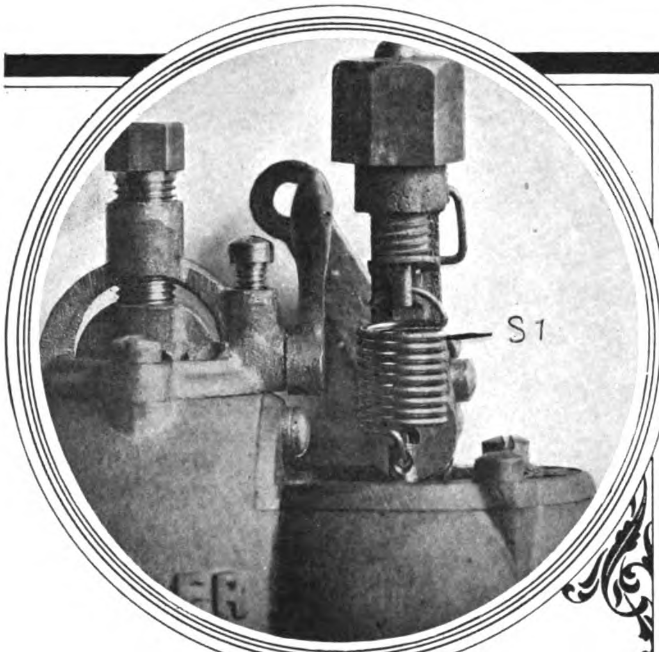


Fig. 2—Adjustment of the auxiliary air mechanism in the position of slow running passing least amount of air

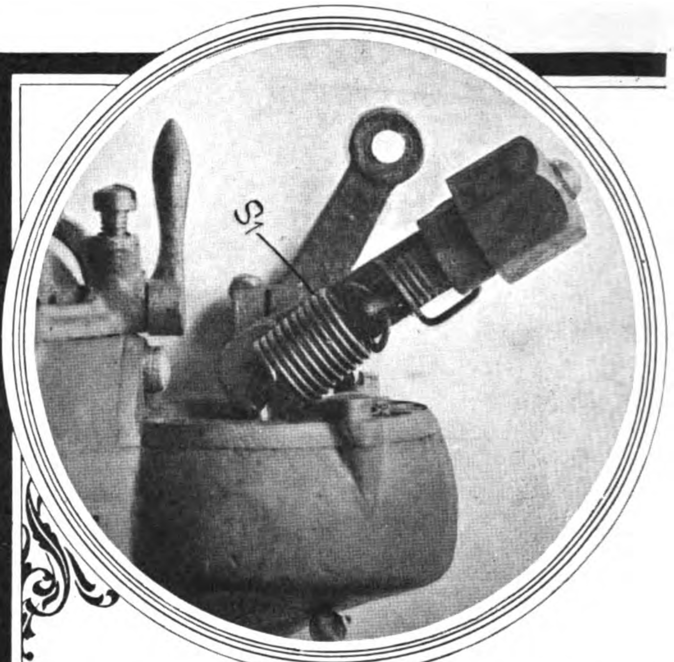


Fig. 3—Adjustment of auxiliary air mechanism in the position of fast running, requiring the maximum volume of air

represents the equivalent. All compounds, as water, steel, copper, gasoline, carbonic acid, sulphur dioxide, anhydrous ammonia, etc., are supposed to reside in one of three states—*i. e.,* as solids, liquids, or in the gas state; these are called the three states of aggregation.

A carbureter must perform the service which is necessary when a liquid is changed from its then state of aggregation to the gas state, and it is just as necessary for the carbureter to boil the gasoline as it is for the steam boiler before mentioned to boil water in order to generate the steam that makes a steam engine interpret the heat units that are represented in it and furnish energy in acceptable form to the steam engine.

The fact is too frequently lost sight of that the gasoline that is fed to a carbureter must be boiled; the heat must be supplied to the carbureter for this purpose, and the nozzle of the carbureter becomes the equivalent of the "grates" in a steam boiler. Fortunately, it is not necessary to build a fire under a good carbureter, but the fact remains that a carbureter, to work properly, must be provided with a system of "grates" that will serve for its intended purpose; otherwise the liquid gasoline will be sucked up into the combustion chamber of the motor's cylinders, where it will provide but poorly, for then it will be necessary for the motor to perform the functions of the carbureter as well as to furnish power. Motors seem to be capable of doing this to some extent, but the service that can be realized from such a busy motor is far below that which is to be expected from a motor that is permitted to do what it is designed for, and not be compelled to work as a boiler.

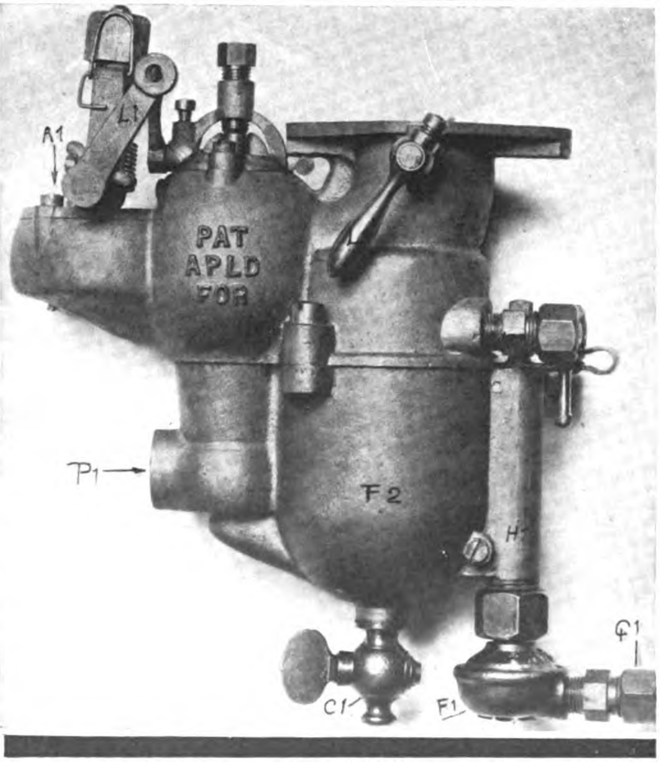


Fig. 4—Depicting the carbureter looking at the side showing the lever control for auxiliary air valve

The reason why a carbureter does not have to be provided with a hot fire under it is due to the low boiling point of the liquid used in it (gasoline); moreover, the gasoline has a lower latent heat of evaporation than this property in water, which is also a favorable circumstance.

Viewing the carbureter in the light of a supplier of vapor makes it a substantial substitute of a steam boiler. Remembering that it is not necessary to furnish heat at a temperature so high as to demand a fire, it remains to point out that there are differences in point of detail that must be given the care that they deserve in view of the importance of the undertaking. In a steam boiler atmospheric air is supplied to the burning fuel in the grate; when the fuel burns the heat from the flame is absorbed by the water in the boiler and the water is turned into steam; that is to say, the energy of the coal is delivered into the water, and when it goes into the cylinder of the steam engine it is absorbed by the piston, which in turn delivers it to the reciprocating parts, thence to the crankshaft, and on through the flywheel to the mechanism to be driven.

In the internal combustion type of motor, instead of delivering the air to the fuel and using it outside of the motor for the purpose of abstracting the heat from the fuel, the fuel is boiled in the carbureter at the low temperature that obtains in the absence of fire, and as the thus vaporized fuel is sucked into the combustion chamber of the motor it is mixed with the air so that upon arrival in the combustion chamber of the cylinder it is ready to be set on fire and burned. In this way the combustion chamber of the cylinder of the motor becomes a fire-box; the

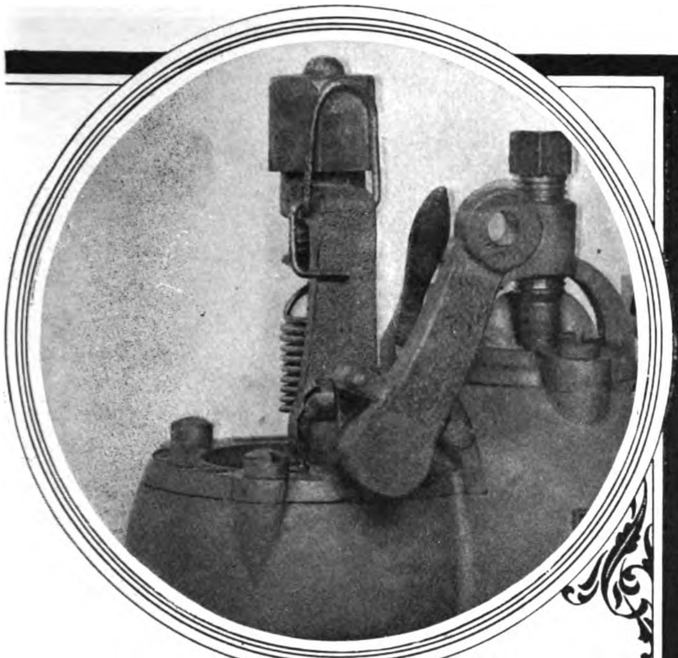


Fig. 5—Presenting the mechanism for the auxiliary air control and the lever placed to actuate the same

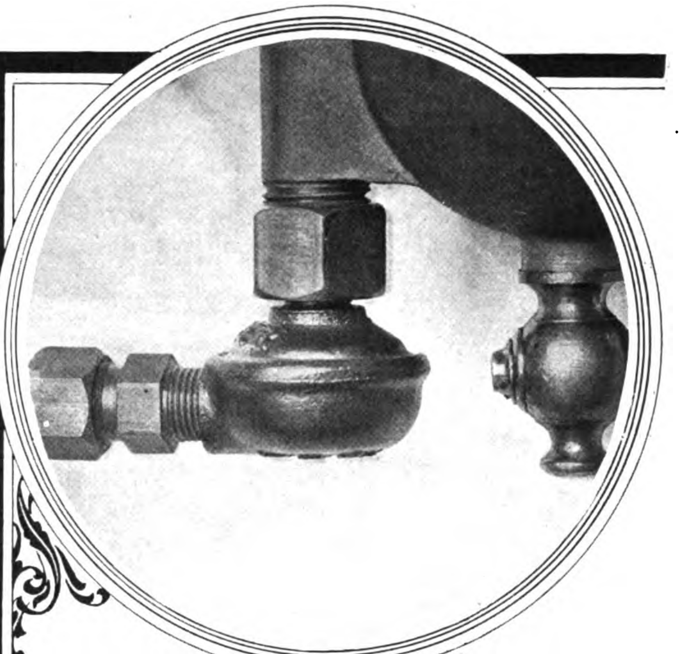


Fig. 6—Point of entrance of the gasoline to the carbureter, showing the filtering device and pipe connections

heat of the fuel is transferred to the piston just as it is absorbed from steam, and the translation from this point on is precisely as in a steam engine.

The difficulties of carburetion are many, and if account is taken of the fact that there is barely 2 per cent. of liquid gasoline in the mixture that is burned in the combustion chamber of the cylinders of the motor it will be seen that it is quite a job to properly regulate the flow of fuel with a view to obtaining the best result. This trouble would be comparatively simple were it possible to run the motor at a constant speed, and maintain **nearly a constant load as well. In automobile work neither of these conditions can be maintained, and in order to meet the varying conditions, and cope successfully with the natural troubles, it is necessary to provide a carbureter that has a separate means capable of performing each of the functions, not only separately, but in an inter-related sense as well.**

The conditions that have to be satisfied are:

(A) The carbureter must be capable of supplying a rich mixture in order to be able to readily start the motor.

(B) The carbureter must be capable of delivering the required amount of fuel (mixture) to the motor without serving in the capacity of an obstruction to the filling of the cylinders.

(C) The mixture must be varied as to quantity at will.

(D) The richness of the mixture must be a controllable factor; if a rich mixture is required it should be rendered available; if a lean mixture is indicated by the conditions the means should be afforded to readily and precisely obtain the same.

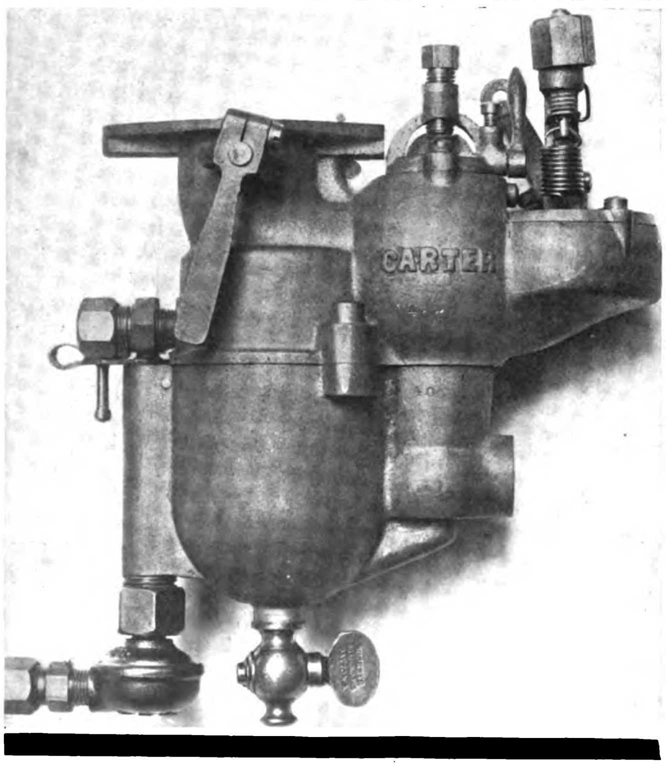


Fig. 7—Other side of the carbureter presenting the remaining lever positions; attention is called to the cock at the bottom for draining out residuum

(E) The carbureter should be so designed that it will work automatically within certain limits.

(F) The driver of the car should have at his disposal the means for relieving the automatic feature of its responsibility under certain conditions.

The Carter carbureter, made by the Carter Carbureter Company, St. Louis, Mo., will serve for the time being as an illustration of the points to be here made. In the illustration, Fig. 4 is an exterior view at one side and Fig. 7 an exterior view of the other. Referring to Fig. 4, the gasoline enters at G1, passes into the **filter F1, thence up in the needle-valve tube H1, and, under control of the needle, into the float bowl F2. As the occasion demands, the residuum, and water, if any accumulates, are drained out through the cock C1. Primary air enters at P1, and the auxiliary air passage is at A1, the control of which is brought about by manipulating the lever L. The mixture, as it passes to the intake, and on to the combustion chamber of the motor, may be throttled by working the lever L2.**

In starting the motor it is not necessary to resort to priming for the reason that an anti-strangle tube is placed (see O, Fig. 1) in such a way that, when the butterfly throttle-valve, which is under the control of the lever L2, is in the closed position, the mixture must pass to the motor through the anti-strangle tube, and the tube being small in area the mixture is relatively rich. If the mixture is too rich all that has to be done is to open the butterfly valve a little and more air will then pass up with the rich mixture; starting, under these conditions, is assured.

To obtain a better view of the situation it will be necessary to study Fig. 1 and become familiar with the parts and their relations. Referring to this illustration, it will be found that there are three methods of supplying air to the carbureter—(a) through A, which leads to the depression chamber; (b) the auxiliary air passageway V, and (c) the high-speed air inlet H. This illustration also shows the construction in general, and among the points of unusual design that are to be noted is the spherical float in the bowl. This float rests on a flattened lever and is free to revolve, but it is so housed in that it cannot depart from its rest. The flattened lever is fulcrumed at a point near the other extremity, and the needle valve is manipulated through the raising and lowering of the float, which in turn is caused by the changing level of the gasoline, due to the use of fuel by the motor. The general operation of the float bowl and the method of control of the gasoline is not different from the usual run of carbureter float systems.

In the manipulation of this carbureter the air opening for high speed is regulated once for all, and there being no regulation for the initial opening there is nothing further to do than to regulate the auxiliary air. It is in this particular part of the carbureter that novelty resides, beyond the fact that the nozzle differs in marked degree from the conventional form of nozzle.

Referring to the auxiliary air valve, the method of control is by means of a lever that is usually placed upon the dash of the car within reach of the driver. The lever connects with the motion as shown in Fig. 5. Referring to Fig. 2, the motion is in the vertical position, which is the one that permits the spring S1 to pull the strongest so that the valve is held to its seat and the air that is used up by the carbureter is mostly supplied through the primary intake at the bottom.

When the demand for air increases, the suction will also be on an increasing basis and the spring S1 is elongated; but if the driver desires to admit more air through the auxiliary intake all that he has to do is to pull the lever on the dash in such a way as to tilt the spring S1, as shown in Fig. 3. This operation has the virtue of lowering the tension of the spring S1 and the auxiliary inlet valve will then open more easily, the suction of the motor furnishing the force.

Don't

ANOTHER INSTALLMENT OF SHORT-METER ADVICE TO THE TYRO—AND THE EXPERT—THE FOLLOWING OF WHICH MAY SAVE THE MOTORIST HEAPS OF TROUBLE, PERHAPS SOME MONEY, AND PROBABLY A LAWSUIT OR TWO

Don't overlook the characteristics of ball bearings; they are made of hard dense steel in order to induce a high polish; it is this high polish that renders them fit; acid in the grease will etch the surfaces, thus destroying the high polish, hence ruining the bearings.

Don't think that the steering gear is everlasting merely because it is housed in; look over it, flush it out, put in a new supply of good lubricant; eliminate the lost motion.

Don't neglect to determine the cause of loss of compression; a lazy motor is not to be regarded as a joy forever.

Don't think that the timer is so made that you will never have to look at it; disregard of its construction will result in leaving you in the lurch some day—it may be several miles from the bark of a dog.

Don't go by a school-house like a whirlwind; how would you like to have your own children placed at the tender mercy of a lunatic with an automobile for a weapon?

Don't dispute the right of way with a fire engine; besides being a formidable rival it may be on its way to put out a fire at your house or place of business.

Don't tell "fish stories" about the speed you make on the highway; people become prejudiced when they hear them. The teller of such stories, if it is the truth, admits that he is a lawbreaker.

Don't stop at every road-side "resort"; the scenery is more attractive just as Nature made it; an automobile is an economic contrivance of value just in proportion as it does good to humanity; it is not in a good service standing in front of a "resort."

Don't go too far in any one day; there is another day coming.

Don't drive at night if the lighting equipment on your car is out of order.

Don't try out your new 50,000-candle power headlight on the public, in town; go out in the country and compete with fireflies.

Don't invite strange children to ride in your car; it gives them bad habits; you may be misunderstood.

Don't entertain the notion that dust is healthy for others; if your curiosity is excited try some of it yourself.

Don't argue with yourself about the difference between right and wrong; you know the difference without being convinced anew.

Don't overlook the fact that a four-cycle motor is, in reality, a four-stroke cycle motor. In other words, there are four operations necessary to the completion of the cycle, *i. e.*, suction, compression, expansion and exhaust.

Don't forget that it takes two revolutions of the crankshaft to deliver four strokes.

Don't count ignition as one of the operations in the four-stroke cycle motor—ignition is but an incident in counting the operations that make up the cycle.

Don't imagine that the differential gear that is placed in the live rear axle can be done away with advantageously; it is put there to weigh out the torquing moment to the two traction wheels, permitting each to go at its natural speed—one of the wheels must go faster than the other in rounding a curve unless one of the tires slips.

Don't add all the complications that the world affords to your automobile; get everything that will be of value; eliminate everything that can be of no adequate service.

Don't go on a tour with a large number of poor tools; take along a few good ones.

Don't forget that you ought to pay for a chicken if you kill it; don't kill the fowl if it can be avoided.

Don't invite your friends for a drive and then begin to show off. Remember, their necks may be worth something even if you do not place a value upon your own.

Don't forget that it is the polish on the balls of a ball-bearing that is of the greatest value from the point of view of long life and efficient service.

Don't think that balls made of inferior material will take a high polish; it may look high to the naked eye, but a microscope will disclose the fallacy.

Don't imagine that sand in the housing of the ball bearings will have any different effect than the same sand would have were it placed in your eye instead; it makes the balls blink.

Don't expect good service from ball bearings if they are placed in a gear-box and the chips from the gears are allowed to mingle with the balls; the way to keep out of the trouble that will follow is to keep the gear-box cleaned out.

Don't fail to take into account the ruinous effect of oil on the tires, but if the tires will rot out if they are steeped in oil how about the high-tension wiring around the motor? It, too, has rubber for insulation.

To Keep a Car Looking New

M. C. HILLICK GIVES A FEW HINTS AS TO HOW TO PRESERVE THE FINISH OF THE AUTOMOBILE

PRESERVATION of the automobile finish is quite as important as developing and rounding out the finish, although the former is, as a rule, quite out of the hands of the painter. Having made the painting and finishing as fine and rich and reliable as it is possible for skill and expert trade knowledge to do, the painter can thereafter serve only in the capacity of an adviser. It is fair and reasonable to say that at the present time plenty of automobile surfaces suffer abuse and go to premature decay through a lack of knowledge on the part of owners and chauffeurs of the particular sort of treatment which such surfaces need.

The highly finished surface, with its outer coat of great brilliancy, is more sensitive than any other material applied to the automobile. It requires, therefore, a care and treatment proportioned to its delicacy.

To know the best means of preservation it is essential first to understand at least in a general way some of the main causes for the decay and premature collapse of the finished surface.

Cracking of the varnish may, of course, be due to two causes: Old age, at which stage of life all varnish is destined to check and fissure and eventually lose its capacity for preserving and beautifying the surface. Premature cracking due to hurried methods of painting and finishing, by which method one coat of paint, or color, or even varnish, is applied over a coat of material not thoroughly dry. This soft, porous, and undried coat generates a gas when confined under another coat, with the result that the gas forces an outlet by cracking the surface. The cure for this latter form of surface disruption is chiefly within the hands and under the control of the painter. The fissuring of the surface incident to old age, on the contrary, depends upon the care and preserving processes practiced by the automobile users, chauffeurs, and so on. The life and usefulness of varnish can be greatly prolonged by proper care and treatment such as for example, frequent washing of the varnished surface with clean, cold water. Water cleanses and cools the varnish, strengthens it, and, in its early days of wear upon the surface, increases its brilliancy and enriches its appearance. Do not wash the surface in the sun nor permit it to dry in the sun. Neither wash it in a freezing atmosphere. During cold weather wash it no less often than during the summer months, but provide a warm apartment for such work.

Spotting of varnish—depriving the surface in spots of its lustre—is a bad form of surface blemish which the automobile owner and user who admires the beauty and brilliancy of his machine needs to guard against. Spotting generally occurs during the early life of varnish—before it becomes old, and harsh, and brittle, and devoid of elasticity. It is due chiefly to the accumulations of mud drying upon the surface and thus through the power of capillary attraction extracting the oil from the varnish. This action in many cases not only extracts the oil but the gum constituent as well. City mud, and of course, the mud of lime districts, the former being strongly charged with ammonia, are notoriously destructive to varnish lustre. The automobile driven in the mud of either city streets or country roads should upon return to the garage be washed immediately thereby eliminating the actively destructive medium.

Soapy water, or dirty water, in fact, is a form of spotting which sometimes occurs in garages and repositories, and which is very difficult of effacement. It very often happens when this soapy or dirty water is permitted to dry upon the surface it leaves a disfigurement impossible to remove except the surface be rubbed with water and pulverized pumice stone and water and revarnished. The lesson is, therefore, to avoid splashing unclean water on the surface, and never to wash the automobile with anything but absolutely clean water.

Coal gas and the gas which sometimes percolates through heating pipes will cause, if not at once, certainly in time, a very bad form of spotting. This form of spotting may be recognized by the dull, lustreless spots, showing a film of greasiness, which afflicts the surface. Damp, ill-ventilated garages cause a great deal of varnish and surface spotting difficult, and often impossible, to rid the surface of. Frequent washing and sun baths assist to both prevent and cure the evil. This treatment failing, nothing remains but to rub the surface down and revarnish.

Pure, fresh air brought into the storage quarters of the automobile in a quantity sufficient to counteract the accumulating foul air, fetid odors and gases, will prevent the varnish spotting and loss of lustre here referred to. It is a feature of economy which the garage manager and automobile owner should alike be vitally interested in.

Complaint on the part of owners and users of automobiles painted in dark colors is widespread concerning the greening and discoloration of the varnish, thus destroying to a greater or less extent the natural attractiveness of the colors and combinations of colors employed. This is due, for the most part, to the too close confinement of the automobile in an insufficiently lighted room. A lack of light affects the varnish disastrously, and in greening and discoloring it the color over which it is used is likewise injured, if not rendered of no effect outright. This emphasizes the need of a great amount of light—really the more the better—for the garage in order to preserve the original and native quality of the finish.

Practical Lubrication

THE IMPORTANCE OF PROFUSE BUT WELL-REGULATED LUBRICATION IS BEING CARED FOR IN THE RIGHT WAY BY UP-TO-DATE MAKERS

DEPRECIATION is what the owner must guard against, and there is no better way to do so than to watch the lubrication. In service, it is the duty of the owner of a car to purchase and use good lubricating oil, but it will not be possible for him to do so unless the maker provides a place to put the oil and a means for its definite circulation. That the makers of automobiles are aware of this fact is shown by the care used in designing the motors, transmissions and other units with adequate provision for the storing and circulation of lubricating oil. There are several ideas in vogue and it will be profitable for the autoist who wants to limit depreciation to study the various methods and familiarize himself with their advantages.

As a positive means of lubrication with absolutely no danger of flooding the Marmon design is offered. Fig. 1 depicts the

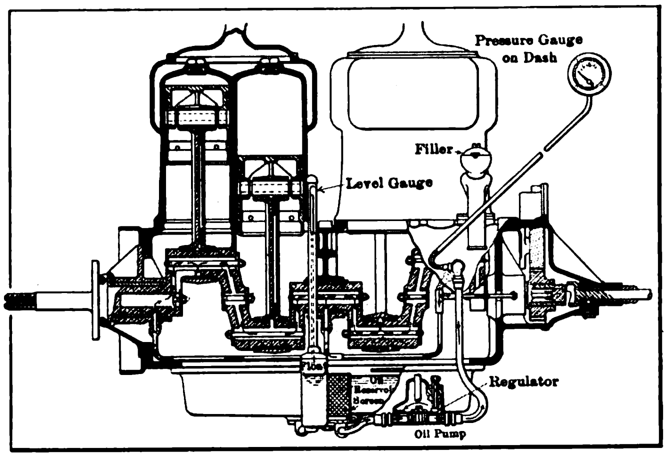


Fig. 1—Marmon lubricating system as adapted for 1911 motors of this make

1911 motor in part section, with an oil tank formed in the front end of the bottom half of the crankcase and a gear pump placed therein to circulate the oil. The direction of circulation is shown by arrows and the pressure generated on the oil is indicated by a gauge which is located in sight of the driver. In order to be able to tell if the supply of lubricating oil is adequate a float is placed in a well in the tank, from which a telltale is operated, by means of which the driver may determine the condition of the oil supply. The crankshaft is bored out to form oil-ways through which the oil flows under pressure to the main and crankpin bearings, and by a system of ducts the lubricant is also forced up to the wrist-pins so that they too are lubricated by oil under pressure. All excesses are returned to the well, but the oil is filtered on the way, and the economy of the system is decidedly pronounced, without running into the danger of using "stale" oil. The mere fact that a little oil is put into the tank daily is sufficient to guard against having it wear out, but it must be remembered that lubricating oil does wear out just as does a suit of clothing or a pair of shoes. When it is depleted of its slippery properties it must be gotten rid of and in this system means for cleaning out the residuum are at hand.

In the system as here depicted the pressure is sufficiently high to maintain the circulation, even against the conditions that obtain when the lubricant is of a poor grade. That any lubricating system is prone to be stopped up by accumulations of paraffine is well appreciated and in the earlier practices this was one of the most prolific causes of trouble. By maintaining a sufficiently high pressure there is no danger from this serious source of trouble. The greatest good comes when the oil is of a proper grade, even if the system can cope with foreign accumulations.

Collins High-Duty Axles

NEW IDEA IN LIVE REAR AXLES; BEVEL GEARS USED FOR TRANSMISSION WORK; LIGHT AND STRONG REAR AXLE UNIT DEPICTED

EXCESSIVE unsprung weight has always been the stock argument against unit types of live rear axles, and that there is something to be said against having too much weight on the live rear axle is now regarded in engineering quarters as a fact. The other side of the question has its advantageous angle, that is to say, practice has sanctioned the placing of the transmission gear integral with the axle. Just why this form of construction works so well is not readily explained, but many of the most silent performers that are to be seen on road and boulevard are built in just this way.

The Collins Axle & Manufacturing Company, Frick building, Pittsburg, Pa., has completed the designs of a line of axles of this class, and the illustrations here offered are made by the wax process from working drawings in order to bring out the real matters of interest and to show that lightness is a pronounced feature, not, however, at the sacrifice of due strength.

In giving this matter thought for the purpose of discriminating, it may as well be remembered that, while the pyramids, for illustration, were made of great strength, at the cost of thousands of tons of material, even granting that they have survived the ravages of time and eaten into centuries, they have ever resided on one spot of earth. Automobiles, on the other hand, as the word implies, are mobile, that is to say they move about.

Even bridges, although they are made of kinetic material, would fall short of the requirement were they to be used in the manner as laid down for automobiles, and, when the situation is properly canvassed, it will be seen that success, from the point of view of the proper design of automobiles, demands that the design be on a kinetic basis.

When the members of a structure, as the columns of a building, are subjected to quiescent loading, as they are, the load is static; there is no shock, vibration, or other consideration, and the static moments are all that have to be taken cognizance of. But if the attention of the reader be attracted to the crankshaft of a locomotive, for purposes of illustration, it will be quite apparent that the character of the load is kinetic, that is to say, the crankshaft is subjected to shock, vibration, alternate bending, and all the other ills which are expressed by the designer as in the category of kinetic moments.

Likewise, in automobile designing, the work is of a kinetic nature, and castings, which are more or less incapable of doing this class of work, should be used but sparingly if at all.

Referring to Fig. 1 of the Collins axle, the shell S1 is of drawn steel, and the method of joining is by means flanging F1, with studded fastenings all around the circle. The spring

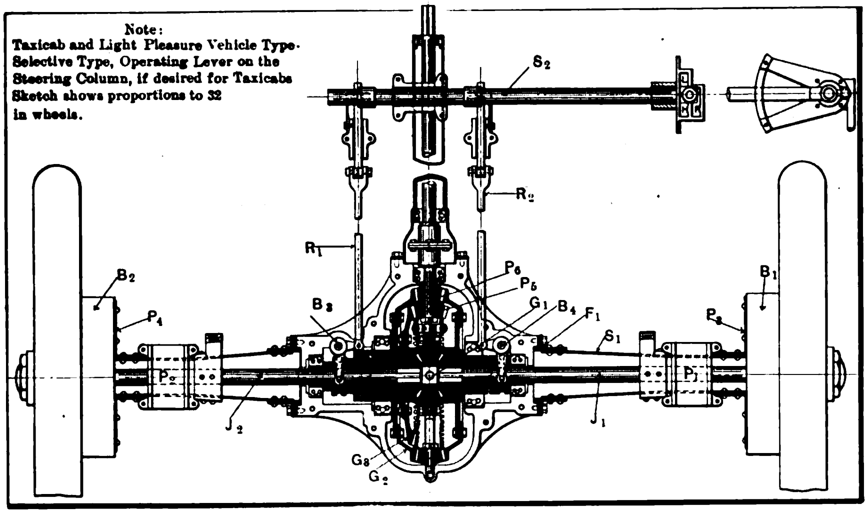


Fig. 1—Type of axle as designed for taxicab and light car work, using bevel gears in the speed change system

perches P1 and P2, are designed to accommodate wide plate springs which is in accord with the practice which is dictated by experience. The brake-drums B1 and B2 are provided with closure-plates P3 and P4, which are flanged to the shell.

The differential gear system G1 is of the bevel type within an oil-tight housing, and the jackshafts J1 and J2 are squared just where they fit into the gears of the differential system.

This axle is made to serve in taxicab work and for light pleasure vehicles. The sliding gear system is composed of a set of bevel gears G2 and G3, meshing with mating pinions P5 and P6. A means is available for withdrawing the gears from the pinions and for keeping one set out of engagement when the other set is working. This plan differs from other types of transmission-gear systems to the extent that bevel gears are used instead of square-cut gears. In the conventional square-cut gear systems it is necessary to clash the gears endwise, that is to say, axially, to engage them; in the bevel gear work the gears are brought into mesh by throwing them together so that contact is all along the faces of the teeth, thus eliminating the chance of over-straining a gear by bringing all the work upon a small portion of a tooth near its end. This gear affords two speeds, forward and reverse.

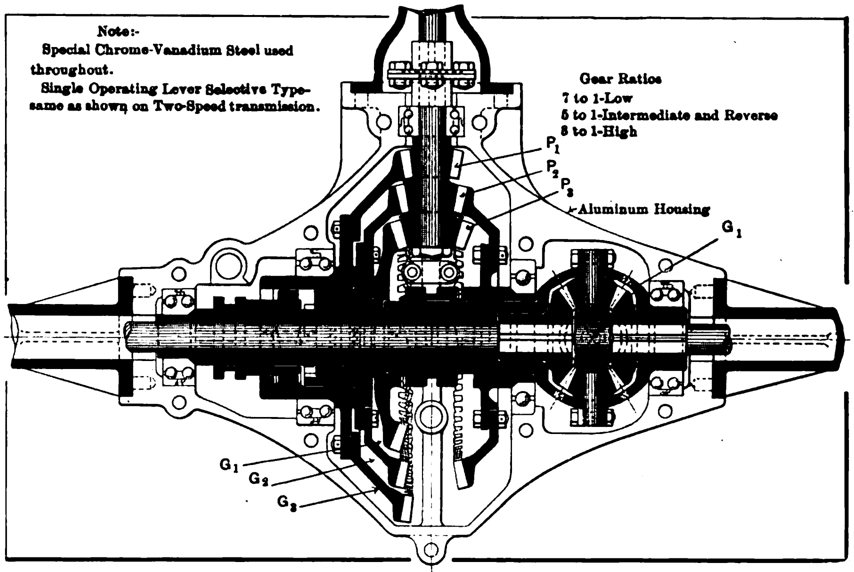


Fig. 2—More pretentious live rear axle with a bevel gear system for speed changes; designed for heavy duty

More Pretentious Type Made Also

As a further indication of the activity of this company reference is had to the larger axle, Fig. 2, with the differential gear incorporated into the system at the right side of the bevel type of sliding gear system. In this case the gears G1, G2, and G3 are nested just as in Fig. 1, but there is one more speed available in this case. These gears mate with the pinions P1, P2, and P3. In both examples the method of sliding the gears to attain the benefit of the respective speeds is just the same as that which is found to be practicable in general practice, as for illustration, the R1 and R2 (see Fig. 1) connect with bell-cranks B3, and B4, for the purpose of shifting the gears, and motion is imparted to the rods by the turning of the shaft S2, which is done by means of side-levers, or which may be accomplished by a pedal.

Construction Includes Fine Grades of Steel

In addition to the elimination of heavy and useless casting material, it was the purpose of the designer to utilize special grades of steel, as chrome-nickel steel in the parts that have to stand the brunt of the work. Heat treatment is resorted to in the process of coaxing out kinetic qualities, and lightness of the rotative parts is a factor to the extent that undue inertia is not a property in the design; this absence of inertia helps to a marvelous degree in the meshing of the gears, not only by reducing clatter which is disagreeable, but the teeth of the gears are saved from the merciless pounding that would otherwise be encountered.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL CLIMBS, ETC.

Dec. 1...........Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11.New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 16-21, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11, '11.Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Mch. 4-11, 1911...Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.

Races, Hill-Climbs, Etc

Aug. 31-Sept. 8..Kansas City, Mo., Reliability Run, Auto Club of Kansas City.
Sept. 2-5.........Indianapolis, Ind., Speedway Meet.
Sept. 3-5.........Run and Labor Day Race Meet of North Wildwood Automobile Club.
Sept. 3-5.........Brighton Beach, Two-day Track Meet.
Sept. 5......... Cheyenne, Wyo., Track Meet.
Sept. 5...........Denver, Col., Road Race, Denver Motor Club.
Sept. 5...........Los Angeles, Cal., Speedway Meet.
Sept. 5-10........Minneapolis, Minn., Track Meet at State Fair.
Sept. 7-10........Buffalo, N. Y., Reliability Run, A. C. of Buffalo.
Sept. 9-10........Providence, R. I., Track Meet.
Sept. 10..........Los Angeles, Cal., Mount Baldy Road Race.
Sept. 10..........San Francisco, Cal., Golden Gate Park Road Race, Automobile Club of San Francisco.
Sept. 10-12.......Catskill Reliability Contest and Hill Climb, Motor Contest Association.
Sept. 10-12.......Seattle, Wash., Race Meet.
Sept. 15..........Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Sept. 16-26.......Asbury Park, N. J., Aviation Meet, Aero Club of America.
Sept. 17..........Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept. 24..........Belmont Track, Narberth Race Meet, Norristown Automobile Club.
Sept., middle of...Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.

Foreign Shows and Races

May 1-Oct. 1....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
Aug. 1-Sept. 15...French Industrial Vehicle Trials.
Oct. 15-Nov. 2....Paris, France, Aeronautical Society Show.

THE AUTOMOBILE

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The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

ROAD-WHEELS have a wider influence on autoists and the conclusions they reach regarding the state of the art than any other point in the design.

* * *

JUST in proportion as this part of the car is prominent from the point of view of the attention demanded of autoists they neglect it.

* * *

HUMAN nature seems to be that way; the things that are to be done as a matter of necessity remain undone, or are only taken up when necessity compels.

* * *

INGENUITY is far-reaching, it is true, but the supply of this quality is not always equal to the demand.

* * *

MOST tender of all spots with the average man is his pocketbook; this fact should have more effect upon autoists from the point of view of road-wheels than it does.

* * *

CERTAINLY, it takes a pretty penny to span the tire bill of the autoist who waits for the tires to give out before looking them over.

* * *

TRUE, it is quite an undertaking to remove and replace a 36 x 4 1-2-inch set of tires.

BUT the hard labor that clung so closely to the old clincher idea is only present with the man who fails to note that progress is being made.

* * *

THERE is now no occasion to struggle with a recalcitrant tire on a rusted clincher rim.

* * *

THIS year brings its crop of quick detachable and demountable rims; they are in various forms; choice is there for the most fastidious.

* * *

MUNSEY Historic Tour is over; the veterans of the long trek are returning to their respective homes, and glad of the chance.

* * *

PERHAPS it is not too much to say that the tour is "historic" in more ways than one; the section of country actually covered is rich in historical events; but the tour itself will go down in history.

* * *

AMONG the points of unusual interest lies the perfection that attended the management of the great event; it just goes to show that a large undertaking can be handled properly when the "captain on the bridge" has his ounce of stamina.

* * *

THEN, there is the record; the sum total of result; not merely the noticing here and there of this or that car as having a clean score; such matters will be given proper weight, to be sure.

* * *

AUTOMOBILES, taking them as a whole, stand up to the gruelling test of a long and strenuous run so perfectly that, while penalties may be exacted, the fact remains that they are for happenings that are well within the ability of the average autoist on a basis of making a road-side repair.

* * *

AUTOISTS owe much to the Munsey build of enterprise; it has broad utility for its foundation. The makers of automobiles that went into the run must also recognize the fact that a show-down such as this carries conviction—it is a mark of merit to be in such company even if a penalty is suffered; it is the penalty that comes when a man's fight is being waged with such vigor that a few scratches are the least to be expected.

* * *

GASOLINE is the residence of the energy that makes the automobile go. That it should present a problem or two is a reasonable expectation. So much energy in so small a package represents a giant done up in the gossamer web of the spider.

* * *

FORTUNATELY the composition of gasoline is such that, like the elephant that minds and works faithfully at piling timber for his master, a force is represented that is as docile as it is large.

The Week in Detroit

NEW COMPANIES INCORPORATED; NEW FACTORIES PLANNED AND IN PROCESS OF ERECTION; BRIEF TRADE AND PERSONAL NEWS

DETROIT, Aug. 29—Several new corporations are in the making here. Two or three have filed articles within the past few days; the others will follow suit in due time. Among the former is the Whitney Motor Car Company, with a capital stock of $150,000, which has opened temporary headquarters at 1416 Ford building. It is the company's intention to manufacture a two-cylinder, gearless, friction-drive roadster to sell for about $400. A model car already has been turned out and arrangements are being made to begin work on twelve other machines within the next month.

The officers of the Whitney Motor Car Company are: President, Brock C. Eby; vice-president, J. C. Hudson; secretary, H. C. Whitney; treasurer, George O. Tackles.

Detroit has had its first glimpse of the latest novelty in motor vehicles, the three-wheeled commercial car. The inventor, W. G. Wagenhals, has come here from St. Louis, Mo., and is trying to interest local capital in the organization of a company to make his machine.

Mr. Wagenhals has figured out that he can put his car on the market at $650.

If plans now under way materialize, the motor car may take a leading part in the settlement of Detroit's vexatious street-car problem. Adolph Gerhard, a former justice of the peace in Hamtramck township, is promoting a $100,000 corporation to operate a system of automobile bus lines in competition with the Detroit United Railway, carrying passengers at three cents a head and giving them transfers in the bargain.

The Culver Chain Company has been incorporated with a capital stock of $50,000, the principal stockholders being William Culver and Arthur Taylor, both of this city. The company has secured a building at 140 and 142 Madison avenue for manufacturing purposes and expect to begin operations shortly.

Two tire companies are among the recent incorporations. The Puncture Proof Tire Company already has opened for business at 229 Beaubien street. It manufactures pneumatic and solid tires for commercial vehicles as well as for pleasure cars. L. J. Haynes is secretary and treasurer of the concern. Another company with a puncture-proof proposition is the Cooley Automobile and Tire Co., which filed articles of association with the Secretary of State last week, and which will locate in Detroit. John B. Chaddock is president; L. D. Cooley, vice-president and general manager; F. H. McMullen, secretary, and B. C. Bastedo, treasurer. These, with George A. Erskine, constitute the board of trustees. The capital stock is $50,000.

The recently-organized Universal Motor Truck Company filed articles with the Secretary of State during the past week, capitalizing at $350,000. Work is already under way on its factory, which will be located on the Grand Trunk railroad, between Farnsworth and Thedore streets, in the northeastern section of the city. The site comprises three and one-half acres.

The Van Dyke Motor Car Company has turned out its first cars, the cars finding a ready sale. By fall the output will be 25 cars a day, it is announced.

Ground will be broken this week for a $30,000 addition to the plant of the Ford Motor Company, Ltd., of Walkerville, Ont., located on the river front in Walkerville. The plans call for a two-story building of reinforced concrete, 70 by 40 feet, with basement, which will be used as a machine shop. The first and second floors will be given over, respectively, to the brazing and painting departments. The addition will give the company 20,000 extra square feet of floor space. The Ford company's new sales building at Woodward avenue and the East Grand Boulevard begins to loom up very conspicuously. The concrete supports for the third floor are now being put in.

A total of 1,275,000 square feet floor space is represented by the six largest motor car and accessory plants now in course of erection in the city, some of which are nearing completion. This is distributed as follows: Dodge Brothers, 367,000 square feet; Alden Sampson Company, 316,000; Lozier Motor Car Company, 200,000; Hudson Motor Car Company, 200,000; Anderson Carriage Company, 100,000; Anderson Forge & Machine Company, 92,000.

Following the reorganization of the Abbott Motor Car Company the plant has been closed down for two weeks for an inventory and a complete audit of the books. M. J. Hammers, the new general manager, will familiarize himself with the details and will collaborate with the department managers in mapping out plans for the coming year.

A number of changes in administrative positions are chronicled. James Bourquin leaves the Chalmers Motor Company, where he has been superintendent, to become general factory manager of the Paige-Detroit Motor Car Company, which recently increased its capital stock from $100,000 to $250,000. Mr. Bourquin is a graduate of the engineering department of the University of Michigan, '04, and entered the employ of the Chalmers company when it was organized as the Thomas-Detroit. Previously he was associated with the Olds Motor Car Company in Lansing and before that with the Peerless Motor Car Company in Cleveland.

Edward H. Broadwell, vice-president of the Fisk Rubber Company, has become identified with the Hudson Motor Car Company in an important capacity. He has acquired considerable stock in the company and has been elected vice-president. As such he will have charge of the selling end. He will assume his new duties September 1.

Edward R. Hewitt, of New York, son of a former mayor of the metropolis and designer of the Hewitt truck, comes to the Metzger Motor Car Company's plant in the near future as technical expert. He is a brother of Peter Cooper Hewitt. The Metzger company now has 600 men at work and expects to be running full capacity by September 1.

Close on the heels of the estimate of 500,773 as the population of Detroit and its nearest suburbs, given out by R. L. Polk & Company last week, comes the official announcement from Washington that the census returns give Detroit alone, without its suburbs, 465,766 people, an increase of 63 per cent. since the last census. For this remarkable showing the automobile industry receives a large share of the credit, as previously indicated.

The Detroit Shock Absorber Company already has been organized with a capital of $5,000 to start with and articles have been filed in Lansing, with the Secretary of State. It is a close corporation, all the shares having been taken by the projectors, F. B. Hibbler and Maximilian K. Golden, who is the inventor of the device.

The Golden absorber is a V-shaped affair, the bottom of the "V" forming a circle, however. One of the arms is attached to the upper part of the spring and the other to the lower part. When the springs are suddenly compressed the arms come together, but a friction band, which may be adjusted to conform to the tension of the spring, causes the latter to recoil gradually. The inner construction is simple, consisting of a locking device operating on the wedge plan. Patents have been applied for. Mr. Hibbler is president and treasurer of the company and Mr. Golden is secretary and general manager.

Lewis A. Austin has resigned as secretary and assistant manager of the Autoparts Manufacturing Company, of Detroit, and after September 1 will be connected with the Western Motor Company, Logansport and Marion, Indiana. Mr. Austin's headquarters will be at Logansport.

Notes on Aviation

BY MARIUS C. KRARUP. A MISSING PRIZE—DELUSIONS OF SCIENCE—GOOD MATHEMATICS WASTED—LIFTING POWER OF HELICOPTERS—ASTRONOMY WANTED AND CLEAN LIVES—EXIT STABILIZER

IN all reports of aviatic performances during the past week the record of one fact or condition more important for judging the value of the performance than all the other facts combined is omitted. The state of the weather is given in generalities only and in terms which may be interpreted as the reader's enthusiasm or distrust dictates. A device to be attached to the aeroplane machine and suitably arranged for producing an automatic record of attacks by irregular atmospheric currents has not yet been invented. No prize has as yet been offered for a device of this nature, which should preferably be so arranged that the curve or curves plotted by it could be rendered in the telegraphic alphabet and reproduced by the receiver.

Aero scientists, as Lanchester, Finsterwalder, Wegner-Dallwitz and even Bendemann, assume that the force required for flying may be calculated according to the acceleration of the volumes of air affected by the thrusts, ignoring that the thrusting of an elastic gas against an infinite body of the same gas involves considerations almost entirely new in physics and incomparable at nearly all points to the motions of solids or liquids. But improvements in aeroplane physics will go on just the same in practice, while acceleration of air in air will remain an inapplicable conception, quantitatively and qualitatively; a mere empty concatenation of words to which there is nothing corresponding in reality; a "phantom thought."

Three pages of perfectly good mathematics in an esteemed European contemporary were recently devoted to the following puzzle: "An airship moves with a speed of 15 meters per second and creates thereby an air resistance of 75 kilograms. As one horsepower overcomes a resistance of 75 kilograms with a speed of one meter per second, there will in theory be 15 horsepower required for moving the airship. How many are now in reality used?" Students of aviation please prepare a diagram of the errors in the mathematician's premises and an estimate of the value of mathematics based thereon.

In experiments with co-axial helices of 6 and 8 meters diameter, a vertical traction effort of 530 kilograms has been obtained by Klingenberg through the employment of 93 horsepower, according to a detailed statement by the experimenter in *Zeitschrift des Vereines Deutscher Ingenieure* of June 18. With a 100 per cent. power transmission efficiency the traction effort should have been about 1,500 kilos.

To use a compass for guidance in crossing the Atlantic or any other wilds uncharted for aviation, with a craft which follows no keel, may have its difficulties, but there is a clear sky above the clouds, with sun or stars visible. Aviators must study astronomy, practice deep breathing and shun catarrhs.

There is a job waiting in aviation for every chauffeur who has lived so intelligently and decently as to endure a rise in altitude of two miles in one-half hour without mental and physical discomfort. The plums hang high for the airman.

Since the recent aviation meet at Reims the Voisin biplanes have been made without the vertical partitions which had been supposed to be "stabilizers." The change was introduced under guise of a "racing model."

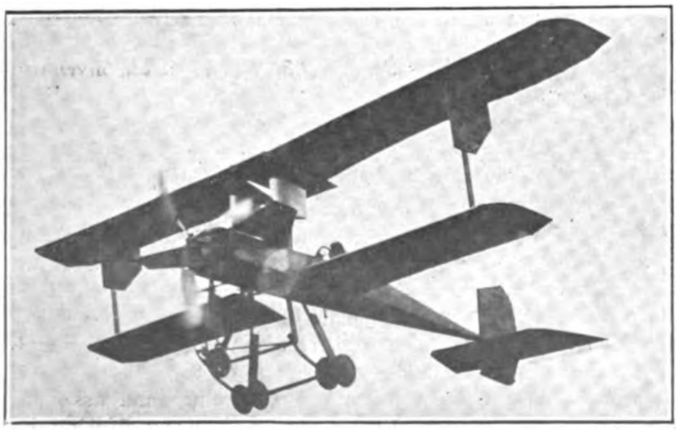
Prayers are heard to the effect that there will be no great need of rubber in aeroplanes. It is high enough.

Aviation News of the Week

BREGUET CONSTRUCTION IN PERFORMANCE—NEW ALTITUDE RECORD—WRIGHT FLIERS IN ATLANTIC CONTEST—WIRELESS MESSAGES

CABLEGRAMS from Lille, France, announce that Louis Bréguet took up five passengers on August 29 on his biplane, sustaining a load, including the gasoline, of 921 kilograms, equaling 2,026 pounds.

The Bréguet biplane differs radically from all other French machines. It is a double monoplane rather than a biplane, as the two supporting surfaces, of which the upper one is of much the larger area, are not stiffened one against the other by a number of uprights but only by two steel tubes at the small central section which carries the motor equipment and load, and by one similar steel tube on each side, arising from near the extremities of the lower plane. The air resistance is thereby reduced and the wings are rendered flexible. The ribs of the wings are of sheet aluminum pressed into U-shape and secured to a steel tube running the length of he wing. The upper wings are warped automatically and take different angles under the influence of the wind and at turns. Two lateral winglets are under control by the driver and two horizontal rudder surfaces in the rear serve to maintain the fore-and-aft balance. All the controls are obtained by means of a single steering wheel and post, the latter being jointed to admit of a rocking motion. The skeleton of the machine is entirely in trussed steel tubes supported on the ground by means of a wheeled chassis mounted in a special pneumato-hydraulic suspension. The power is derived from a 55-horsepower Renault aviation motor with eight cylinders, air-cooled and placed in V-shape, four in each branch of the V and the branches 90° apart. As tried in a recent contest conducted under the auspices of the Automobile Club of France by Mr. Lumet, this motor developed a little more than 60 horsepower and its weight was 179 1-2 kilos. In the Bréguet machine the motor is placed well forward and the three-bladed aluminum propeller in front of it, while the aviator and passengers are seated behind. The propeller shaft is geared down to reduced speed by mounting it on the camshaft of the motor, and the aluminum propeller blades are flexibly mounted upon three steel arms secured to the shaft. Starting of the motor and the machine is effected from the aviator's seat by means of a starting crank.



The Breguet double monoplane which carried six persons in flight Aug. 29 at Lille, France

The Gnome motor has recently been produced in a new form in which the intake valves are mechanically operated and placed in the heads of the cylinders. The Gnome motor previously had automatic intake valves in the pistons, drawing the mixture from the crank chamber.

Managers of the aviation tournament to be held at Belmont Park, N. Y., announce that there will be prizes at the meet to the value of $50,000 and that, in addition, the contestants will get a share in the net revenues on some plan approved by them.

In a flight on August 29 Léon Morane, flying a Blériot machine, ascended to an altitude of 6,692 feet at Havre, France. This record was approved by the judges. J. Armstrong Drexel had reached the height of 6,752 feet in a Farman machine on August 12, at Lanark, England, and the Kew Observatory had verified this reading on August 20 by testing of the barograph carried by Drexel. The French judges, however, demand ocular as well as instrumental evidence for the establishment of a record. Brookins holds the American record of 6,275 feet made with a Wright machine at Asbury Park.

Preparations for the attempt by Walter Wellman, of Washington, D. C., and A. Vaniman, his technical assistant, to cross from Atlantic City, N. J., to some point in Europe by means of the almost dirigible balloon "America" are being actively carried on, and it is expected that rehearsals for the start can begin in ten days and that the departure may take place shortly thereafter. The filling of the great bag with hydrogen is almost completed but will be supplemented later to make up for leakage.

At the Harvard-Boston meet, to be held at Atlantic, Mass., September 3 to further notice, the three aviators, Brookins, Johnstone and Hoxsey, who fly Wright machines, will try conclusions with fliers of rival machines, this being the first occasion for the Wright corporation to enter into public contest against other machines claimed to infringe the Wright patents.

The new "headless" Wright flier shown at Asbury Park and reputed capable of carrying five persons has not developed any speed superior to the records made with other fast machines, particularly some French monoplanes and the Curtiss biplane, but then it has not been equipped with a motor of high power commensurate with the area of its supporting surfaces. It is believed it will be so equipped for the impending Harvard-Boston meet at Atlantic, Mass.

Experiments in receiving and dispatching wireless messages from an aeroplane in flight, such as were begun at Sheepshead Bay last week, will be continued at Hammondsport, N. Y., this week and thereafter. H. M. Horton has devised a sending apparatus and Lieutenant Culver, attached to the Signal Corps of the Department of the East, devised a receiving apparatus which was tried at Sheepshead Bay by J. A. D. McCurdy on the latter's Curtiss biplane. Lieutenant Culver and aviator McCurdy will conduct the experiments at Hammondsport, in both receiving and sending, and the results will be reported to the War Department.

J. C. Mars, one of the aviators who entertained the public last week at Sheepshead Bay, near New York, undertook to fly across the lower bay to Staten Island and rose to a height of about 2,000 feet, when a pump lever which he worked with his foot in order to supply the motor of his Curtiss biplane with extra lubrication, on the same plan as is followed in automobile racing machines, broke and the motor stopped working. The machine fell into the sea with considerable speed, but Mars was saved by the timely arrival of a tug boat.

Communications

VERY FEW HOUSES MORTGAGED TO BUY AUTOMOBILES; WANTS A NATIONAL LICENSING LAW FOR AUTOMOBILISTS; AFFORDING THE LATEST VIEWS IN RELATION TO THE EXPEDIENCY OF OWNING AN AUTOMOBILE

Very Few Homes Mortgaged to Buy Automobiles—For the purpose of arriving at the true facts and obtaining exact information relative to the rumors which have been so persistently circulated by some bankers, that automobiles were purchased by the wholesale with money secured by mortgaging homes, letters have been written to 24,000 bankers in the United States and enclosed was a blank form asking the bankers to state the number of people in their vicinity who had mortgaged homes or who had borrowed money to purchase automobiles, The bankers to state, to the best of their knowledge, the percentage of motor cars used for business or useful purposes and whether or not in the bankers' opinion the sale of automobiles would increase in their respective territories.

Replies have been received to date from 4,830 bankers who state that there are 198,216 automobiles in their cities and towns. Of this number only 1,254 have been purchased by the placing of mortgages and only 7,475 have borrowed money without mortgage to purchase automobiles. In the opinion of 3,229 bankers, the sale of automobiles will increase during 1911 over that of 1910, while 1,601 say the sales will not increase.

With less than one per cent. of automobiles bought on mortgages and less than 4 per cent purchased with borrowed money, recent claims of alarmists are conclusively proved to be practically without any foundation whatever.—Benjamin Briscoe, President United States Motor Company.

Wants a National Licensing Law for Automobilists—The man who operates a locomotive on a steel, perfectly protected road must be a man without blemish—you might say, almost the perfect physical man, and well balanced mentally. What kind of persons are allowed to drive automobiles on roads which may never have been leveled off or worked, which are allowed to go for months, yes, years, without any attention? Stones, rubbish, and all sorts and conditions of things allowed to accumulate thereon, all varieties of animal life allowed to roam at will on the road, endangering their own as well as other lives. The State will license any person over eighteen years of age to operate automobiles of any power or capacity, without regard to the physical and mental ability or disability of the driver. Such machines are certainly much more hazardous than locomotives. There must be better regulation of this rapidly growing sport and occupation. Lives must be safeguarded and the only effectual remedy is a national automobile law. Not only should a national automobile law fix the license fees, but it should be framed on just as stringent lines as the rules governing promotion of fireman to the rank of locomotive engineer. Only persons free from physical disability, and of sound mind, should be allowed to drive motor cars, and all should be compelled to pass a real, not a "fake," examination and undergo just as strenuous a medical examination as locomotive engineers and applicants for life insurance.

I always feel, when driving my car, that I am perfectly capable of taking care of myself and friends, and that I have absolute control of the car. I know the car because I live with it and keep it lubricated and in good running order all the time. But I am afraid of the other fellow. The fellow who always feels that he must pass you on the road. The fellow who dashes madly through town and city streets. The fellow who turns his corners as though the entire mechanism of the car was as sturdy as a battleship. The fellow who keeps his cut-out open day and night, in town or in the mountains. Those are the persons who will compel the Government to act in their own defense, for they do not seem capable of caring for themselves or safeguarding their fellow men. Welcome the day when Congress awakes to the necessity and passes a good national automobile law that will assure the utmost safety to citizens.—Allan Dale, Little Silver, N. J.

Standardization Coming

SOCIETY OF AUTOMOBILE ENGINEERS HAS APPOINTED COMMITTEE TO TAKE THE INITIAL STEP TOWARD THAT END

Following the decision made at the meeting of the S. A. E. at Detroit last month, the Standardization Committee of the Society has been organized: Howard E. Coffin, Pres., S. A. E.; Henry Souther, Hartford, Conn.; James H. Foster, Hydraulic Pressed Steel Co., Cleveland, O.; H. S. White, Detroit Seamless Steel Tube Co., Detroit, Mich.; Charles T. Jeffery, The Thomas B. Jeffery Co., Kenosha, Wis.; Elwood Haynes, The Haynes Automobile Co., Kokomo, Ind.; H. W. Alden, The Timken-Detroit Axle Co., Detroit, Mich.; Arthur Holmes, The H. H. Franklin Manufacturing Co., Syracuse, N. Y.; W. H. Van Dervoort, The Moline Automobile Co., East Moline, Ill.; D. F. Graham, The New Departure Manufacturing Co., Bristol, Conn.; G. E. Merryweather, The Motch & Merryweather Machinery Co., Cleveland, Ohio; A. C. Bergman, Simplex Automobile Co., New York; Coker F. Clarkson (secretary), 1451 Broadway, New York. It is the expectation to add to this list of committeemen as the occasion demands—the subject is a big one.

On August 22 the following new members were elected: Fred-Wm. Blanchard, Faulkner-Blanchard Motor Car Co., Detroit, Mich.; T. P. Chase, Chalmers Motors Co., Detroit, Mich.; Edward W. Curtis, Jr., Studebaker Bros. Mfg. Co., Chicago, Ill.; Henry L. Barton, Metal Products Co., Detroit, Mich.; DeWitt Clinton Cookingham, Rauch & Lang Co., Cleveland, O.; Geo. William Cooke, Pierce-Arrow Motor Car Co., Buffalo, N. Y.; Wm. Morris Davis, E. R. Thomas Motor Co., Buffalo, N. Y.; H. W. Gillett, Mgr., The Aluminum Castings Co., Detroit, Mich.; Edward Dixon, Thos. B. Jeffery & Co., Kenosha, Wis.; Frank E. Ferris, Brush Runabout Co., Detroit, Mich.; Starling Henry Humphrey, Brush Runabout Co., Detroit, Mich.; Geo. N. Hickey, Van Dyke Motor Car Co., Detroit, Mich.; Wm. H. Hogle, Brush Runabout Co., Detroit, Mich.; Harold H. Kennedy, The Waverly Co., Indianapolis, Ind.; Fritz Loeffler, Waldhof Fellstoffabrik, Manheim, Waldhof, Germany; Ralph L. Morgan, Ralph L. Morgan Co., Worcester, Mass.; Horace Henley Newson, McCord Mfg. Co., Detroit, Mich.; George L. Norris, American Vanadium Co., Pittsburg, Pa.; Charles R. Short, G. & E. Power Co., Philadelphia, Pa.; Nicholas Shamroy, Landau & Golden, New York City; Charles B. Rose, Velie Motor Vehicle Co., Moline, Ill.; Wm. H. Reddig, Chalmers Motor Co., Detroit, Mich.; Geo. A. Weidely, Premier Motor Mfg. Co., Indianapolis, Ind.; Clyde W. Stringer, Brush Runabout Co., Detroit, Mich. *Associate Membership.*—Albert F. Rockwell, The New Departure Mfg. Co., Bristol, Conn.; Winfield DeWitt Rhentan, The White Company, Cleveland, O.; R. A. Radle, Clark Sales Co., Detroit, Mich.; Thomas Towne, Ideal Opening Die Co., New York City; Walter Webster Totman, Whitney Mfg Co., Hartford, Conn.; George S. Morrow, Stepmey Spare Wheel Co., Chicago Ill.; Henry May, Pierce-Arrow Motor Car Co., Buffalo, N. Y.; Frank E. Couch, 316 Hudson Street, New York City; Charles F. Case, Oliver Motor Car Co., Detroit, Mich.; Clyde E. Dickey, Denman & Davis, New York City; Wellington F. Evans, Metal Products Co., Detroit, Mich.

Good Fields for Vanderbilt and Grand Prize

The Vanderbilt Cup race, one of the most notable speed competitions of motordom, will start at dawn October 1. The course is laid out over the Long Island Motor Parkway and is one of the fastest road courses in the United States.

The turns will not be banked this year as they have been in the past, but will be widened in several instances. The Massapequa turn, which is on an acute angle, will necessarily be banked, but it too will be materially broadened. Practice over the course will begin September 20.

Entries for the event so far received are as follows:

VANDERBILT CUP

Car	Driver	Entrant
Simplex	Ralph E. Beardsley	Simplex Auto Co.
National	Not named	National Mot. Veh. Co.
Alco	Harry F. Grant	American Loco. Co.
Benz	D. B. Brown	Benz Import Co.
National	Not named	National Mot. Veh. Co.
Simplex	L. A. Mitchell	Henry B. Harris
Pope-H'f'd	Not named	B. C. Fincke
Pope-H'f'd	Not named	H. Emil Holt
Benz	Edw. Hearne	Benz Import Co.
Benz	Geo. Robertson	Benz Import Co.

MASSAPEQUA SWEEPSTAKES

Cole "30"	Endicott	Cole Motor Co.

For the Grand Prize race to be held October 15 there are entered to date fourteen cars of American and foreign manufacture, as follows:

GRAND PRIZE

Car	Driver	Entrant
Alco	Harry F. Grant	Amer. Loco Co.
Benz	B. Oldfield	Benz & Company
Benz	Victor Hemery	Benz & Company
Benz	Geo. Robertson	Benz & Company
Fiat	Louis Wagner	Fiat Auto. Company
Fiat	Ralph De Palma	Fiat Auto. Company
Fiat	Felice Nazarro	Fiat Auto. Company
Marmon	Not named	Nordyke-Marmon Co.
Marmon	Not named	Nordyke-Marmon Co.
Marmon	Not named	Nordyke-Marmon Co.
Marq.-Buick	L. Chevrolet	Marquette Motor Co.
Marq.-Buick	Robert Burman	Marquette Motor Co.
Marq.-Buick	A. Chevrolet	Marquette Motor Co.
Roebling-Planche	W. A. Roebling, 2d	W. A. Roebling, 2d

Premier Representatives in Convention

The annual gathering of representatives of the Premier Motor Manufacturing Company was held in Indianapolis Tuesday, Wednesday and Thursday of last week. Among the social events of the convention was a luncheon at the Columbia Club Tuesday noon followed by a banquet at the same place that evening. On Wednesday there was an automobile ride around the city, followed by a clam bake at Broad Ripple.

The guests of the company during the meeting were: R. M. Owen, New York; R. E. Ingersoll, New York; G. B. Kimball and R. I. Eads, Boston; John Guy Monihan and Allen Sheldon, Philadelphia; Mr. Avery and W. E. Stalnaker, Chicago; C. E. Gibson, O. G. Meyers and Lee Burns, Indianapolis; Elmer McConaha, Richmond, Ind.; H. P. Mammen, Evansville, Ind.; Louis Schwaebe, Los Angeles, Cal.; F. D. James, Tampa; H. O. Bell, Spokane; H. A. Bowman, Little Rock, Ark.; A. F. Chase, Minneapolis; H. L. Bracken, Salt Lake City; G. E. Ayres and J. F. Minton, Jr., Houston, Tex.; H. D. Walker, Greenwood, Tenn.; H. C. Stricker, Cincinnati; G. E. Schmitt and Fred Schmitt, Hamilton, Ohio; Edward Miller, Columbus, Ohio; W. C. Rowe, Beverly, Mass.; John O'Donnell, Providence, R. I.; C. C. Lake, Kansas City; Mr. Michiel and C. H. Martin, Pittsburg; H. P. Stratton, Petersburg, Va.; F. P. Miller, Jacksonville; B. D. Kent, Oklahoma City; W. D. Sanders, Columbus, Miss.; F. L. Riggs, Chattanooga; H. L. Ramsey and J. A. Dugan, Louisville; H. B. Pinkerton, Peoria, Ill.; W. J. Casterton, Detroit; J. H. Fleming, Scranton, Pa.; Thomas Neet, Versailles, Ky.; H. M. Allen, Lewiston, Mont.

Unconfirmed rumor has it that there will be a race meeting at the Brighton Beach race track Saturday and Monday, September 3-5. A number of well known racers are said to be entered, but the most painstaking investigation failed to show more than two that had been definitely made up to Wednesday afternoon.

The Capital's First Hill Climb a Success

WASHINGTON, D. C., Aug. 30—The first hill climb ever held in Washington took place to-day on Nayors Hill, under the auspices of the Automobile Club of Washington, and was a big success. The hill, an incline of ten degrees in seven-tenths of a mile, was in splendid condition and while the majority of the drivers were amateurs the time made was good.

A Buick 16, driven by T. C. Johnston, carried off the premier honors of the day by winning the free-for-all event, negotiating the distance in 49 1-5 seconds, the fastest time made during the day. Summary:

Car	Driver	Time
CARS LISTED AT $800 AND UNDER		
Krit	Thomas Cadick	1:35:05
Hupmobile	E. Hamilton	1:39
Krit	K. Crittenden	1:40 3-5
Maxwell	B. Robertson	1:52 2-5
Hupmobile	H. N. Brown	2:00
CARS LISTED AT $801 TO $1,200		
Warren-Detroit	Tom Berger	1:03 4-5
Ford	C. E. Miller	1:13 4 5
Oakland	H. Bauer	1:20
Ford	E. J. Drake	3:00
CARS LISTED AT $1,201 TO $1,600		
Buick	W. Angle	1:09 2-5
Warren-Detroit	G. W. Wells	1:11
Parry	I. C. Barber	1:11
Petrel	A. Llano	1:15 1-5
Warren-Detroit	N. Bowles	1:21
Regal	Arthur Laroche	1:25
CARS LISTED AT $1,601 TO $2,000		
Buick	W. Kronkite	1:02 1-5
Oakland	H. Bauer	1:02 3-5
Buick	G. G. Hamner	1:07
Apperson	G. Orme	1:13 2-5
Buick	G. Halstead	1:18
Apperson	J. J. Fister	1:19
CARS LISTED AT $2,001 TO $3,000		
Matheson	W. B. McBurney	1:03 2-5
Columbia	R. A. Klock	1:26
CARS LISTED AT $3,001 TO $4,000		
Matheson	W. B. McBurney	0:58
Matheson	A. D. Hall	1:07 2-5
Palmer-Singer	F. L. Lescault	1:02
FREE-FOR-ALL		
Buick 16, Model B	T. C. Johnston	0:49 1-5
Matheson	H. Sanjen	0:53
Matheson	W. B. McBurney	0:56 1-5
Palmer-Singer	F. L. Lescault	1:02
Warren-Detroit	T. Berger	1:05

Safe Handling of Gasoline

(*Continued from page* 356.)

It would not be a paying investment, for illustration, to buy in "car lots" just to realize a small saving over the price of gasoline in barrel packages. The difference in price is not sufficient to compensate for interest on the investment together with the chances of deterioration, even if the means at hand for the storage of the fuel be up to the most fitting requirement. If an owner keeps a single car in commission, it is very likely that the storage tank will be sufficiently large if it will hold one barrel of the fuel. Should the demand be on a basis of two, three, or five cars, as is frequently the case in the more pretentious establishments, the capacity for the storage of fuel should be increased accordingly, but it is not believed that it would be wise to add capacity in direct proportion to the number of cars in commission. It is more than likely that the following will hold:

PROPOSED CAPACITY FOR STORING AUTOMOBILE GASOLINE

Number of Cars in Commission	Capacity of Tank in U. S. Gallons
1	50
2	50
3	100
4	100
5	150
6	150
8	200
10	250

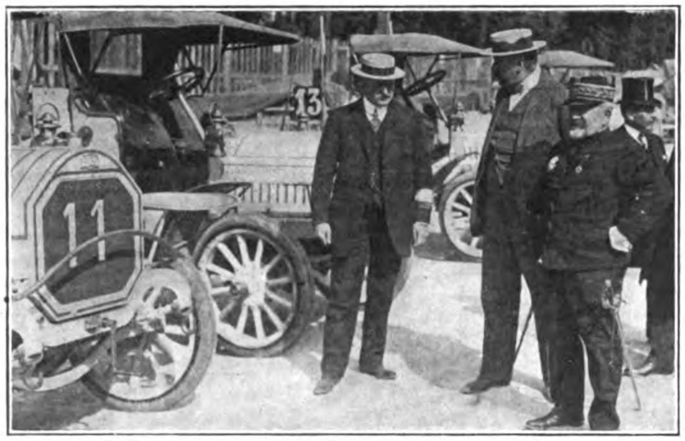
The plan that seems to work the most efficaciously and preserve the gasoline for the longest time, is depicted in Fig. 1, in which T1 is the gasoline tank sunk beneath the grade, outside of the line of the garage. The tank is filled through the filler pipe, F1, after which the cover, C1, is screwed into place and the lock, L1, is then used so that the owner will have control of the supply. The tank is ventilated by the fitting V1, which is connected to the tank at a point near the middle, using the pipe A1. The supply of gasoline is pumped to the gasoline tank of the automobile through the connection C2, by the measuring pump, P1, utilizing the suction connection, S1, which leads to the tank at a point near the end.

That the gasoline should be filtered as it is taken from the "package" and spilled into the storage tank is said to be a pressing need, and one of the devices used for this purpose in practice is depicted in Fig. 2, which, by spiral action and segregation, cleans the gasoline and permits of eliminating the sediment by cleaning out the filtering device as the occasion requires.

Problem of the Garage Involving Fuel

When garages are considered, the situation has to be handled somewhat differently; it is not possible there to bring all the cars to be supplied within a reasonable distance of the pump, and the supply may best be handled by means of a portable tank with a measuring pump attached to it. Just such a tank is here illustrated as Fig. 3. As will be observed, the tank, T1, is of convenient size and is fitted to wheels, W1, with casters, C1 and C2, at the front and a handle, H2, for the operator to grip when the car is being rolled about the garage floor. Gasoline is run into the tank through the filler opening, F1, and when it is filled the tank is locked, a padlock being applied for the purpose. By means of the pump, P1, gasoline is forced into the gasoline tank of the automobile requiring fuel, through the hose, H1, to which a suitable terminal valve, S1, is fitted, the idea being to be able to reach the filler of the tank of every make of car, and to be able to stop off the flow of gasoline quickly when the tank is full, in order to abort the spillage of gasoline on the floor of the garage. The pump is manipulated by turning the crank, C3. These facilities for storing and handling automobile gasoline are made by S. F. Bowser & Co., Fort Wayne, Ind., from whom the illustrations were procured.

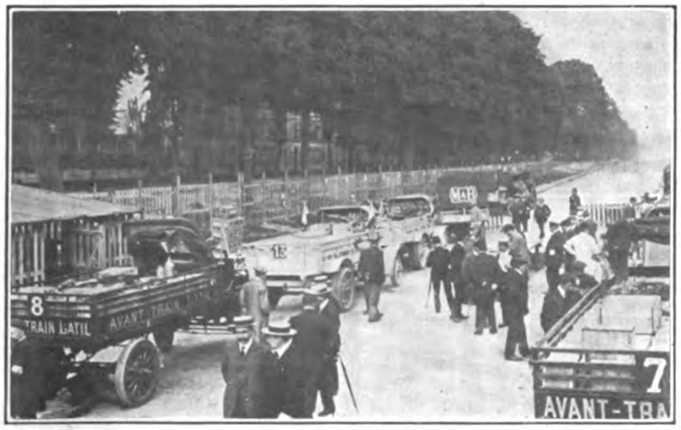
Barry's French isn't up to much, but he is a well lubricated mechanic. It takes a brave man to face a stern world in which the greatest necessities are spelled out in a foreign tongue. Barry thinks an automobile is classed as A on the list of necessities, and coupling the car up to its little sisters, the garage, and gasoline, Barry contributes the rest, being a capable machinist, so that his use of the alphabet is by way of listing the first necessities of humanity in the manner as follows: (A) Automobile, (B) Garage, (C) Gasoline, and (D) Machinist—Barry. The sign over Barry's little garage is, therefore, a little shy on the arrangement of the letters, which does not interfere with his enterprise, and that he will make a go of it is taken for granted. Barry, being honest, and a good machinist, has a firm grip on the two principles that spell success.



General Breen, French Minister of War, inspects cars

The Berliet truck in the motor vehicle test

The De Dion-Bouton truck at the line-up



Portion of line-up of industrial veh'cles at French contest

French Commercial Trial

COMMERCIAL motor manufacturers of France are now engaged in a competition having the advantage of allowing all to be winners. The test is a military one, organized by the Automobile Club of France at the request of the army authorities. The army must have commercial vehicles for its transport service, but instead of buying them outright it prefers to offer subsidies to private owners of an approved type of vehicle, on the understanding that the owners will present the vehicle for active service when called upon. It is in order to decide which are the most suitable types that the competition is being held.

Thirty-six vehicles, entered by nine different firms, are taking part in the trials. In addition there are two competitors in the omnibus section. There being no subsidies here, and little demand for 'buses outside the Paris General Omnibus Company, the response has not been hearty. Because of the army requirements, the thirty-six trucks entered for the competition show a large amount of similarity. They are in two distinct classes, carrying respectively two- and four-ton loads, but in many cases the difference between the two models is slight.

In addition to road capacity, the army fixes the size of the wheels, the width of tires, the road clearance, the size of the platform body, the ratio of weight to useful load; also it insists on protection for the driver, accessibility of all organs, protection of the radiator, hooks front and rear for hauling or being hauled, economy in fuel and lubricant, and the use of some device to prevent the vehicle running backward on a grade. It is because they are bound by these requirements that a certain similarity exists between the vehicles produced in entirely different factories.

The great majority of makers prefer to put their motors under the driver's feet. This is really not obligatory, but as the army requirements stipulate a platform of 11 feet 6 inches in length, it is difficult to find room for the motor under a bonnet. While there are plenty of details that could be improved under the heading accessibility, the average standard is high. The motors have profited by the improvements carried out on touring car models, with the result that piping is reduced to a minimum, valve stems are enclosed, electric wires are passed through a tube, the magneto is under a cover, and the under pan can be readily dismounted.

As three distinct fuels have to be employed—gasoline, alcohol and benzol—and as economy forms the basis of classification, considerable attention has been paid to carbureters. In the majority of cases the makers adopt some standard type and modify it according to their own ideas. Warming either by the exhaust or by the circulation water is adopted in every case, while many of the cars, in addition, have supplementary hand-controlled additional air supply. Only one type of ignition is now employed, namely, high-tension magneto, with, for every firm but one, a fixed sparking point. There is not a set of storage batteries to be found on the whole 36 vehicles. Lubrication, in the majority of cases, is assured by pressure feed to the main bearings, with in some cases the addition of troughs for the connecting rod ends.

A preference is shown by the army authorities for steel-shod wheels in place of solid rubber. The majority of manufacturers, however, believe that greatest economy is to be gained by employing solid rubber, the bandages being single for the front wheels and double for the rear. Only Delahaye and Malicet & Blin have boldly adopted metal bandages for both front and

THIRTY-SIX VEHICLES, REPRESENTING NINE DIFFERENT FIRMS, NOW BEING TRIED OUT UNDER ARMY AUSPICES TO DETERMINE UTILITY

rear wheels of their three-ton trucks, sticking to rubber for the smaller two-ton models. Berliet uses rubber for the front wheels and metal for the rear ones, thus making the economy of one pair of tires, and the same is done for the front-drive Latil; as these latter have no mechanism behind the dashboard, comparison is not possible. In connection with the steel bandages of the Delahaye trucks, it is interesting to note that two sets of superimposed springs are employed, the upper set being much lighter than the lower set. When running light the upper leaves carry the weight of the vehicle, and when fully loaded they are depressed until they come in contact with the lower set, the two pairs then working together as one. The arrangement appears to work to advantage, for it is obvious that the same stiffness of springs is not required for an empty platform as for the same platform with a three- or four-ton load on it.

As a test the vehicles have to pass one month on the road, running singly, in convoys, with and without load, and maintaining an average speed which in no case will exceed 15½ miles an hour. The daily runs will have to be made with gasoline, alcohol and benzol as fuel, the consumption being controlled on certain days and the amount of lubricant noted throughout the competition. The final basis of awards will be made on economy with these three fuels.

The following table shows the sizes of the motors engaged in the competition and the official weight of each vehicle fully loaded and without useful load. Under the latter heading is comprised the vehicle with all spare parts considered necessary, all tanks filled, bodywork, and driver.

THREE-TON SECTION

Maker	Motor	Weight empty, lbs.	Weight loaded, lbs.
1—Malicet & Blin	4 cyl. 90 x 120	6,613	13,522
2—Malicet & Blin	4 cyl. 90 x 120	6,613	13,592
5—De Dion-Bouton	4 cyl. 100 x 130	6,366	13,299
6—De Dion-Bouton	4 cyl. 100 x 130	6,520	13,261
7—Front-drive Latil	4 cyl. 105 x 140	6,425	13,546
8—Front-drive Latil	4 cyl. 105 x 140	6,458	13,646
13—Peugeot	4 cyl. 90 x 120	6,406	13,107
14—Peugeot	4 cyl. 90 x 120	6,426	13,346
18—Delahaye	4 cyl. 100 x 160	6,606	13,457
19—Delahaye	4 cyl. 100 x 160	6,113	13,514
22—Panhard-Levassor	4 cyl. 91 x 130	6,462	13,553
23—Panhard-Levassor	4 cyl. 91 x 130	6,534	13,566
26—Berliet	4 cyl. 100 x 140	6,595	14,651
27—Berliet	4 cyl. 100 x 140	6,593	14,631
35—Delaugere-Clayette	4 cyl. 90 x 120	6,595	13,073
36—Delaugere-Clayette	4 cyl. 90 x 120	6,613	13,007

TWO-TON SECTION

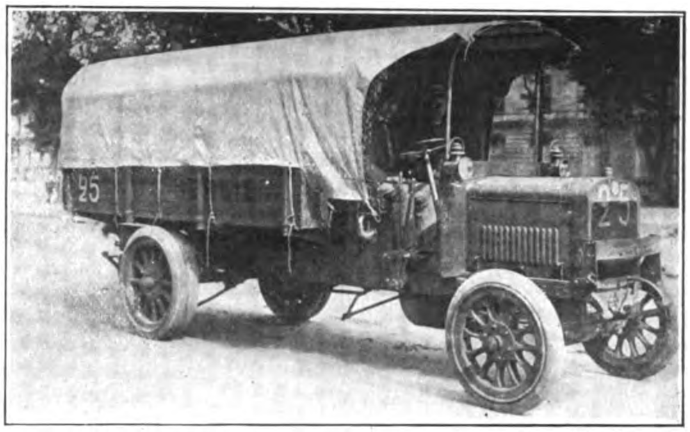
Maker	Motor	Weight empty, lbs.	Weight loaded, lbs.
3—Malicet & Blin	4 cyl. 90 x 120	6,450	12,235
4—Malicet & Blin	4 cyl. 90 x 120	6,408	12,197
11—Peugeot	4 cyl. 90 x 120	5,485	10,634
12—Peugeot	4 cyl. 90 x 120	5,462	10,632
9—Front-drive Latil	2 cyl. 105 x 140	5,478	10.332
10—Front-drive Latil	2 cyl. 105 x 140	5,480	10,152
16—Delahaye	2 cyl. 100 x 160	4,695	9,298
17—Delahaye	2 cyl. 100 x 160	4,703	8,201
20—Panhard-Levassor	4 cyl. 81 x 120	6,399	13,323
21—Panhard-Levassor	4 cyl. 81 x 120	6,603	12.336
24—Berliet	4 cyl. 100 x 140	5,998	11,825
25—Berliet	4 cyl. 100 x 140	6,026	11,840
30—Vinot-Deguingand	4 cyl. 95 x 130	5,220	11,009
31—Vinot-Deguingand	4 cyl. 95 x 130	5,791	10,854

Benz, Not Mack, Gets Truck Trophy

On page 339 of The Automobile of August 25 it was said that "Mack Wins in Its Class." The information received by The Automobile at the time was to the effect that the Mack truck was slightly in the lead. It now transpires that the Benz truck was the winner, the figures being as follows:

COST PER TON MILE AS FIGURED BY THE COMMITTEE

Car No. 72, Benz	$ .00736
Car No. 73, Mack	.00738



Another one of Berliet's heavy trucks

The Peugeot and Delahaye trucks on the road

Malicet-et-Blin truck being weighed on the scale at Meulan

The Peugeot auto truck in the competition

Doings in the East

NEW JERSEY AUTOMOBILE CLUB ACTIVE; CONTEST BOARD MAKING RULINGS; LANCASTER CLUB LOOKING AFTER ROAD WORK; QUITE A NUMBER OF NEW FACTORIES

—The Weed Chain Tire Grip Company announces that it will reduce the price of Weed chains to-day.

—The Automobile Accessories Company, William B. Yoder, president, has secured the Pittsburg agency for the Shawmut tires.

—George Sill Leonard, for some years with the Boston branch of the Studebaker company, is now with the Peerless company in the Hub.

—The Banker Wind Shield Company of Pittsburg is now fairly located in its new factory at Ellsworth avenue and Summerlea streets, East End.

—W. R. Cole & Son, of Oil City, Pa., have secured the agency for the Middleby automobile in Jefferson, Clarion, Armstrong, Clearfield and Indiana Counties, Pa.

—So complete has been the satisfaction given by Stearns taxicabs in Buffalo that the Buffalo Taxicab Company has just placed an order for seven more cars.

—William F. Lehman, veteran salesman in the automobile trade of Philadelphia, has joined the sales force of the Philadelphia branch of the Maxwell-Briscoe Company.

—Samuel Creese & Son, of Beaver Falls, Pa., have bought property on Seventh avenue in that place and will build a large automobile garage and repair shop at once.

—After losing nine horses, the Troy Laundry Co., of 172 Main St., Poughkeepsie, has purchased a gasoline delivery wagon from the International Harvester Co.

—The feature of the recent encampment of the N. G. P. at Gettysburg, Pa., was the use of a monster three-ton Packard motor truck for carrying the equipment and supplies.

—J. C. Howell has resigned his position as assistant manager of the Warner Instrument Company, to become advertising manager for Reed & Barton Company, at Taunton, Mass.

—Montgomery Hallowell, for several years connected with Lord & Thomas in New York, has been appointed general advertising manager of the United States Motor Company.

—The Franklin Motor Car Company, of 152 North Broad street, has contracted with the Cole Motor Car Company for the Philadelphia and vicinity selling rights of the Cole "30."

—The Whitten-Gilmore Company of Boston has added another former Studebaker man to its sales staff in Fred W. Nichols who has been selling motor cars in the Hub for some years.

—The Inter-State branch, that was opened in Boston this week, is located at 153 Boylston street, with Virgil A. Charles in charge. The entire New England business will be directed from there.

—A. J. Beckert, who was for several years connected with the firm of L. Glesenkamp Sons & Company, is now sales agent for the Willoughby Company and has his offices at Forbes Field, Pittsburg.

—The Stewart & Clark Manufacturing Company, makers of the Stewart speedometer, will open a sales office in Philadelphia. They are now negotiating for a very handsome salesroom on Broad street.

—Lucian Clawson and Elmer Turner, formerly of the Greensburg Auto Company, and Harvey Shoup are having plans drawn for a three-story garage in Maple avenue, Greensburg, Pa., to cost $20,000.

—The Castle Square Garage Company of Boston has taken on the Great Western for New England with headquarters on Ferdinand street. Subagencies will be placed in other New England cities.

—The Pittsburgh Automobile Dealers' Association is backing the movement to secure a new South Side tunnel which will give access to more than 100,000 people back of the Monongahela River hills.

—The Liberty Automobile Company, of Pittsburg, which was partly burned out recently, is now located at 5977 Centre avenue, East End. The company has recently taken the agency for the Abbott-Detroit car.

—Walter F. Winchester has severed his connection with the Pierce-Arrow Motor Car Co. of Buffalo, and hereafter will be head of the Winchester Motor Car Co., dealers in Pierce-Arrow cars, at Jacksonville, Fla.

—The location of the Stearns agency in Seattle has been moved from Fifth and University Streets to Broadway and Madison. The garage and salesrooms will be used exclusively in the interest of the Stearns in Seattle.

—H. C. & C. D. Castle has been merged into the Lozier Sales Company, of Boston, which will handle Lozier cars in the eastern half of Massachusetts. H. C. Castle, of the old firm, is president of the new Lozier Sales Company.

—Stillman & Hoag, Englewood, N. J., will continue handling the Locomobile and White gas cars during the coming season of 1911 and have taken the Chalmers-Detroit to replace the Buick line, which they have been handling.

—C. G. Norris, an English engineer is now in this country with two or three very interesting engineering novelties, one of which is the new type of wheel which has been adopted by the London Omnibus Company for its motor 'buses.

—The Consolidated Rubber Tire Company, manufacturers of the Kelly-Springfield tires, 315 North Broad street, Philadelphia, will shortly remove to 208 North Broad street. The floor space of the new quarters is nearly double that of the old.

—The city of Pittsburg will shortly build a model garage for housing its vehicles. It will hold the downtown fuel wagon of the fire department, the motorcycles of the police bureau and the city detectives' automobiles, and will cost $9,000.

—Vice-President and General Sales Manager of the United States Motor Company has announced that the Alden Sampson Manufacturing Company will build, in addition to its line of heavy commercial vehicles, a 1000-pound delivery wagon.

—Members of the New Jersey Automobile and Motor Club will take part in a sociability run Saturday, Sept. 10. It is expected that in the neighborhood of 100 cars will be in line, for the run is the first of the kind arranged for this season. The route the party will take will be from the city clubhouse in Park Place to the country club at Lake Apshawa, near Butler. On arrival there a clambake and corn roast will be the order.

—Vice-President Horace DeLisser, of the United States Motor Company, makes the announcement that that organization will hereafter be represented in all big racing and endurance events. Contest Manager M. C. Reeves will be in charge of the racing team.

—The Automobile Association of Indiana County, Pa., is prosecuting all road supervisors who do not comply with the laws for the betterment of country roads and its committee is making weekly trips over the five inspection districts to gather data.

—The first annual reliability run of the Automobile Club of Buffalo will start September 7 and will be concluded September 10. Both start and finish each day of the run will be from the club house on Main street and the course for each day will measure about 200 miles.

—Glenn H. Curtiss, the noted aviator, although completely absorbed in his work in which he has become a leader, recently purchased an Oakland runabout from the factory's representative, the Pittsburg Automobile Company.

—E. R. Mertens, superintendent of the Columbia Motor Car Company, has had ten cars of the 1911 model on the road in test. The new Columbia, which is of higher power than the 1911 car, is said to be very efficient. It has been demonstrated to be a hill climber and much is expected of it.

—The Howard Auto Transportation Company has been organized to conduct a passenger and freight service in Howard county, Maryland, within thirty days. The incorporators are Albert Nichols, Samuel A. Nichols, Samuel H. Hopkins, Covington Zepp and Stuart M. Bailey, all of Howard county.

—During the eleven months commencing August 1, 1909, and ending June 30, 1910, rubber was imported into this country to the extent of 96,000,000 pounds. This shows an increase of 13,000,000 pounds over the corresponding period preceding and over 24,000,000 pounds more than the same length of time in 1906-07.

—The National Automobile Company, capital $100,000, has been organized in Pittsburg and will take over the location formerly occupied by the Standard Automobile Company at 5917 Baum street. M. J. Caton is president of the new company, which will have the agency for the Owen and Haynes automobiles.

—The Hazard Motor Manufacturing Company, of Rochester, N. Y., has been incorporated, with a capital stock of $400,000, to take over the former Hazard Engineering Company. The officers of the new company are: E. C. Hazard, president; John F. Alden, vice-president; George R. Coates, treasurer; Willett E. Hazard, secretary; George E. Hazard, works manager.

—W. S. Drummond, organizer and former president of the New York Transportation Company, who is now engaged in the banking business in London and Paris, is in this country negotiating for the French rights to the Twombly automobile system and quick-removable power plant, which attracted so much attention from the trade experts when it was exhibited at the Automobile Club of America a few weeks ago.

—The Automobile Legal Association, of Boston, has been notified that Attorney-General O'Malley, of New York State, had rendered an opinion that motor cars bearing registrations of Massachusetts, Connecticut and Vermont did not come under the reciprocity clause of the New York law and therefore motorists from those States would have to register their cars to operate in the Empire State.

—The Matheson Automobile Company has just closed contracts with the following concerns: M. M. Gillett, Smethport. Pa.; W. King Smith Company, Syracuse, N. Y.; L. G. Everist & Son, Sioux City, Iowa; J. R. Todd, New Orleans, La.; Ideal Motor Car Company, Harrisburg, Pa.; J. M. Lopez, Biloxi, Miss.; J. K. Gilchrist Company, 123 East Seventh street, Cincinnati, Ohio.

—The S. M. Supplies Company, which has the Boston agency for the Inter-State and Brush cars for a year or more, has decided to drop its affiliation with the motor industry because of a press of other business. Victor M. Charles, manager of the agencies, will probably take charge of the Inter-State branch that is to be opened in Boston. It is expected that the Brush will also be handled as a branch through the U. S. Motors Company.

—The Collins Gear & Motor Company, of Pittsburg, has secured a location at Canonsburg, Pa., and will let contracts for a plant 60 x 300 feet at once. The company has a capital of $250,000 and will manufacture an appliance for automobiles invented by D. P. Collins at Pittsburg. Its officers are: President, J. J. Flannery; vice-president, D. P. Collins; treasurer, H. A. Neeb; secretary, J. M. Flannery. The offices of the company are at present at 324 Frick Bldg., Pittsburg.

—A four-cylinder 40-horsepower Pope-Hartford combination ladder and chemical wagon has been installed in Mansfield, Mass., for the fire department. The wagon cost $4,500 and is a thoroughly modern machine capable of carrying ten firemen and giving a speed of 35 miles an hour. It is equipped with a 40-gallon chemical tank and engine; one 20-ft. extension ladder; a 12-ft. ladder; two 3-gallon extinguishers; 1,000 feet of regulation fire hose; 200 feet of ordinary hose; axes, ropes and other things needed at fires.

—The C. W. Kelsey Manufacturing Company, of Hartford, Conn., has its first car on the road. It is called the Spartan and is a four-cylinder motor, three speeds, selective shaft drive, vestibule body and will seat four passengers. The car is to sell for $1,000, which includes lamp equipment, magneto and horn. C. W. Kelsey, president and general manager of the company, was formerly connected with the Maxwell-Briscoe Company as sales manager and recently resigned from a similar position with the Columbia Motor Car Company.

—The Boston *American* plans to have a contest for commercial vehicles on Oct. 14 and 15 starting from Boston and going to Newburyport the first day by way of Haverhill, Lowell and Lawrence, and the second day returning to Boston through Salem, Lynn, Beverly, Chelsea and Cambridge. It will cover about 130 miles and will be patterned after the Philadelphia *North American* contest from Philadelphia to Atlantic City recently. The machines will be divided into four classes of from 1000 pounds to anything over three tons, gasoline or electric. Officials of the Bay State A. A. will conduct it.

Middle West News

LOZIER CONCENTRATING AT DETROIT; INDIANAPOLIS SPEEDWAY BEING PUT TO WORK; PREMIER PLANT GETTING A TOUCH OF IMPROVEMENT; AGENCIES BEING ESTABLISHED

—R. L. Griggs will open a large garage to-day in Virginia, Minn.

—The number of automobiles in use in St. Louis has exactly doubled within eight months.

—The agency of St. Louis and territory for Continental automobile tires has been transferred to the Phoenix Auto Supply Company.

—The Anderson Carriage Co. of Detroit has opened a branch in Cleveland at Steeres' garage, 10550 Euclid avenue, with G. H. Rempes in charge.

—A. I. Dutton, Publicity Director of the Willys-Overland Company, has resigned to become sales manager of a prominent Chicago concern.

—A broad highway sixty miles long between Toledo and Detroit, traversing one of the most beautiful regions in the world, now seems a probability.

—Plans have been accepted for the $15,000 clubhouse which will be built by the Milwaukee Automobile Club, and the work of erection will start at once.

—T. L. Hausmann, late with the New York-Chalmers Company, has been appointed manager of the St. Louis branch, and is busy getting his sales force together.

—The Regal Motor Car Co. is soon to open a branch in Cleveland. A building has been leased for the purpose at 1926 Euclid avenue. Frank L. Pierce, formerly of the Gaeth Motor Car Co., will be in charge.

—A. A. Franklin & Company have been appointed factory distributors of the Cole "30" for Missouri. The company has offices and salesrooms at 4127 Olive street, St. Louis.

—A. R. Davis, manager of the Cleveland Studebaker Co., has been made a member of the Question Club, which is an exclusive club among automobile manufacturers and owners.

—The Scioto Auto Car Company of Chillicothe, Ohio, was incorporated with a capital of $150,000 to manufacture automobiles and motor trucks. The incorporators are F. C. Arbenz and others.

—The M. M. Baker Company, of Peoria, Ill., has leased a building at 2007-9 Locust street, for the establishment of a St. Louis house from which will be handled the Stoddard-Dayton and Courier cars.

—The Fayette County (Iowa) Automobile Association has just been formed, with the following officers: President, H. P. Hancock, West Union; Secretary, M. O. Musser, West Union; Treasurer, C. W. Bopp, Hawkeye.

—John G. Perrin, general superintendent of the Lozier factories at Plattsburg and Detroit, has just returned from an extended European trip taken for the purpose of studying the automobile trade and manufacturing conditions in general.

—H. W. Meyer, formerly of the Zimmerman Manufacturing Co. of Auburn, Ind., and more recently the Decatur Motor Car Co., of Decatur, Ind., is now general manager of the Planhard Manufacturing Co., carbureter manufacturers of Kokomo, Ind.

—The Standard Auto Sales Company has secured the lease of the first floor of the K. of C. Building in South Hazel street, Youngstown, Ohio, and will shortly move its garage, salesroom and repair shop there from its present quarters on West Rayen street.

—The Phillips Automobile Company has secured the agency of the Hudson Motor Car Company in St. Louis, formerly held by the Park Automobile Company. In addition to the Hudson, the Phillips Automobile Company will handle the Babcock Electric.

—The third annual good roads convention of the National Grange, Farmers' Union, American Road Builders' Association, U. S. Office of Public Roads, the National Association of Automobile Manufacturers and other organizations will be held October 6 to 8 at St. Louis.

—The *Tribune* Reliability run to Aberdeen, S. D., will start from Minneapolis either on Friday, Sept. 16, or two weeks later. It will last five days outgoing, one day at the Aberdeen control and two days returning, reaching Minneapolis on the night of the following Tuesday.

—Frank J. Santry, who has been for the last two years with C. C. Bleasdale in the Maxwell agency in Cleveland, has resigned and has accepted a position with Morgan & Williams, of Warren, Ohio, distributers in that section for Maxwell, Oakland, Overland, Oldsmobile and Columbia cars.

—E. B. Tozier of the Diamond Tire Company is having erected on Race street, just south of Ninth, in Cincinnati, a building of unusual architectural beauty. The structure is 24 x 120 feet, two stories and basement, and is to be occupied as salesroom and offices by the Diamond Tire Company.

—The Hitchcock Motor Company of Warren, Ohio, has been organized. M. H. Hood of West Farmington, Ohio, has bought the interest of J. H. Hitchcock and will be the president of the company. E. W. Skinner, for the past three years manager of the Bangora Slate Company at Columbus, Ohio, has bought the interest of R. H. Crehan and will devote his time to the company.

—The Henderson Sales Company of Indianapolis has selected Atlanta for its Southern headquarters, and will distribute from that city in the following States: North Carolina, South Carolina, Virginia, Tennessee, Georgia, Florida and Alabama. The local branch will be located at 76 Peachtree street and will be in charge of Leonard Cater.

—C. B. Warren has returned to the Haynes Automobile Co of Kokomo, Ind., resuming his old position of salesmanager. Mr. Warren left the Haynes Company in 1908 to represent the Stearns Automobile Co. on the Pacific coast, and later went into the retail business in St. Paul, Minn., with Burney Bird who represents the Haynes Co. in the Twin Cities.

—Mr. N. H. Miniter, formerly general factory representative of the Schebler carbureter and for the past year sales manager of the Eisemann Magneto Company, has been appointed sales manager of the Reichenbach Laboratories Company, manufacturers of the "Vortex Vaporizer." Mr. Miniter will make his headquarters at the home office of the company, 2420 Michigan avenue, Chicago.

—The seventh annual outing of the Milwaukee Automobile Club to the orphans of Milwaukee was a big success this year. The ride was to and from Washington Park, where the festivities were held. There were 101 orphans from the St. Rose's asylum, 90 from the Milwaukee Protestant Orphan asylum and many from the St. Aemilianus asylum, more than 200 in all, and each boy and girl was taken home at night an enthusiastic motorist.

—A record was established recently by a two-ton United States Motor truck on a three days' run from Cincinnati to Chicago. The distance of 361.4 miles was covered in about 26 hours and 15 minutes. Twenty-six gallons of gasoline and two and one-half gallons of oil were consumed on the trip. The demonstration was made by Norman S. Hill, sales manager of the United States Motor Truck Company of Cincinnati, and E. C. Schumard, general superintendent of the same company.

—According to advices from the course, the winning Lozier car in the Elgin National Trophy race was equipped with Michelin tires as were also the National that finished second in that contest and the one that got third money. In the Illinois Trophy race the winner, a National; Falcar, second and Marmon, third, ran on Michelin tires. The winning Marmon in the Kane County Trophy race as well as the Marion which finished second and the Marmon that was third were all similarly equipped.

—At the annual meeting of the Firestone Tire & Rubber Company, held in Akron, August 24, the former board of directors was retained and the following officers were re-elected for the coming year: H. S. Firestone, president and general manager; Will Christy, vice-president; S. G. Carkhuff, secretary and J. G. Robertson, treasurer. It was announced that the new model tire plant now in process of construction will be completed by February, increasing the manufacturing capacity fourfold.

—The Stover Motor Car Company of Cincinnati was incorporated with an authorized capital stock of $25,000 to manufacture and sell motor cars and other vehicles by L. K. Emerson, George W. Platt, R. L. Dallings, Stanly M. Adams, Parker K. Gale and Alex. L. Parker. The American Auto Sales Company of Cleveland was incorporated with an authorized capital stock of $50,000 to do a general automobile and repair business by George H. Canniff, John K. Corwin, E. P. Kinney, W. W. Welch and Frederick P. Walters.

—The Milwaukee Automobile Club will furnish the automobile to make the five-mile race with an aeroplane at the State fair here September 13-17. Indications are that the Milwaukee Automobile Club will inaugurate with a motor parade the opening day of the Wisconsin State fair and with this end in view has asked that, if possible, the new Grand avenue viaduct, one of the largest concrete bridge structures in the world, may be completed for traffic during State fair week. Plans are to have the viaduct used for the first time by the parade.

—The Louisville Automobile Club's second annual reliability and economy contest will be held September 20, 21 and 22 and two of the cars which participated in the 1910 Glidden tour will probably enter. The Cole car and a Premier will likely be named. Entries have been received and several numbers have already been assigned. The tour this year will cover about 500 miles through the Bluegrass. Three silver loving cups are offered this year—one for economy, another for the best reliability score and the third prize is called the owner's cup.

From the Sunny South

THE PRESENT MONTH WILL SEE NASHVILLE THE HOME OF THE ONLY AUTOMOBILE FACTORY BELOW MASON & DIXON'S LINE—GENERAL TRADE NEWS

—A charter has been granted the Jackson, Tenn., Garage Company of Nashville, Tenn. The capital stock is $10,000 and the incorporators are: Chas. E. Dexter, F. M. Spiller, Mark Glen, and J. A. Pope.

—Amateur and professional automobile men of Texas, elated with the success which attended the recent meet on Galveston Beach, are beginning already to formulate plans for a more extensive meet next year.

—The Governor of Tennessee has announced the appointment of a large number of delegates to the Southern Appalachian Good Roads Convention to be held in Knoxville, Tenn., during the Appalachian Exposition at that place. The convention opens on Sept. 12.

—The Regal Company of Detroit has opened a Southern branch at 380 Peachtree street, Atlanta, under the name of the Southern Regal Auto Company of Georgia. This company will have Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas and Tennessee as its territory.

—*The Exhaust* is the title of a new automobile journal, the first number of which will be issued on Sept. 5th. It will be published by the Exhaust Publishing Company, 204 Stahlman Building, Nashville, Tenn. Charles C. Gilbert, secretary of the Nashville Automobile Company, is the editor.

—The first Baltimore chauffeur to have his license suspended for using his owner's car without the latter's consent is Frank T. Trainor. The action was taken by Motor Vehicle Commissioner John E. George under the new Swann Motor Vehicle Law. The owner and the Automobile Club of Maryland, through the club's counsel, Osborne I. Yellott, prosecuted the case.

—The city of Nashville, beginning to-day, will oil all new streets that are built and all old ones that are repaired, expecting in this way to ultimately get most of the streets of the city oiled, excepting of course the uptown paved streets. Rock is abundant at Nashville and all of the streets are well built, but unfortunately the rock is soft limestone, wears rapidly and makes a tremendous amount of fine dust, so much so that it is necessary to sprinkle all of the streets of the city daily.

—By the middle of September the Southern Motor Works, said to be the only automobile manufactory in the South, will be turning out Marathon cars from its Nashville plant at the rate of five per day, according to plans. The plant has really been running for several weeks, but all of the equipment has not yet been placed in position. About 75 men are now employed, but the force is to be rapidly augmented until it reaches 400. The plant is located in a big brick structure that was formerly a cotton factory and with some remodeling has made a very desirable place for its present purpose. The plant was formerly located at Jackson, Tenn., but was removed to Nashville, the capital largely increased and operations greatly enlarged. Only two models were turned out at Jackson, but the Nashville factory will begin with four, roadsters, touring cars, as per the old patterns, and the same with torpedo body. C. H. DeZevallos will have charge of the uptown agency.

Across the Great Divide

FRANKLIN SMASHES COAST RECORDS; FRISCO GETS NEW AGENCIES; PORTLAND IS AWAKENING TO MANUFACTURING; ALAMEDA ESTABLISHING AUTO SERVICE

—The Pacific Motor Car Company, of San Francisco, has just taken over the agency for the Reo car.

—The Cole Motor Car Company will establish a branch house at San Francisco. F. W. Cole, Jr., will be in charge as manager.

—The Glenn County Garage, at Willows, Cal., has taken the agency in that district for the Studebaker, E-M-F and Flanders cars

—The Morrison-Cole Motor Car Company, which it is now officially announced will handle the Cadillac in San Francisco, has been recently organized for that purpose.

—Rene J. Marx, manager of the Pacific Coast branch of Renault Frères, announces that the Renault car has been taken over by the Portland Taxicab Company.

—Max L. Rosenfeld, San Francisco agent for the Apperson car, has leased the stores formerly occupied by the Pullman and Dorris agencies on Golden Gate avenue.

—The city of Alameda, Cal., has just put in commission a Pope-Hartford combined police patrol and ambulance. It is a 50-horsepower machine and will accommodate twelve persons.

—The E. S. DeTamble Company will be exclusive Pacific coast distributers for the DeTamble line of cars covering all territory west of Denver, including the Republic of Mexico.

—The Middleton Motor Car Company has been incorporated in San Francisco, with a capital stock of $50,000, by W. H. Middleton, W. C. Crittenden, E. P. Cooper, S. B. Holman and C. C. Burr.

—C. F. Splitdorf, the well-known manufacturer of ignition specialties, has just opened a branch at 1226 South Olive Street, Los Angeles, Cal. P. M. Graves will have charge of the new branch.

—The Elmore car is to have a new home in San Francisco. A. J. Smith, the Pacific Coast distributer, has taken a five-year lease of a new permanent building which is to be erected on Golden Gate avenue, near Van Ness avenue.

—The Ajax Auto Traction Company, of Portland, Ore., has let contracts for the construction of a large manufacturing plant, and has ordered a complete machine shop equipment. The company is capitalized at $500,000, and is backed by a number of prominent Oregon business men.

—The Monitor Automobile Works, 206 N. Academy St., Janesville, Wis., formerly of Chicago, has just opened a Los Angeles agency with the C. G. Dwight Auto Co. This concern is one of the best known in Los Angeles and will push the Monitor commercial car among the merchants of that city.

—Two record-breaking performances marked the recent trip of a score of air-cooled Franklin cars from Portland, Ore., to the Government camp on Mount Hood. A one-ton truck of 18-horsepower made the climb carrying 2,600 pounds of dead weight, and G. L. Campbell drove his six-cylinder 48-horsepower car, carrying seven persons up to the camp, 50 miles, in two hours, consuming but 12 gallons of gasoline.

Prominent Automobile Accessories

USEFUL EMERGENCY WHEEL

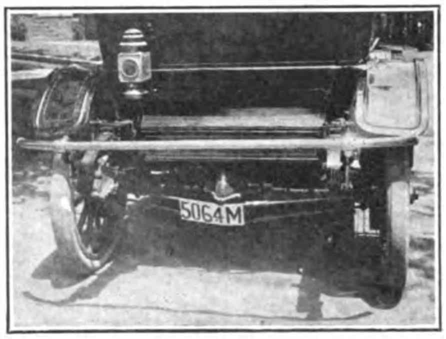
Time lost by reason of tire trouble is frequently a big factor to the autoist, and any device which can save him a quarter of an hour or more—with its consequent fuming and fretting—is not to be ignored. Such a device is the Jenkins emergency wheel, made by the factory of the same name in Richmond, Va. As the primary consideration, ease and quickness of application have naturally been first considered in this wheel, although the element of strength has not been overlooked in its make-up. It will fit any make of wheel or rim.

A quick-action hand pump

Six steel plates firmly fastened to the emergency rim form seats upon which the rim of the regular car wheel rests when it is in place. The emergency wheel is held in place against the side of the car wheel by three steel arms, which reach through the inside of the car wheel and engage the inner edge of the rim. The simple tightening of the three bolts on the outside of these three arms holds the emergency wheel fast to the car wheel, forming a strong positive support that cannot give way.

The regular car wheel cannot be harmed by the emergency wheel, for when the latter is in place no part of it comes in contact with the injured wheel. Steering is not interfered with when the substitute has once been firmly placed, and any car so equipped may be driven a hundred miles or more without trouble.

In Fig. 1 is shown the left front wheel with its *hors de combat* tire jacked from the ground and the operator loosening the nuts on the three steel arms which reach through the car wheel and engage the inner edge of the rim. Fig. 2 shows the operator placing the emergency wheel on the outside of the car wheel that is out of commission, and turning the arms so that they will engage the inner edge of the rim of the latter. In Fig. 3 the operator is tightening up the nuts at the outside end of the three steel arms, after which he is ready to proceed. The whole operation consumes but very little time—experts have been said to perform it in considerably less than a minute.



Rear fender to save tail lamp, fenders, gasoline tank and body

SAVES ROOM AND DOES THE WORK

The combination-filter, measure and funnel here shown is a very compact and handy item in a car's outfit. It is made by Charles R. Gibson, of Salamanca, N. Y. Just above the handle is a spring lever, pressure upon which opens the funnel and allows the oil to run through the filter after the proper amount has been measured.

EASY-ACTION, POWERFUL HAND PUMP

Inflating tires by hand is such an exhausting procedure that the motorist whose car is not equipped with one of the mechanical pumps should see to it that the hand pump he carries is powerful and easy-working. The Myers Airtite, manufactured by the Keystone Novelty Company of Columbia, Pa., possesses merit along these lines that should recommend it to the autoist. With no leather parts and with metal piston and expansion rings like those in the cylinder of an engine, it is positively air-tight, and being made throughout of brass, steel and iron, it will outlast many of the ordinary pumps.

Measure, funnel and filter in one

REAR FENDERS FOR AUTOMOBILES

Automobiles, used in the larger cities, that are not equipped with fenders are as difficult to find as the proverbial needle that got in the way of the hay stack. In thus equipping their cars, owners have mechanically followed the custom of attaching a fender only to the front of the car. Automobile mechanics have for some time sought to provide some adequate means for protecting the rear axle, gasoline tank, tail lamp, body and fender. It would seem that their problem is solved by the simple expedient of attaching a bumper to the rear spring hangers.

The accompanying illustration shows that a Detroit motorist has seen the utility of this idea and has attached a "Swivel-action" bumper to the rear of his car. These fenders are being marketed by the Emil Grossman Company, 232 West 58th street, New York City.

Fig. 1—First operation in adjusting Jenkins Emergency Wheel

Fig. 2—Second operation, fitting emergency wheel in place

Fig. 3—Final operation, tightening nuts at ends of steel arms

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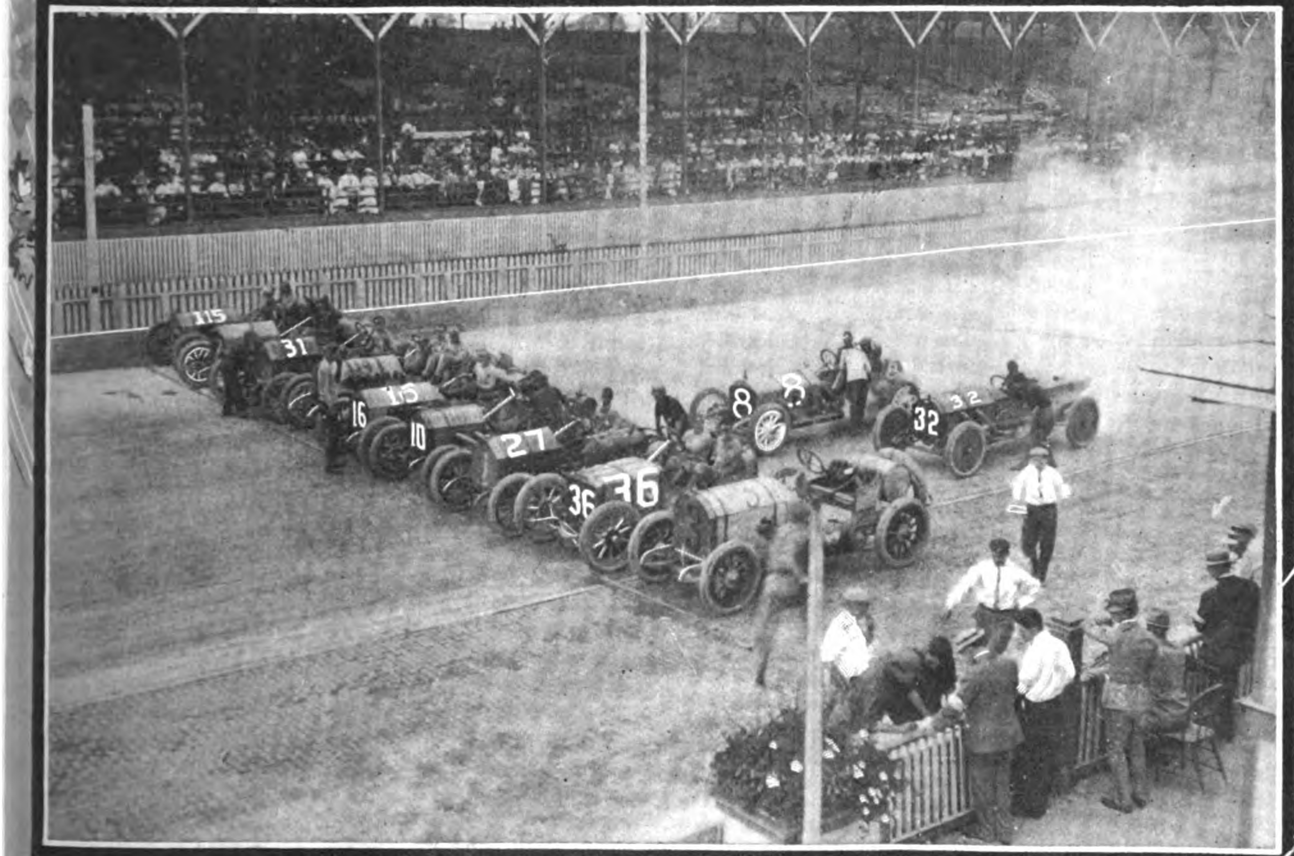
THE AUTOMOBILE

Labor Day Events at Indianapolis

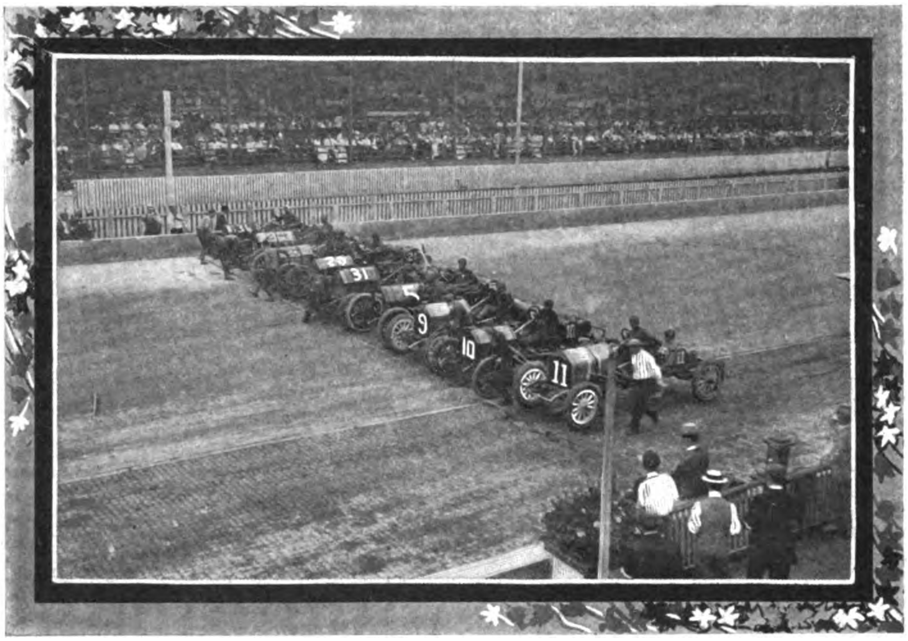


INDIANAPOLIS, IND., Sept. 3—Although no records were broken in the first day's races of the two-day meet which marked the closing of motor car competition at the Indianapolis Speedway for the season of 1910, considerable interest was shown and some remarkable performances were made in the two 100-mile events in which the Benz and one of the Nationals were the shining lights.

The 100-mile free-for-all was won by Hearne in the big 200-horsepower Benz. The prizes in this event are $1,000 to the winner, $500 for second place, $200 for third and $100 for fourth. This event brought to light a dark horse—a new Indiana car, the Westcott, burst into the limelight by showing its heels to a classy field and finished second to the big Benz. The Benz's time for this event was 1 hour 19 minutes and 58.1 seconds, which is 25.1 seconds slower than the Marmon's National Speedway record. The Westcott crossed the tape 4 minutes behind the winning Benz, and National, No. 7, was third.

There were 11 starters in the Remy Grand Brassard event and the six cars that finished made non-stop runs. National No. 9 was first in this event with National No. 11 second, Speedwell third, Midland fourth, Black Crow fifth, McFarlan sixth.

In the time trials the nearest that the 200-horsepower Fiat could come to the record



Start of the Remy Brassard—National, Marmon, National, Speedwell, Firestone-Columbus, Black Crow, Midland, McFarlan, Cino

was a mile in 38:64 and 40:20 in the 90 horsepower machine of the same make. In event No. 2, a race between three Herreshoffs, Emmons was first and Smith second. The Cole 30 was winner of the third event, with the Staver and another Cole close contenders for second place. Marmon No. 26 won the laurels in event No. 4, but was close pressed by Falcar No. 15, while Falcar No. 16 was third. In the fifth event National No. 9 was the shining light with Marmon No. 10 second and National No. 18 third. National No. 9 was the bright star in the sixth event, second and third places going to National No. 18 and National No. 11, respectively. The Benz 120 made its first appearance in event No. 7, which it won easily, with National No. 7 second. Fiat No. 2 would have given the Benz a good run for the money in this race had it not been for stalling the motor at the tape at the start. The five-mile handicap event went to Cole No. 6, with the Matheson finishing second and the McFarlan third.

The Westcott's performance in the 100-mile free-for-all event is remarkable for the fact that not a single stop was made throughout the race. Driver Knight stopped for 24 seconds in the thirty-fourth lap to take on oil, and it is interesting to note that though he set the pace the entire distance his tires were in excellent condition at the end. Two stops were made by National No. 7, each of which consumed more than a minute and a half, the first being in the thirteenth lap on account of a blown-out right rear tire, and the second in the twenty-fifth lap for a right front tire and water. Similar tire trouble was encountered by Harroun, who was fourth, the changes being made in the eighteenth and thirty-fifth laps. Creditable performances were also made in this race by the little Falcars which had already competed in two previous events. Pierce lost about three minutes in the twenty-fifth lap repairing a broken ignition cable, and Galnow lost two minutes in the twelfth lap replacing a spark plug.

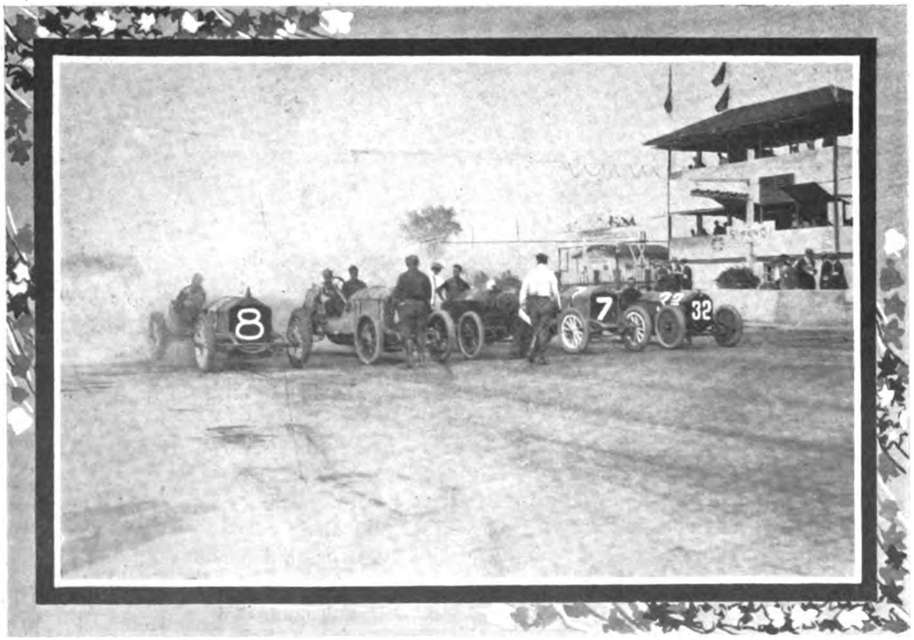
Joe Dawson in a Marmon, who drove the winner of this year's Cobe Trophy, led the field in the Remy Grand Brassard for many laps, and it was nip-and-tuck between him and National No. 9 until he suffered engine-bearing trouble and went out in the twenty-fifth lap. With the Marmon to the mat, the two Nationals had the race well in hand, though Clemens' Speedwell clung like a wolf on their trail until the very finish of the event.

Labor Day's Events

INDIANAPOLIS, Sept. 5—The powers that be were surely lenient to the crowds that thronged the Indianapolis Motor Speedway to witness the closing events of the season, for notwithstanding the fact that a heavy downpour of rain occurred shortly before the time for which the first event was scheduled, the weather soon cleared up and remained favorable throughout the afternoon leaving the track cool and in excellent condition, a fact which notably improved the wearing efficiency of the tires.

The 200-mile race for cars of 600 cubic inches piston displacement or less was the feature event of the day, and at 3:30 o'clock the twelve starters were sent away. The first prize in this race was $1,000, second $500 and third $200, and in addition to this the Bosch Magneto Company posted an extra $300 as a first prize, $200 for second and $100 for third. National No. 8 was the winner in this event with National No. 7 second, while McFarlan Six, No. 23, after getting first and fourth positions in two previous events and making the only non-stop run in the race, finished third. A threatening cloudburst so enveloped the track in darkness near the finish of this race that much difficulty was experienced by the starter and the timers in bringing it to a successful close. The race was continued, however, until a National No. 18 came in fourth. McFarlan No. 24 was on its last lap when the race was finished, while Black Crow No. 28 was also running on its seventy-eighth lap.

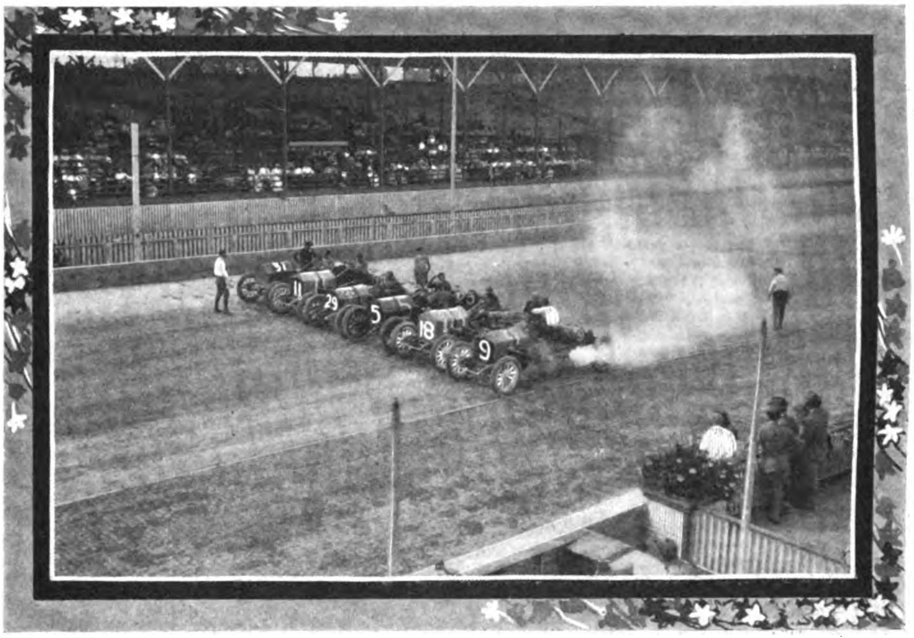
At 30 miles National No. 8, McFarlan No. 24 and Marmon No. 32 were fighting for the lead with the first named two lengths in front, while National No. 7



Line-up for the Class D, free-for-all—Marmon, National, Fiat, Benz, National and Marmon No. 10 were having it out for fourth position. This is rather remarkable because National No. 8 lost almost a minute in the fourteenth lap replacing a right front tire. At 40, 50 and 60 miles Marmon No. 32 was in the lead and although it was necessary for it to stop at the end of the twenty-ninth lap it succeeded in establishing a new record for the distance of 75 miles, the time being 1:03:31.9 the previous record of 1:09:34.6 being held by a National and made on this track. This stop of 2 minutes 15 seconds, in which Marmon No. 32 took on gasoline and oil and changed a right rear tire, set it behind considerably, but at 100 miles it was again but a hundredth of a second behind the leader. From here on, however, National No. 8 held the lead and Marmon No. 32 was running second at 170 miles, after which it dropped out.

One of the most interesting events of the day was the 50-mile free-for-all open race which was won by the big German Benz of 120 horsepower. The Benz ran away from a field of eight starters in this event and in doing so annexed three records. At 15 miles it smashed the Indianapolis speedway record of 12:32:04 by making the distance in 11:22:02. The Atlanta speedway record of 15:31:80 for 20 miles was reduced to 15:06:52; and at 25 miles the National's Indianapolis record of 21:21:07 was shattered and replaced by a new one of 18:56:84. Among the starters in this race were the 200-horsepower Fiat, National No. 7, National No. 8, Matheson No. 14, Westcott No. 27, Firestone-Columbus No. 31 and Marmon No. 32, the prizes being $800 for first place, $400 for second and $200 for third. At the end of 10 miles the Benz led, having passed the Fiat after the first lap. The latter was running a close second, however, with Marmon No. 32 well up in third place, while both Nationals were trailing a mile behind. The Benz also held the lead at 20 miles though closely pressed by Marmon No. 32. The Fiat began to lose time in the seventh lap when it was compelled to stop for a rear tire change. The Benz practically had things its own way at 30 miles, the Fiat and Marmon No. 32 both being compelled to run into their pits during the eleventh lap and change tires. These stops enabled National No. 7 to climb into second place, while Marmon No. 32 was running third and the Fiat fourth. The Benz was almost a lap to the good at 40 miles though Marmon No. 32 had regained second place and Livingstone was running third. The Fiat suffered tire trouble again in the sixteenth lap. At the end of the race the Benz was still almost a lap in the lead while Marmon No. 32 was second, National No. 7 third and the Fiat fourth.

In event No. 7, a free-for-all open race of 10 miles, there were six starters. This event went to the 200-horsepower Fiat, which got away in the lead and at the end of the first lap was almost a hundred yards ahead of its nearest rival, the Benz, and although the Fiat maintained the leading position till the finish of the race the end of each lap showed the Benz about 25 yards closer, and at the finish of the race, which was most exciting, the German car was less than a length behind. Third position in this event went to National No. 11. Of the ten events on the program this afternoon the rest were for 5-mile distances and each was confined to a different class of cars.

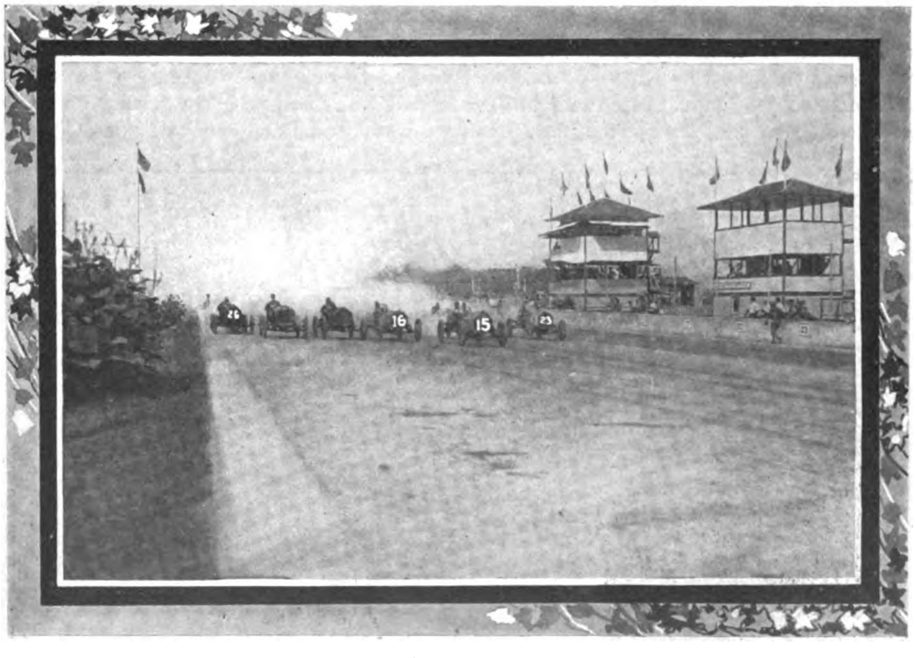

Start of the 301-450 race—National, National, Speedwell, Midland, National, Firestone-Columbus

FIRST DAY'S SUMMARIES

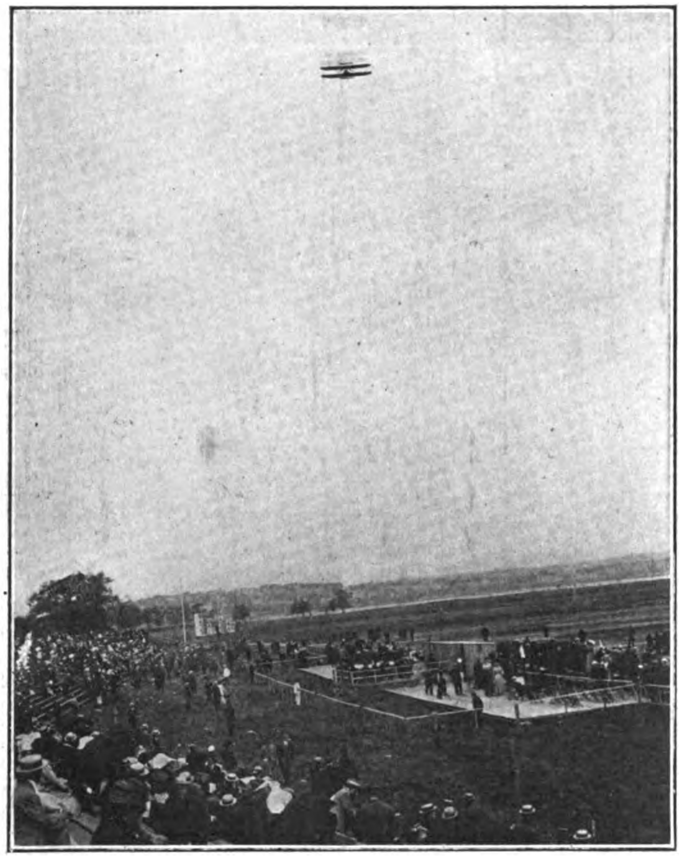
One mile—Time trials (Record 35.68)—

No.	Car	Driver	Time	
1	Fiat	De Palma	38.64	
2	Fiat	De Palma	40.20	
Five miles—160 cubic inches and less—				
			2½ Miles	5 Miles
19	Herreshoff	Emmons	3:21.22	6:20.48
21	Herreshoff	Smith	3:24.71	6:21.19
20	Herreshoff	McCormick	4:01.35	8:04.80
Five miles—161 to 230 cubic inches—				
6	Cole	Edmunds	2:31.28	5:05.50
17	Staver	Keifer	2:40.25	5:07.20
33	Cole	Endicott	2:51.21	5:07.79
35	Hudson		3:05.14	
Five miles—451 to 600 cubic inches—				
9	National	Wilcox	2:11.50	4:06.75
18	National	Greiner	2:12.31	4:07.51
11	National	Merz	2:16.57	4:18.10
14	Matheson	Basle	2:18.18	4:19.79

(*Continued on page 423*)


The 231-300 bunch under way—McFarlan, Falcar, Falcar, McFarlan, Parry, Marmon

Harvard-Boston Aero M

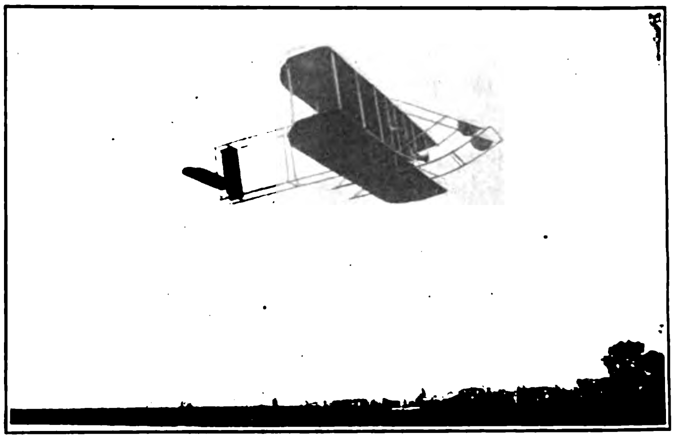


View of the ground and grandstand with Aviator Johnstone aloft in a Wright machine

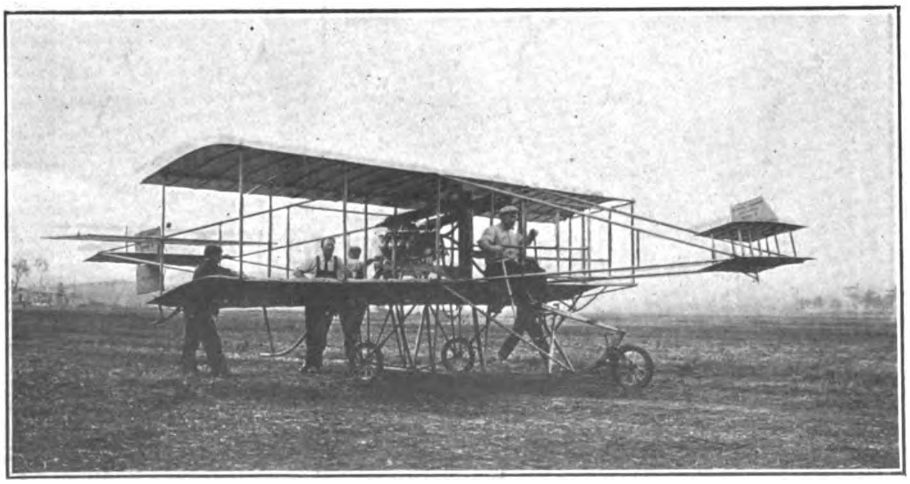
CAMPED in a salt marsh district known locally as Squantum and officially as Atlantic, Mass., the Harvard-Boston aviation meet was duly opened last Saturday to the accompaniment of a pattering rain and in the presence of a sea of umbrellas under which were heard the unflattering comments of Bostonians and strangers alike with regard to the poor provisions made for transporting a crowd of visitors to the flying grounds by rail or otherwise.

Among the aviators who had been billed to show the new art, the majority were mostly noted by their absence, but those who were there were the reliables whose ability to fly has been demonstrated over both sea and land, and, as in accordance with this fact, the aviation field stretched itself amphibiously from the grandstand toward the waters of Boston Bay, covering an uneven expanse of summer-dried marshland, studded with shallow tidal sinkholes and scalloped with patches of rank grass and sandy hummocks. The field in its soft unevenness offered a premium for machines and aviators capable of negotiating a quick getaway, at starting, whether by means of powerful motors or a friendly monorail starting device.

Claude Grahame-White, the noted English aviator who contested with Paulhan in the flight from London to Manchester, cut the impatience of spectators short as early as Friday, when many had congregated, by short decisive and rapid flights in his Blériot monoplane, not only inside the grounds but out over the ocean and making rises and swoops for the special delectation of the unpaid admissions grouped in the adjacent landscape, and on Saturday he was again the readiest starter and most willing exhibitor. Twenty yards of run in the tall grass was sufficient for sending his machine up, though the Gnome engine with which it is equipped is not of the 14-cylinder but the original 7-cylinder pattern. The most original wizard of aviation, Wilbur Wright, has been on the ground for several days and supervised the installation of quarters for his two fliers Ralph Johnstone and Walter Brookins, who took turns with the new "headless" biplane and a Wright biplane of the type shown many times before and practically the same which the Wrights had ready and tried out in 1905. Glenn H. Curtiss was present with the same machine which last Wednesday and Thursday he had flown from Cleveland to Sandusky and back again over Lake Erie, partly in a driving rain. It is of the rapid type, the planes having but slight curvature while the motor is of the eight-cylinder V-type and said to develop about 60 horsepower. Charles F. Willard had charge of another Curtiss machine, considerably smaller and provided with much more strongly curved planes and therefore better adapted for exhibition work but not for speed. A. V. Roe of England was ready with one of his triplanes, having two of these apparently cumbersome machines on the ground, but was handicapped in starting by the nature of the field, whose unevenness and softness were naturally unfavorable to the height and weight of his construction. Horace F. Kearney with a Pfitzner monoplane did not have good enough



The "headless" Wright flyer with rear elevating rudder

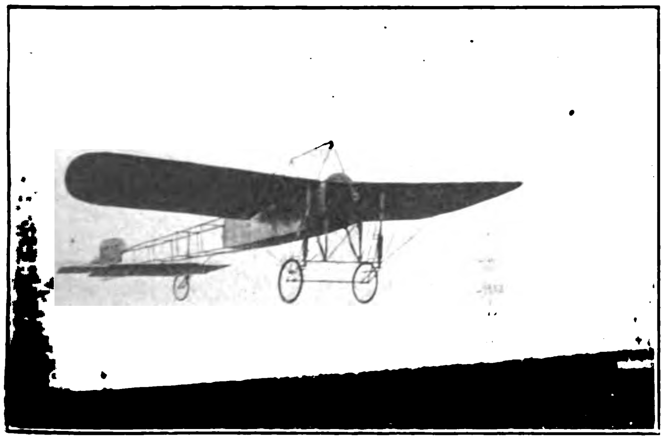


A Curtiss machine in which the ailerons have been moved back of main planes and with single elevating rudder

FLIERS OF ACKNOWLEDGED REPUTE BRAVE THE DIFFICULTIES OF A SOFT FIELD, RAIN, FOG AND OCEANWARD WINDS AT THE BIG AVIATION MEET

luck to get his machine ranked among the successful ones for the present. The indefatigable amateur Clifford B. Harmon was present with a Farman biplane provided with Gnome motor and a large gasoline tank, but suffered the misfortune of having his machine seriously wrecked in one of the first flights he undertook on the opening day. In trying to turn around one of the pylons or marking towers, before his machine had reached sufficient speed to permit this maneuver and only about fifty feet in the air, one end of his machine struck the ground, the aviator stating that the accident was due mostly to his own fault in judgment superinduced by the soft ground which interfered with his start, and by a gust of wind which caught underneath one side of the planes unexpectedly. While it had been this aviator's intention to go to St. Louis to give an exhibition, the accident changed this plan, and the machine was taken to the aeroplane factory of W. Stanley Burgess at Marblehead, Mass., for repairs.

A representative of the United States Navy was present to witness the bomb-throwing experiments for which arrangements had been made by placing an imitation man-of-war near the middle of the field and providing plaster of paris balls about 3 inches in diameter. From a height of 400 to 500 feet Grahame-White, carrying ten balls in a fisherman's creel beside his seat in the Blériot machine, succeeded in throwing one ball right into the central funnel rated as the bull's eye and another into one of the other smokestacks of the putative vessel, while most of the other balls hit near the vulnerable spots; and the naval representative shuddered at the destruction which would have been wrought.

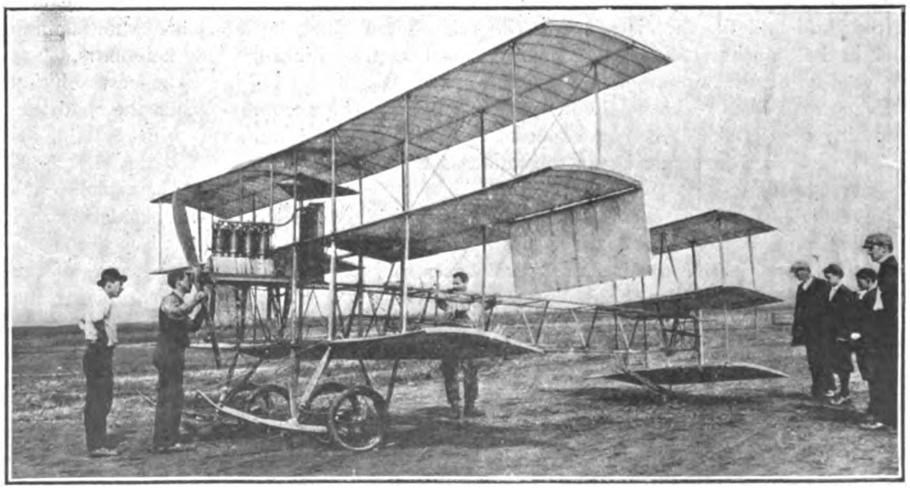


Grahame-White flying in his Blériot monoplane—the dummy man-of-war target for bomb-throwers to the extreme right

Sunday was officially a rest day, but a considerable number of visitors gained access to the ground and were rewarded by seeing Cromwell Dixon, a lad of sixteen and the youngest aeronaut of the age (though closely pressed by the aviator Marcel Hanriot, of France, a son of the well-known automobile racing man of the same name), attempt a flight with a small dirigble balloon and save himself from being carried out over the ocean only by the exercise of great presence of mind and a dexterity promising greater accomplishments in the future.

Start of a Farman machine which has been likened to "clothes on a line"

While all the aviators mentioned entertained the crowds worthily on Labor Day and Tuesday and made all the evolutions, swoops and dives in which the eye delights, no records were broken or created. On Tuesday a London fog made it impossible to see a machine more than 100 or 200 feet in any direction, including upward. The most interesting trials were those relating to the getaway or the length of the run on the ground required to make the machine rise. Grahame-White succeeded in rising with his Farman biplane, with a start of 66 feet, while the Curtiss machine required twice this distance. The big Curtiss flier is now equipped with "ailerons," or winglets, which extend to the rear of the main planes, so as to obtain a steering and balancing action which is not reduced and interfered with by having three planes.



Mr. Roe's triplane (British) which had difficulties in leaving the ground

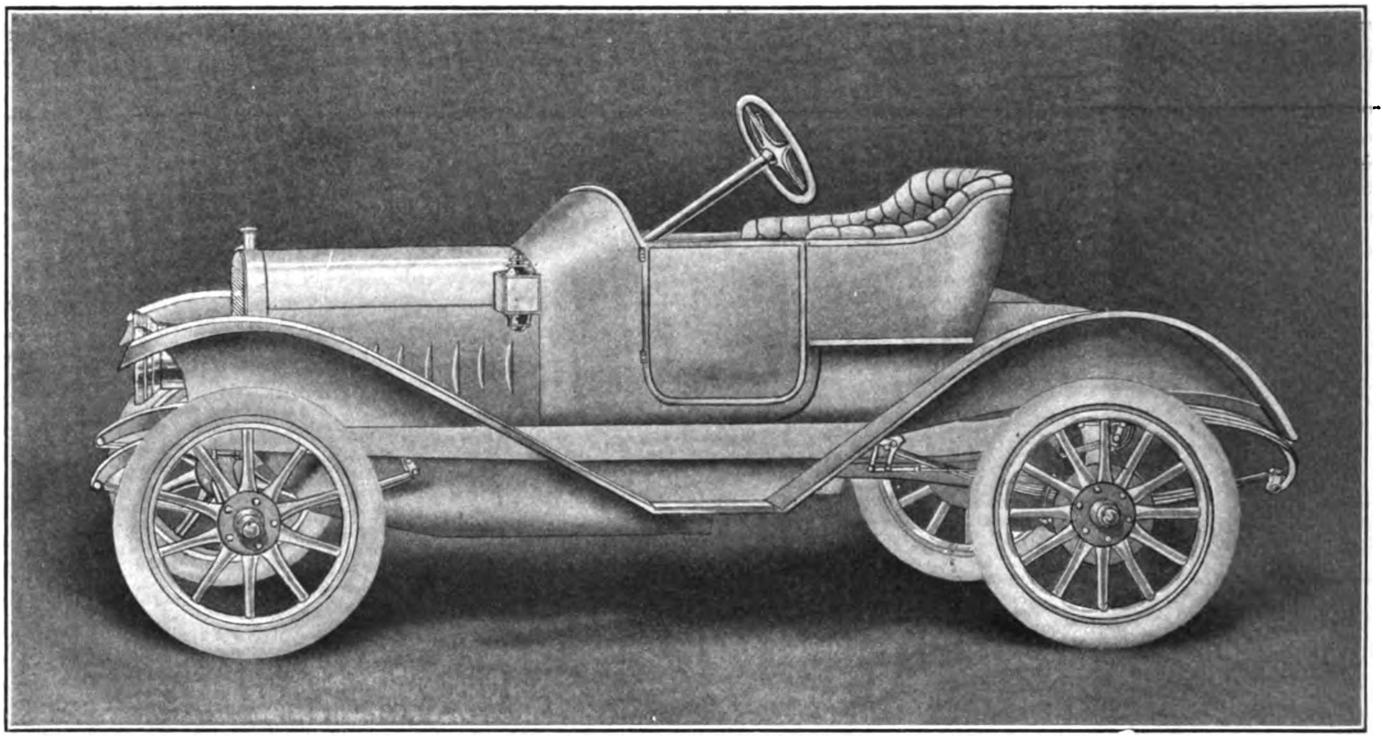


Fig. 1—Illustration of the convertible runabout body, showing fore-door construction and general appearance on a 100-inch wheelbase car

New Body Creation

PRESENTING GENERAL WORKING DRAWINGS OF A NEW IDEA IN BODY WORK SHOWING ACCOMMODATION FOR A GUEST. DRAWN BY GEORGE J. MERCER FOR THE AUTOMOBILE.

THOUSANDS of autoists have learned by experience that a tonneau adds very materially to the cost of maintenance of a car, due to the fact that empty seats in the tonneau constitute an invitation for additions to the party, and the disagreeable feature is entirely beyond the fact as represented in a more or less apt quotation, *i e.*, "two is company and three is a crowd." It is almost impossible to evade taking the neighbors along; they suggest the idea every time they get a chance, not in so many words perhaps, but in a hundred ways both firm and convincing.

The added cost would not be a serious consideration were it confined merely to filling the tonneau occasionally, but it seems to be the misfortune of nearly every autoist to have to entertain guests every time the car is rolled out. The entertainment is in more ways than one, even the tire bill mounts up to enormous figures relatively, and one of the strange situations is portrayed in the fact that the owner of a car has to get down on his knees in the mud and fix the tires, while the self-invited guest lays back in the tonneau smoking the owner's perfectos, and criticising the quality of the automobile.

Every man likes to be neighborly; he is willing to be accommodating absolutely at his own expense, and self-sacrifice is not to be overlooked in summing up the qualities to be esteemed in the average man.

Nevertheless, it does seem as if neighbors quickly wear out their welcome, partly on account of their bad manners, to some extent in view of the large increase in expenses that attend their presence, and there is also the feeling that they think a man is as rich as Crœsus because he owns an automobile. There is small chance of accumulating even Crœsus' chicken-feed under the conditions represented by a tonneau and a perfectly willing set of neighbors.

This situation is much more serious than an outsider might realize. The pleasure that should attend the presence of a sweet running automobile is much dimmed, partly by the feeling that the owner has when he looks at the empty seats in his tonneau and encounters the longing gaze of his nearby friends. Then, there is the fellow who persists in coming along but who refuses every invitation to stop by the wayside for luncheon for fear he will have to pay the bill. It is bad enough to have one's enjoyment shattered by the presence of mixed company, but to be compelled to go without anything to eat for a whole day simply because the company has a tightwad in his makeup is past putting into good English.

There are two or three solutions to this problem, one of which is to have a family large enough to fill the tonneau; the second idea demands that one's neighbors be discouraged, but in the absence of a large family, the really right solution to the whole problem is to own an automobile with a body that is not inviting. Of course, one could attach an old-fashioned body to the car and shame the neighbors out of riding in it. This is a severe remedy and is almost as hard upon the owner as it would be upon the neighbors.

The best solution after all lies in the unconsummated future. When the roadster type of body came into vogue, autoists hailed it with delight. They said to themselves, "This is the right answer. The rumble seat is not sufficiently inviting and autoing will be a pleasurable undertaking." These autoists counted without considering their neighbors. The self-invited guest is not rebuffed by the prospect of sitting in the "monkey seat" at the rear. Most owners of cars have the impression that he would rather sit on the radiator than be debarred of the ride in someone else's car. Unfortunately, the average autoist has friends whom he would like to entertain, but he finally reaches a state of mind which prevents him from inviting his real friends to partake of his hospitality if it is in the form of holding down a monkey seat in the vicinity of the rear axle of a short wheelbase automobile. The rumble-seated body, therefore, fell short of the whole requirement by many yards.

Referring specifically to the large number of autoists who really cannot afford to run a big touring car day after day, when as a matter of fact they only need a runabout type of body, it remains to give them a convertible runabout body, if the same can be so designed that it will permit of inviting a friend along without feeling that the guest will be reduced to the status of a servant through force of the seat he is compelled to occupy in the car. To satisfy this exacting situation, it will tax the ingenuity of the best type of body designer, with the possible chance that the problem cannot be solved at all.

By way of a suggestion, a design is here presented that offers possibilities. Fig. 1 shows the body as it would appear on a Hudson car with a wheelbase of 100 inches, and all the other earmarks of comfortable touring. The general appearance of the body is in full accord with the latest ideas along torpedo lines with a fore-door and an overhanging cowl from the dash back for the protection of the occupants of the seat. The idea involved in drawing the body to fit some particular make of car is in order to show how it will appear in practice, but it will be understood that the body may be fitted to any automobile provided the dimensions are made to accord with the characteristics of the car.

Fig. 2 is a side elevation of the body showing the accommodation seat thrown back ready for the occupant. The seat proper, marked A, is formed out of the back of the main seat, and the lazy back for the accommodation seat marked C is formed by upholstering the underside of the trap door of the torpedo stern. The dotted lines show how the back of the seat proper swings back to form the accommodation seat and how the top trap door is swung up to form the lazy back of the accommodation seat. Fig. 3 is a plan of the body showing a main seat that is 36 inches across at the front edge, and which flares outward toward the back. The accommodation seat, which is 15 inches deep and 14 inches wide, is shown open, leaving a space 11 x 14 inches for the lower extremities of the occupants of the accommodation seat. Under all ordinary conditions, the accommodation seat is folded up, that is to say, the back of the seat proper is latched in its normal position, and the trap door of the torpedo stern is closed. The general appearance of the car, when the accommodation seat is folded up, is that of a smart torpedo-stern type of runabout fitted with fore-doors.

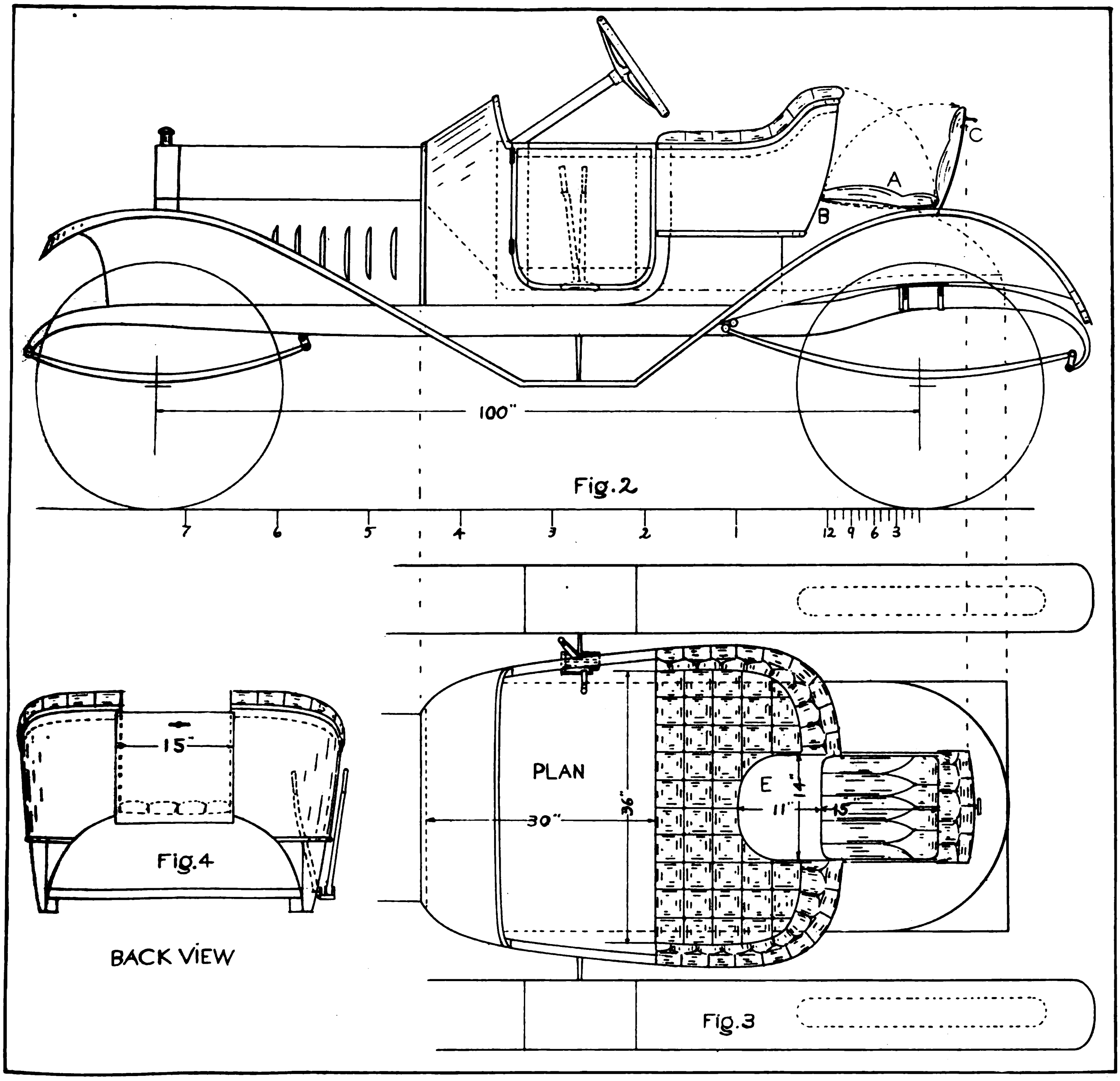
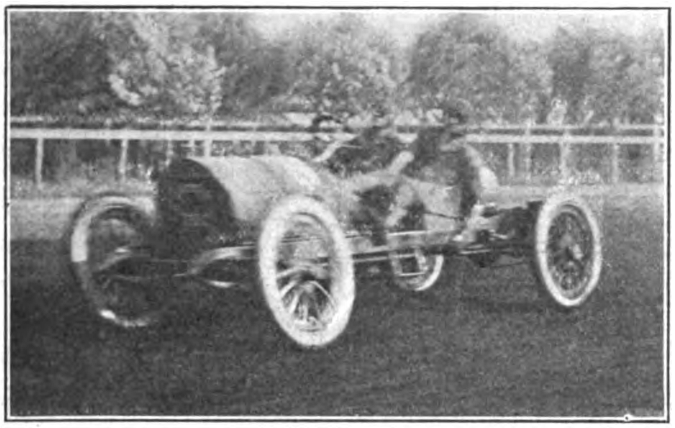
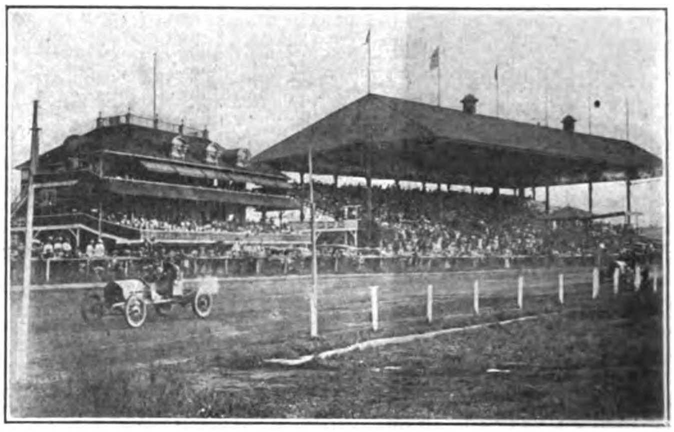


Fig. 2—Side elevation of the body, showing the third seat opened up; Fig. 3—Plan of the body, presenting the arrangement and method of opening up the extra seat



Mercer driven by Sherwood, third in the hour race



Allen-Kingston leading Simplex in the hour race

Brighton Beach Fizzle

ADVERTISED LABOR DAY SPEED CARNIVAL MADE A POOR SHOWING; EVENTS UNDER FIVE MILES IN VIOLATION OF RULE 78 OF THE CONTEST BOARD

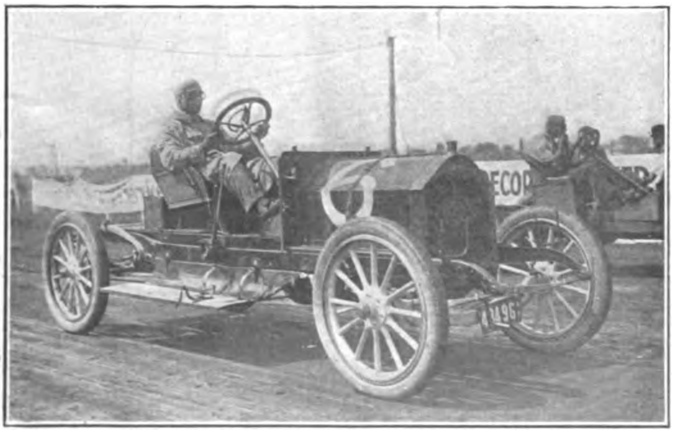
PROBABLY 6000 persons paid $2.00 a head to sit in the grand stand and witness the Labor Day performance, which was advertised by the promoters as a speed carnival, the assumption being that Brighton Beach would be the scene of some of the greatest events that were ever heralded to take place at that Motordrome. It was a two-day affair, opening on Saturday at 2 P. M., skipping Sunday and reconvening on Labor Day at 11 A. M. The weather situation was distinctly bad on Saturday, rather indicating that Old Boreas had a hunch that the racing was not to be up to much—Boreas was right.

The first race was between the S. P. O. cars at five miles. The next was a ten-mile dash from the scratch, after which the first of the hour races was put on. In this race the Knox, while distinctly in the lead, had the misfortune to damage a valve at the thirty-ninth mile, which left the Simplex to win by itself. The splendid performance of the Knox up to the time of the accident proved to be one of the bright spots in an otherwise dull situation. By actual count just thirteen automobiles participated in the races. It was unfortunate that the big Benz was raced under unofficial conditions; it will be remembered that rule 78 of the Contest Board demands the use of automatic electric or mechanical timing equipment in all races under five miles. This equipment was not provided as after events proved.

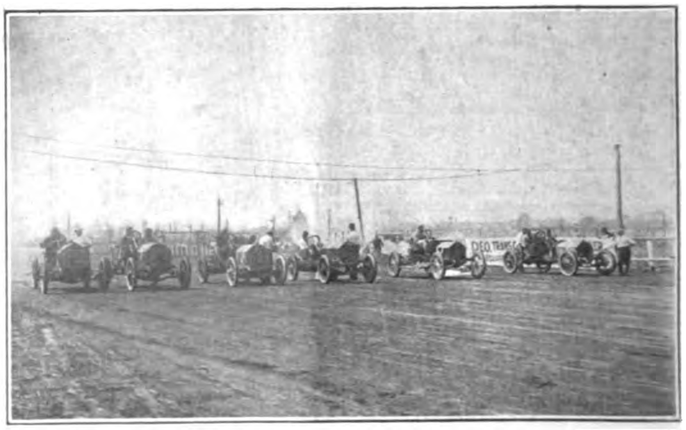
The patrons, expecting to witness some good racing, were not much impressed by 13 cars and a battery of motorcycles—some of them, no doubt, had visions of the promises made on the billboards and in some newspapers. The summary of the event, which was really a Monday affair on account of bad weather on Saturday, is as follows:

SUMMARY OF THE EVENTS AT BRIGHTON BEACH

No.	Car	Driver		Time	Position
Event 1—Five miles; 300 cubic inches and under. Class E.					
17	S. P. O.	M. P. Batts		5:16 2-5	1
23	S. P. O.	Jean Juhasz			2
Event 2—Mile time trials.			**First trial**	**Second**	**Third**
2	Simplex	Robertson	53 3-5	52 2-5	
3	Darracq	Kerscher	53 2-5	52 4-5	
4	Simplex	Beardsley	1:00		
6	Black Crow	Otto F. Rost	1:15 2-5		
10	Isotta	Ray Howard	1:10	59 3-5	
19	Benz	Oldfield	50 2-5	50 4-5	49 4-5
Event 3—Ten miles for 600 cubic inches and under. Class E.					
2	Simplex	Robertson		10:12 1-5	1
5	Fiat	Kerscher			2
Event 4—One hour race.					
2	Simplex	Robertson		55 7-8 miles	1
5	Fiat	Kerscher		51 miles	2
10	Isotta	Howard		48 miles	3
4	Simplex	Beardsley		44 miles	4
6	Black Crow	Rost		44 miles	5
1	Knox	Oldfield		39 miles	6
7	Allen Kingston	Ormsby		25 miles	7
Event 5—Ten miles. Under 300 cubic inches. Class E.					
8	Mercer	E. H. Sherwood		10:46 4-5	1
17	S. P. O.	M. P. Batts			2
Event 6—Ten miles. Under 600 cubic inches. Class E.					
2	Simplex	Robertson		10:08 1-5	2
Event 7—One hour race.					
2	Simplex	Robertson		55 miles	1
7	Allen Kingston	Ormsby		48 miles	2
8	Mercer	Sherwood		35 miles	3
10	Isotta	Howard		No finish	



Black Crow driven by Rost, fifth in the hour race



Start of the hour race, won by Simplex, No. 2

Engineering Section

DEVOTED TO THE DISCUSSION OF ENGINEERING PHASES OF AUTOMOBILING, INCLUDING DESIGNING AND CONSTRUCTION FEATURES OF PRODUCTS, AND INFORMATION TO AUTOISTS

A PLACE FOR EVERYTHING AND EVERYTHING IN ITS PLACE—TAKEN AT THE MAXWELL SPARE PARTS BUILDING

REPAIRS have to be made sooner or later, no matter how good an automobile may be, and the pertinent question is, How much will the necessary parts cost and how long will it take to procure them from the maker of the particular car? If the parts are not carried in stock the time that will elapse between ordering and receiving will include the interval of making, after the manufacturer makes up his mind to stop regular work long enough to put a man on one small job. In this way it is more than likely that the cost of the repair parts will be very high to the maker, and if he fails to charge all the cost to the owner of the automobile he will suffer a pecuniary loss.

That any customer would be so lacking in acumen as to patronize a maker of automobiles who is losing money, is not believed. Lack of stability of an enterprise is a sure sign that the purchase price of the product is not the measure of the whole cost to the purchaser. The manufacture, under such conditions, is likely to be slighted. Repair parts, if they can be had at all, will be charged for according to the need for money of the maker; worth, that is to say intrinsic value, will have little or nothing to do with the transaction.

Legitimate prey, if the man who wants a repair part is to be regarded as such, is still entitled to a chance. What chance will he have from a maker who fails to include in his "wise" provision any means for taking care of his customers?

Among the makers of automobiles, taking the better class, it is the custom to run a repair department and to have a separate storeroom for spare parts. In this way if an order comes in for a repair part it is handled by "part number," and it is stored in a bin under that number, or according to a system that allows of promptly locating the part wanted so that it can be expressed to the customer the very day it is ordered.

If an automobile is worth anything to the user, it is a loss, in a pecuniary sense, to have the automobile placed out of commission during the time that it is undergoing repair. If that time is shortened by having the parts in stock at the plant of the maker, in this is a source of profit to the user of the car.

From the quality point of view it is not too much to venture that a car that is protected by repair parts in stock, awaiting instructions to ship, is considerably better than a car that is not backed up by a stock of spare parts, even if the builder of the latter does say that it never gets out of order and will never have to be repaired.

There is a superstition among many users of automobiles that it is cheaper to go to a machine shop and have parts made to order than it is to go to the maker of the car and purchase spare parts. It is even claimed that parts made to order are better than those regularly made—they ought to be, they cost so much more; but are they better?

It looks like a simple matter to whittle out a crankshaft from a billet of steel; surely a machinist will be able to do the work within a few hours; this is the reasoning. When the owner of a car undertakes to put this fine reasoning into force he licenses a repair shop to run up a bill that will be anything from $100 to $300, nor can he be sure that the crankshaft will be good for the purpose after it is made.

It is no different with a connecting rod, cylinder, piston, or even a bolt. The experience of a concern that is doing things daily in a large way is surely to be compared favorably with the experience of a man who has to undertake the work for the first time. Willingness to do a job at some one else's cost is not experience. Quality is not the companion of mere desire; experience is what counts.

The critic who from his pedestal on high says that a design or a part is not as good as it ought to be may be quite honest; the question is, who is his authority, or what is his ground for expressing his criticism? If a critic states that a part is not well made, and he offers to make a better one, it only remains to allow him to build a whole new automobile; what is the sense in placing so good a piece of work in so poor a frame? Why spoil the splendid job that he promises by using it under such disadvantages?

In the meantime it is not too much to say that it is a nice feeling to have, that comes with the assurance that spare parts can be obtained readily, and that the cost, even though it may seem a little high, is a known quantity and within the limit set by the importance of the undertaking as represented by the value of the service that the car will render when it is in good working order.

First Aid to the Injured

HUGO ERICHSEN, M.D., TELLS THE AUTOIST HOW TO TAKE CARE OF WOUNDS, FRACTURES, DISLOCATIONS, ETC., UNTIL THE DOCTOR ARRIVES

IT seems strange, when you come to think of it, that people carry an elaborate kit of tools, as a precaution against accidents to their machines, but usually make no provision whatsoever against mishaps to themselves. And yet timely aid is of the greatest importance in many such emergencies and even death may occasionally only be averted by a prompt stoppage of hemorrhage.

In considering automobile accidents there are practically only four forms of injuries with which we are here concerned, namely, bruises. wounds, fractures and dislocations.

For the proper treatment of these conditions, it is not necessary to carry an extensive outfit of medicaments and appliances, and the automobile medicine case may therefore be quite compact and take up but little space. I would suggest some mild antiseptic and disinfectant in a powdered form, such as formidine; a powerful hemostatic, such as adrenalin, the active principle of suprarenal glands; a small jar of moist sterilized gauze, some adhesive plaster, and a small collection of bandages of various sizes. To these it might also be advisable to add some remedy that will quiet pain, but this should only be administered when the suffering of the patient is almost unbearable.

Whisky is useful when collapse is threatened and the patient evidently requires stimulation, that is to say when the face is very pale and the extremities are cold. But the indiscriminate use of whisky, which is so common in all forms of accidents, cannot be too strongly condemned.

Contusions or bruises are often met with as a result of minor automobile accidents and are sometimes complicated by a hemorrhage under the skin. In the way of medication nothing can be done under such circumstances except to stop pain if it is excruciating. But the patient should be placed in a comfortable position until a physician arrives. At the same time all tight-fitting garments must be loosened, so that the circulation and respiration will not be interfered with. If the injured one looks pale or has fainted, it is also advisable to place him in such a position that his head will be lower than his heels. If the contusion is not of much consequence, the application of some analgesic ointment or balm, which is now purchasable in the convenient form of tubes, will afford the sufferer considerable relief.

Wounds are of more importance than contusions because they may involve a severance of one of the large arteries of the body and thus give rise to hemorrhage endangering life. If the wound is of small extent, the bleeding may be stopped effectively by the application of adrenalin or by exerting direct pressure upon it. In case one of the main arteries has been cut, however, which is apparent when the blood spurts from the wound, it is necessary to exert pressure at some point along the course of the artery between the site of the injury and the heart. This is best effected by what is called a tourniquet, a contrivance that can be easily improvised. If the wound is located just above the elbow, for instance, a handkerchief is tied around the upper third of the arm and a small block of wood, cork or smooth stone inserted between it and the skin directly over the artery, which can be readily detected by its pulsation. An iron rod or wooden stick is then introduced between the skin and the handkerchief, opposite to the block or stone and turned until the arm is constricted and the bleeding stops.

FIRST AID TO THE INJURED

Fig. 1—Emergency bandage; injured hand bandaged by means of handkerchief and placed in sling. Fig. 2—Shows application of improvised tourniquet. Fig. 3—Shows how parasols and umbrellas may be used for splints in case of fracture; held in place by three large handkerchiefs

Small wounds should be carefully cleansed by means of pure water and, after being dried with a clean cloth, dusted over with formidine or some other antiseptic powder. Everything that is brought into contact with them should be as clean as possible. They may then be covered with a layer of moist sterilized gauze and bandaged, remaining in this condition until the patient can receive proper medical attention. In the case of clean cuts, it may be advisable to bring the edges of the wound together with strips of adhesive plaster, which may be allowed to remain in place until the healing process is complete. Every particle of foreign matter must be removed, however, before a wound is treated in this manner, for if it is not, it will give trouble later on by causing inflammation and suppuration.

In transporting a wounded person to some locality in which he can receive medical aid, he should be disturbed as little as possible and carefully protected against the sun, the dust of the road and the attacks of insects.

Sometimes it is impracticable to expose the site of a hemorrhage by partially undressing the patient, in which case no time should be lost in ripping the clothing and getting down to the site of the trouble without delay. In many such instances prompt action is required in order to prevent a fatal issue, since a person may bleed to death in a very short time, if one of the largest arteries is severed.

A layman can distinguish between a fracture and a dislocation of a bone by the excessive motility of the injured part in the one case and its immovability in the other. Sometimes the altered shape of the limb will reveal the nature of the injury, but in other instances it may be necessary to remove the shoes and garments. In such cases no attempt should be made to pull them off. Instead they should be cut away by means of some sharp instrument, such as a knife or shears.

When a limb is dislocated or sprained, but little can be done except to keep it as quiet as possible until it can be restored to its normal condition or subjected to proper treatment by a physician.

In a case of fracture, however, much may be done to render the patient's condition more bearable by means of improvised splints, that keep the injured extremity at rest and prevent the broken ends of the bone from rubbing against each other. Canes, parasols or umbrellas, if they are at hand, may be used for this purpose. In the open field, away from any habitation, even the branches of trees may have to be resorted to.

Letters

DISCUSSING MATTERS OF INTEREST TO USERS OF AUTOMOBILES; RELATING EXPERIENCES OF SOME; RAISING QUESTIONS OF GENERAL VALUE; AFFORDING OPPORTUNITY TO THOSE WHO WISH TO CONTRIBUTE

What Is the Best Automobile for This Case?

Editor THE AUTOMOBILE:

[2,352]—If I am not taking too much of your valuable time I would like very much to have a little advice in regard to what kind of an automobile to buy and would thank you very much for an answer. I am hardly able to own one, but have the fever, and others around here are indulging in cars so that I want one, too. I live in the country and our roads are fair. Part of the roads are piked. A few are hilly and sandy. There are so many kinds of automobiles to be had around $1,000 to $1,200 that it is difficult to make up one's mind as to the one to select. Then, there are secondhand cars advertised that are said to be made over so that they are as good as new; what about them?

Custar, Ohio. U. E. L.

The editor of THE AUTOMOBILE begs the question, but the following may be of some relevance:

Wilkins—"Do you have trouble with that 'used' car that you purchased a while back?"

Bilkins—"Couldn't have more if it was a widow with eight children and I married it."

Permanent Magnets Are Not Hardened All Over

Editor THE AUTOMOBILE:

[2,353]—Please tell me if permanent magnets are hardened all over?

N. H. G.

Pottstown, Penn.

No. See Fig. 4; the parts that are hardened are indicated by lines; the hardening is confined to a portion near the ends of the magnets.

Electric Lighting Is Now Regular Equipment

Editor THE AUTOMOBILE:

[2,354]—I am about to purchase an automobile and would like to have you advise me as to the expediency of adapting electric lighting on the same, also, would you retain the acetylene system as an auxiliary to the electric system if the same is adapted?

PETER N. COMBS.

Altoona, Penn.

It would be a good idea to retain the acetylene system, and by following the plan as shown in Figs. 1 and 2, it will be possible to do so. As the illustration depicts, the electrical fixtures are applied to the acetylene lamps by means of lamp attachments that permit of using the electric lights with the lamp standing up in front of the burner, but if it becomes necessary to use acetylene, the lamps are folded down as in Fig. 2.

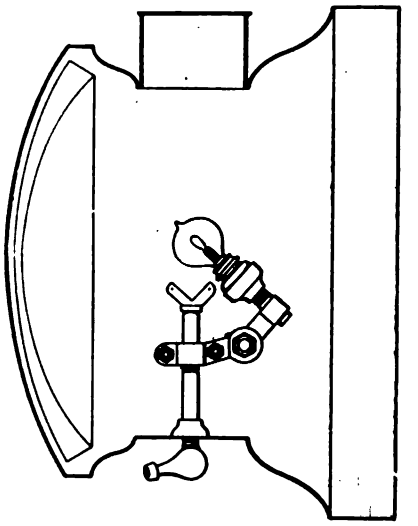


Fig. 1—Acetylene lamp with an electric lighting attachment; showing the same in position

Bevel Gear Steering Gears Are Not Irreversible

Editor THE AUTOMOBILE:

[2,355]—I have been told that bevel gear steering gears are irreversible; is this true? Please illustrate one and state why it is irreversible, if it is.

ADAM B. CONVERSE.

Erie, Penn.

No. The illustration Fig. 5, is of just such a gear, it being made of a 14-tooth pinion meshing with a 56-tooth gear; the ratio is therefore as 1 is to 4. Since the teeth are such that the gear will rotate with the same ease in either direction under a given amount of pressure, then there is nothing irreversible from this cause, and since the ratio is as 1 is to 4, it remains to be seen that it takes 4 times as much pressure for the pinion to drive the gear as it does for the gear to rotate the pinion; but there is nothing irreversible about a 4 to 1 ratio.

Would Like to Know Just How Wiring Is Insulated

Editor THE AUTOMOBILE:

[2,356]—Please illustrate the way that wire is wound on the kick-coil of an ignition system; this system, as I understand it, has but one winding of fine wire. What size of wire would you use?

ED. F. CALIGAN.

Racine, Wis.

The coil is shown in section in Fig. 3. The size of the wire may be No. 40 B. & S. gauge. It should be what is known as double-cotton covered magnet wire. The core should first be insulated by several wraps of oil-paper. Over the paper the wire is wound. In order to get 1-2 pound of wire on, it will be necessary to wind closely. The ends should have insulating washers; they can be made of red fiber or other suitable material.

Is Camphor Good for Cleaning Cylinders?

Editor THE AUTOMOBILE:

[2,357]—I have been informed that the addition of camphor to lubricating oil will lessen the accumulation of carbon in cylinders of gasoline engines.

As a subscriber to your paper, will you kindly inform me if this is correct and if the use of same would in any way harm the engine?

W. S. N.

New York City.

The Editor of THE AUTOMOBILE is not favorable to the plan; if some autoist can relate experience space will be given.

It is not necessary to confine discussion to camphor; other substances have relating properties.

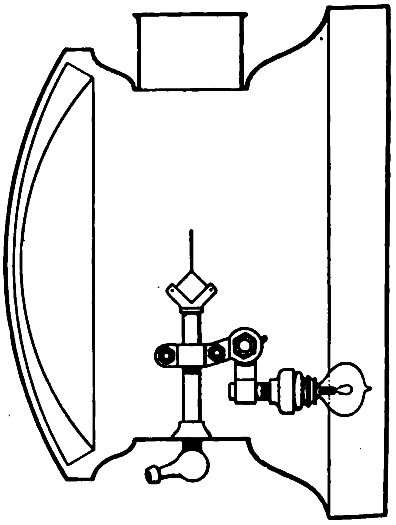


Fig. 2—Acetylene lamp fitted with an electric lighting attachment with the same thrown back out of the way

Just Why Is It Necessary to Change Gears?

Editor The Automobile:

[2,358]—As a new subscriber and also the new owner of an automobile I come to you with what may seem to you to be a simple case, but the fact remains that I am in trouble and what is equally to the point I do not understand just why I should be. Since my motor will go fast or slow accordingly as I manipulate the spark and throttle levers, why is it that I have to slide the gears, and why, too, do they make such a thundering clatter every time that I do undertake to slide them? Other autoists seem to get on very well; it is but rarely that some of them cause such a noise. Also, will the clatter that is made when I slide the gears do any damage?

New Owner.

Newark, N. J.

The clatter that you cause, according to your own version of the performance, is due to the fact that you are not deft enough to so slide the gears that they will engage. Instead of engaging they rub against each other, and, considering the impact of the mass at the speed that they travel, it is to be expected that the ends of the teeth will be all battered up before long. Just how long it will take you to ruin the transmission depends upon the quality of the material of which the gears are made and the length of time that you take in learning how to manipulate the sliding-gear lever.

Just why it is necessary to employ a system of change gears in conjunction with an internal combustion motor would be a simple story to relate to one understanding graphics. By the use of graphics it is possible to plot two curves, one of which would portray the power of the motor at its several speeds, and the other would indicate the power demanded to run the automobile at its several speeds. At all events it will be easy to understand that the power available from the motor at any speed at which it is being run must be equal to the power required to run the automobile at the speed that it is geared to run, or the motor will stall; that is to say, it will shut down.

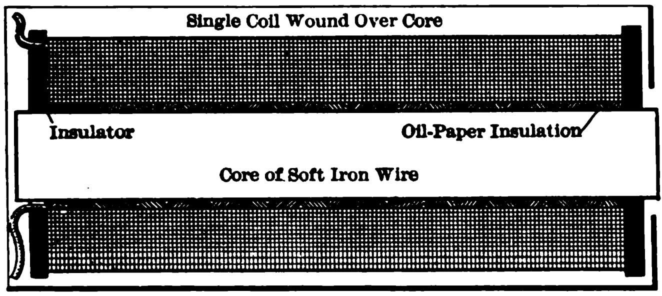


Fig. 3—Section of a kick-coil as used in starting a motor, showing how the windings are insulated

The power that may be delivered from a motor is not the same at all of its speeds; in fine, the power increases with the speed. Unfortunately the power does not increase in direct proportion to speed, and after the speed is increased beyond a certain point, the power ceases to increase, but a point in the speed range is finally reached where there is an actual falling off.

Referring now to the power demanded to run the automobile, it is simple to understand that the faster the car is required to go, the more power it will take. But if the roads are soft more power will be required than when they are hard, and if the roads are hilly the power demanded going up hill will be more than when the car is traveling upon a level hard road, and the least power will be taken when the car is going down grade; if the grade is sufficient, that is to say, if the hill is steep enough, and the car is going down, the power may be cut off; it might even be necessary to apply the brakes.

Having thus recited the well-understood general conditions under which a motor is required to deliver its power, it remains to point out that the reason why the change gears are used is because the power needed to propel the car on a level hard road at high speed is not as much as that which is demanded to drive the car up hill, and when the hill is reached, in order to be able to go up, the motor is permitted to run fast, but by sliding into a lower gear, the car is geared to go up the hill slower. The result is that the power required to go up the hill is kept within the ability of the motor. Likewise, as the road condition demands, the gear ratio is adjusted to harmonize the relation of the motor to the demand; the variable being the speed of the car, as it must be, for the reason that it is not possible to either alter the road or make the motor deliver more power than it is capable of delivering.

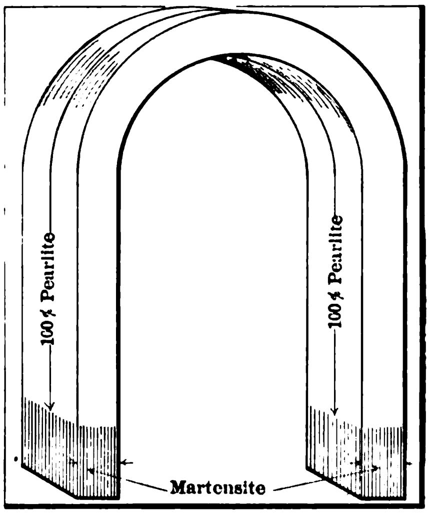


Fig. 4—Illustrating the hardened part of permanent magnets as used in magnetos

Referring to the question of sliding the gears with a view to eliminating the noise complained of, the points to be observed are as follows:

(A) Remember that the mating gears must be going at a common speed when they engage if noise is to be avoided.

(B) No two automobiles seem to act alike, and it is necessary for the driver to ascertain just how each car performs on the road and work accordingly.

(C) When the mating gears are rotating at substantially the same speed, deftly shift the gears. Deftness is half the battle. It is not an occasion on which languor will be enjoyed.

(D) How is the manipulator to know when the mating gears are rotating at a common speed? It is too bad that some rule can not be given for this.

(E) In dropping from a high to a low speed it is usually the case that a slight pause is all that is necessary before shifting.

(F) In changing from a low to a high speed the plan is to go up gradually. Accelerating the car is the process. If low gear is in, slide to second, then to third, and if there is a fourth, then go into it. Be deliberate—there is no occasion to act panicky.

(G) If, in attempting to slide the gears, it is found that they "refuse," back out, wait a second, then try again; don't linger.

(H) If the system is "selective," it is always possible to find some one of the selec-

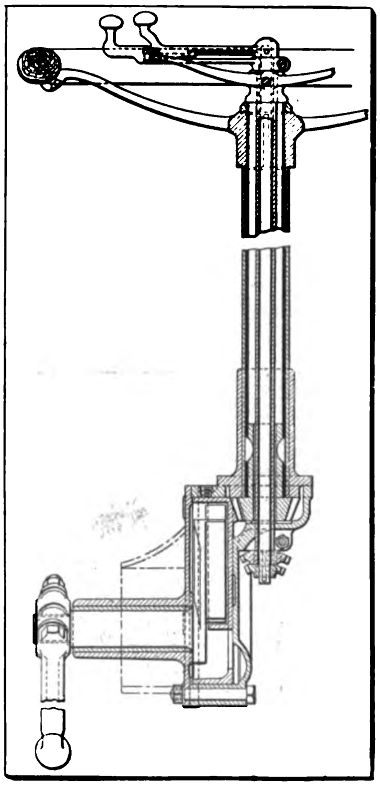


Fig. 5—Section of a steering gear showing the relations of a bevel gear and pinion for this service

tions that will work without clattering. Try to judge of the speed that the car is making; having decided as to this point, try to match up.

(I) It is also feasible to alter the speed of the motor so that the sliding can be accomplished without clashing; some designs of automobiles really indicate that changing the speed of the motor a little is a necessity.

(J) Bravery is worth more than any other one quality; timidity is the bane of the autoist; deliberate long enough to make sure of the ground, then go ahead—go at it like a whirlwind.

Wants to Know What Sizes of Wire to Use

Editor The Automobile:

[2,359]—I would like to make a single coil to use on my motor and having a high-tension distributer it is my purpose to build a coil that will be better than I would be likely to be able to purchase at any price that I can afford to pay. I have plenty of time at my disposal and understand electrical work sufficiently to make it possible for me to properly insulate the windings. I am somewhat at a loss to determine just what would be good sizes of wire to use and how much of each size, referring, of course, to the primary and secondary windings.

Amateur.

Philadelphia, Pa.

The first thing to take notice of is the space available for the windings. If this matter is so disposed of that choice may be taken, it is more than likely that the primary coil should be composed of 1-2 pound of No. 18 B. & S. gauge double-cotton covered magnet wire, and the secondary winding should be composed of 1-2 pound of No. 36 double-cotton covered magnet wire. Silk covering is better. If space permits use more than 1-2 pound of wire in each instance.

Motor Heats Up—Radiator Remains Stone Cold

Editor The Automobile:

[2,360]—I have a 2-cylinder, opposed, water-cooled motor, and while it has served me well for two years, it now shows signs of wear and I would like to have you tell me why the motor heats up and the radiator remains stone cold.

P. H. F.

Salt Lake City.

Since the radiator is placed to wipe the heat out of the water and the heat is put into the same at the cylinders of the motor, does it not stand to reason that, if the radiator remains cold, the water is not being circulated? What is it that is utilized to circulate the water in your case? Is there a water pump? If so, does it not stand to reason that it is shirking its plain duty? Have the pump repaired.

Mont Ventoux Hill Climb

BROUGHT THE LONG-STROKE SINGLE-CYLINDER MOTOR PERFORMANCE INTO BOLD RELIEF; ACCIDENT TO GASTE'S SIX-CYLINDER ROSSEL

AVIGNON, FRANCE, Aug. 29—An average of 37.6 miles an hour with a standing start up a winding hill measuring 13 1-2 miles, beginning with a grade of 6 per cent., increasing to 9, 10 and finally 13 per cent., can be considered satisfactory going even for a big racing car, but when the performance is accomplished by a little one-lunger of slightly less than 4 inches bore it is nothing less than astounding.

Nine years ago when the attempt was first made to capture the wild Mont Ventoux hill the mere ability to reach the top was considered remarkable. Automobiles have progressed some since 1902, as is proved by the fact that Boillot with his one-lunger Lion-Peugeot this year beat all comers by racing to the top in 21 minutes 30 2-5 seconds, getting very near the record established a year ago by a 155-millimeter, four-cylinder Brasier racing car.

The test is the high-water mark of hill-climbing, for starting at an altitude of 970 feet, the course rises in 13 1-2 miles to 6,216 feet, the grades being 2 1-2 miles at 6 per cent., 6 miles at 9 per cent., 4 miles at 10 per cent., and the remaining portion beginning at 10 and ending at 13 per cent.

This year's climb was marked by an accident which put Gaste's six-cylinder Rossel out of business almost at the commencement and made the victory easy for Boillot's Lion-Peugeot. While taking a sharp turn at nearly 60 miles an hour the Rossel skidded and went over into the ditch, with a broken arm for the driver.

The Lion-Peugeot which then took first place is the familiar single-cylinder racer of 3 9-10 by 10 inches bore and stroke, holding all world's records for its class. The motor was designed by Boudreau & Vernet, of Paris, and is remarkable, in addition to its long stroke, by the use of three intake and three exhaust valves.

In the same section second best time was made by the Spanish car Hispano-Suiza, having a four-cylinder motor of 2 1-2 by 7 4-5 inches bore and stroke. Piloted by Chassaigne, it was clocked in 22 minutes 31 2-5 seconds. Third place went to Giuppone on a

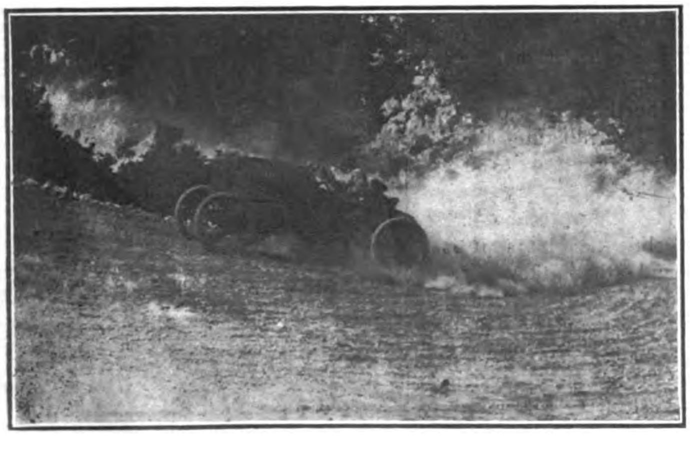


Fig. 1—Lion-Peugeot single-cylinder motor making sharp turn at 60 miles per hour or better

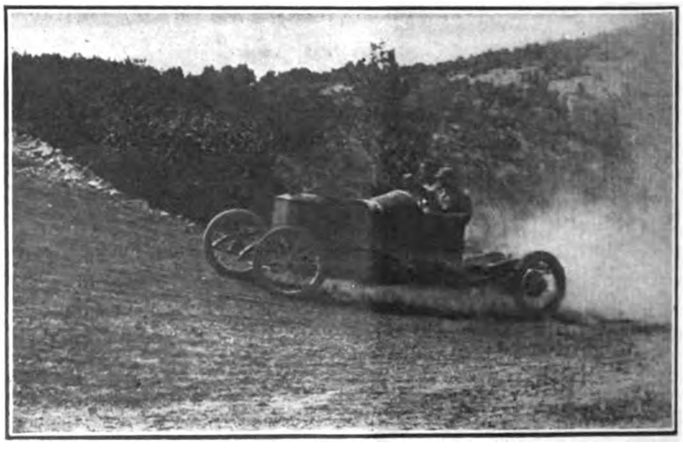


Fig. 2—One of the Hispano-Suiza cars on the turn just behind the Lion-Peugeot

Fig. 3—Hispano-Suiza going like mad around the curve, trying to take first place—actually crossed the tape second

one-lunger Lion-Peugeot identical with the winner, and fourth position to a Hispano-Suiza similar to the one which took second place. Ignoring all class distinctions, however, second best time was made by Zuccarelli's Hispano-Suiza of 3-3-10 bore by 6 1-2 inches bore. It was clocked in 21 minutes 56 1-5 seconds, or 25 3-5 seconds behind the winner. The following is the summarize result, which should be scanned with more than a little interest by the autoist recognizes the potential force of the argument in favor of fuel economy. It will be understood that the long-stroke single-cylinder motor was here in competition with even six-cylinder motors, which are not famous for fuel economy, and, while the larger motors probably delivered more power, the fact remains that they did not cover the whole distance finishing so quickly.

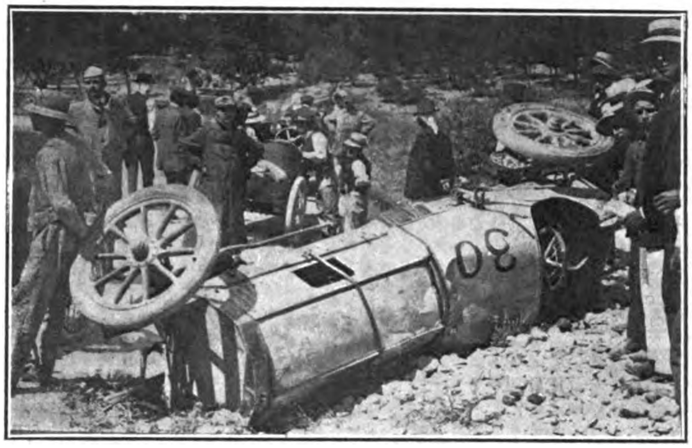


Fig. 4—Six-cylinder Rossel car just after the accident, which resulted in a fractured arm for Gaste, the pilot

First Section

1. Boillot, Lion-Peugeot, 1 cylinder, 3 9-10 by 10 ins...21m. 30 2-5s.
2. Chassaigne, Hispano-Suiza, 4 cylinders, 2 1-2 by 7 4-5 ins........22m. 31 2-5s.
3. Giuppone, Lion-Peugeot, 1 cylinder, 3 9-10 by 10 ins..24m. 2s.
4. Pilleverdie, Hispano-Suiza, 4 cylinders, 2 1-2 by 7 4-5 ins........24m. 38 2-5s.

Second Section

1. Ducreau, Brasier, 4 cylinders, 2 7-10 by 4 7-10 ins...38m. 35 1-5s.
2. Bablot, Brasier, 4 cylinders. 2 7-10 by 4 7-10 ins......39m. 6 2-5s.
3. Aligro, Brasier, 4 cylinders, 2 7-10 by 4 7-10 ins......41m. 1 1-5s.

Fourth Section

1. Zuccarelli, Hispano-Suiza, 4 cylinders, 3 3-10 by 6 1-2 ins........21m. 56 1-5s.
2. Meynet, Sigma, 4 cylinders, 3 3-10 by 4 1-12 ins......30m. 5 3-5s.
3. Haubourdin, Tribet, 6 cylinders, 2 9-10 by 4 ins......31m. 22 4-5s.

Eighth Section

1. Joerns, Opel, 4 cylinders, 4 1-2 by 6 9-10 ins........23m. 13s.

Some Ultra-Refinements

DISCUSSION OF CARBURETER DESIGNING; HOW THE CRANKCASE MAY BE RENDERED IMMUNE FROM GRADE TROUBLE, ETC. BY PINGREE GROVE

SCANT attention is given to refinement in point of mechanical details, especially in accessory construction, and if the automobile, as a machine, is to ultimately stand on the same stable platform as the locomotive and other older machines, some of the engineers engaged in the work will have to take the time to point out the frailties and indicate the way to final success. It will be something of a task, to be sure, and the chances are that no one man will be able to do very much about it.

At all events, the sooner the work is started the better, and the less of it there will remain for other hands to do. It was only a few issues ago when it was stated, on page 275 of THE AUTOMOBILE, that "some rubber mixtures used in tires wear ten times as long as others." This was found to be so, according to the statement of P. Breuil, by tests that were actually made at the Conservatory for Arts and Sciences. Rubber was very aptly described as an organic material which has strayed into mechanics. It may be too much to state that rubber is not the only organic material that has strayed into mechanics, especially the mechanics of the automobile.

It is probably true that the tire problem is being wrestled with every day in the year, and, knowing its many complexities, it may be that it will be necessary to trust to the makers of tires to reduce a difference of ten to one down to a point where the sound of it will be somewhat less alarming.

Synthetic discussion, especially as it relates to the rubber problem, usually ends in words, but many of the remaining problems of the automobile are so well in hand that this character of discussion is not necessary. Take the carbureter problem for illustration. Why should there be so much talk on the side of undemonstrated theory? Its many angles are quite generally appreciated, and yet it is handled as a subject just as if it were a monoplane or some other really new contrivance.

Just to show that the carbureter problem will sustain discussion without departing from known quantities, let us take up the matter of the accumulation of water and the result of its presence in gasoline. Surely none will deny that gasoline is hungry for water; every dabbler in the chemistry of hydrocarbons will testify to the fact that pentane (chymogene) will coax water through a glass bottle with a ground-in stopper placed to prevent the water from passing through anything but the walls of the bottle. The hunger of hydrocarbons for water increases as the volatility of the product, and in proportion as it is anhydrous.

Automobile gasoline holds very little pentane or other hydrocarbon distillates lighter than hexane, but it is a gatherer of water to a greater or less extent in any event, and for good results in practice, the design of the equipment must be such as to enable the operator to eliminate the water. The design, on the other hand, should be such that it will not take the better part of an hour to find out what is the matter when a drop of water plugs up the orifice of the nozzle as shown in Fig. 2, which is a characteristic type of construction with an enlargement below the throat of the orifice. The globule of water is wedged in, having floated up in the stream, and it being too large to pass through the constricted passageway, and too tough to be torn asunder, lodges there and serves as a corking medium that will effectually stall the motor every time it happens.

What is the remedy for trouble such as this? Let us say it is best pictured when the water globule is not permitted to enter the carbureter. How is this to be done? Some say all the gasoline used should be poured through a chamois skin. If the skin first dampened by water it will not then let the gasoline through, but water will be free to pass. On the other hand, if the chamois skin is first soaked in gasoline, then it will refuse to pass water. But in these phenomena will be found the ground for suspecting that water is not likely to be kept out of the fuel system merely because the chamois skin is used to filter the gasoline. It is only a question of days when a more or less water-wet chamois skin will be used, and then the water, which is nearly always present in gasoline, will get by.

The best protection against water lies in a plan which controls the flow of the same and a means for separating it out of the gasoline before it reaches the constricted throat of the nozzle.

How is this to be done? Certainly not by assuming that all water is to be kept out of the carbureter. Even if it is possible by eternal vigilance to put nothing but unwatered gasoline into the tank, the first time the automobile is washed a little water will probably be forced into the carbureter by way of the float-bowl vent hole. But even if this is not likely to happen, the vent hole is there and the gasoline, being thirsty for water, will drink in some of its aquatic companion through the same vent hole.

If the gasoline is fed by gravitational force there will be still another vent hole somewhere in the system, through which water will creep. If the vent holes are not provided the gasoline will not flow, hence the remedy does not lie in the direction of sealing up the system.

In the further discussion of the problem Fig. 1 will be referred to for the purpose of elucidation. The gasoline enters at the top of the float bowl, and in this example an ante-chamber is provided. The orifice for the needle valve instead of being flush with the floor of the ante-chamber extends up to the roof. As the gasoline enters, then instead of passing down into the bowl below, assuming that the needle is off of the seat, it settles in the ante-chamber with the heavier portions laying on the floor, and the more volatile (lighter) portions will migrate toward the upper level.

The orifice leading to the seat of the needle valve instead of being quite open is constricted at the throat, and the wall is thinned down to a knife edge around the extremity. If water rises due to agitation it cannot enter the throat of the extremity of the passageway because the opening is too small, nor can the water lodge on the rim of the crater, due to the knife edge, which affords no lodging place. The result is that the globules of water, like marbles, will roll off of the rim when the carbureter is vibrated, and they being heavy will fall to the bottom of the ante-chamber. An outlet is provided near the bottom of the chamber, through which the water accumulations may be drained at intervals.

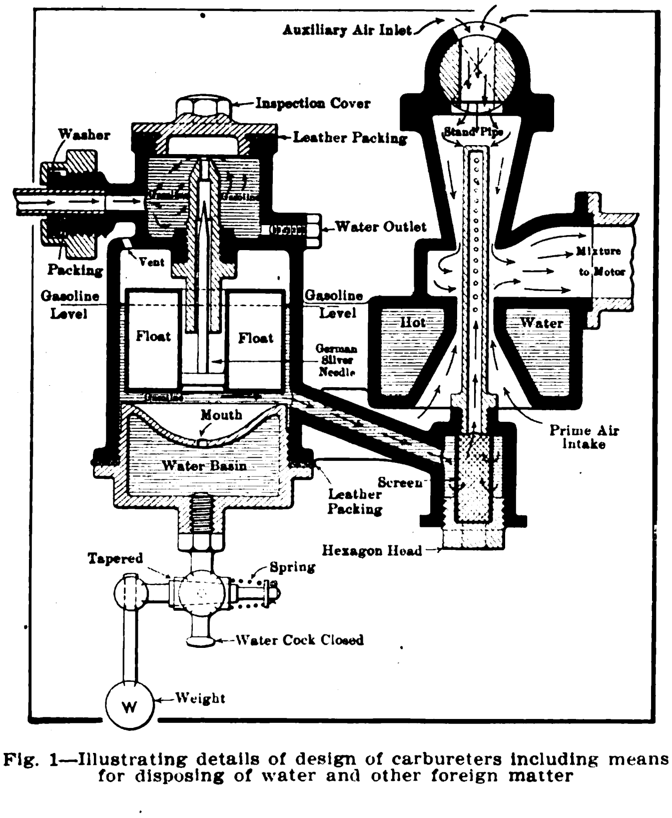


Fig. 1—Illustrating details of design of carbureters including means for disposing of water and other foreign matter

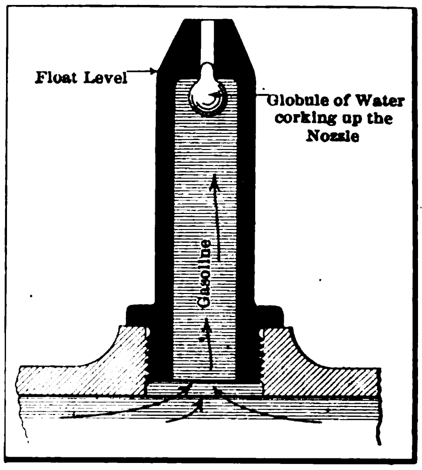


Fig. 2—Depicting the way by which a globule of water serves as a cork, preventing the gasoline from flowing out of the nozzle

But this precaution is of small avail in view of the presence of a vent hole for the float bowl. True, all the water that can find its way into the float bowl must be squirted in by the "washer" or be coaxed in by the anhydrous gasoline. To guard against water from these causes the bottom of the float bowl is provided with a water well formed out of the bottom cover by means of a core. This well is provided with a large mouth and at the low point a hole is drilled large enough to permit the globules of water to pass down into the well.

It must be remembered that if water will stop up the throat of a nozzle as shown in Fig. 2 it will stop up any other small hole so that care must be taken to have the hole leading to the well large enough to prevent the passage of water.

A cock is screwed into a threaded hole in the boss, formed in the bottom wall of the well. This cock is for the purpose of draining the water out of the well at rather frequent intervals; on this account the cock shown is so designed that it will work easy, but the handle is weighted and hangs down when the cock is closed. In addition to this the valve of the cock is tapered and a spring is placed on the reduced end in such a way as to put tension in the direction of forcing the tapered valve up against the tapered seat. A little lubricating oil, if placed on the seat, will hide in the pores of the metal and the valve will work easy at all times although it will be perfectly tight. The weighted handle will keep it from opening.

The rim around the mouth of the well will catch all the water and lead it down to the opening at the bottom so that only gasoline will flow from the float bowl to the filter at the bottom casting for the standpipe. The screen below the standpipe is there to pick up all the scum that may reside in the gasoline, it being in the form of water and other impurities. About once a week it will be found necessary to unscrew the screen and clean it off. It will choke up the passageway if this operation is neglected.

The screwed-in cover at the top is placed there to permit of opening up the ante-chamber and cleaning the same out from time to time. A leather packing-ring is used to make a tight joint when the cover is screwed in; the same kind of a joint is used to make a tight seam for the well, which also forms the bottom of the float bowl.

The waterjacket is limited to the walls that enclose the rich mixture; it is a well-appreciated fact that the liquid in the float bowl should be maintained at a constant temperature in order that the viscosity will be the same at all times. If the temperature of the liquid is not constant, then the amount of the same that will flow through the nozzle orifice will change.

In order to supply enough heat to vaporize the liquid gasoline the hot water is placed in the position of greatest advantage, *i. e.*, in a jacket concentric with the primary air intake and in juxtaposition to the primary nozzle.

The auxiliary air is not allowed to contact with the jacket walls; the cooler it is the better, provided the gasoline is vaporized before it is mingled in the stream of auxiliary air. As

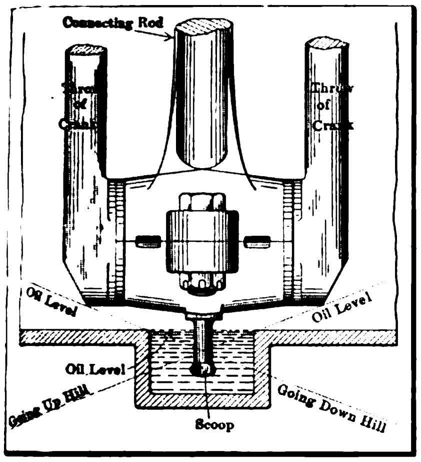


Fig. 3—Section of a crankcase showing how the scoop on the cap of the connecting-rod can be compelled to dip in the lubricating oil on a steep grade

for the remaining details of design, they are unimportant from the point of view of this discussion, and in the regular course all the ideas as here enumerated can be utilized without adapting the form of carbureter as here shown.

When a car is going up grade, or even when it is descending, the lubricating oil, instead of lying level on the bottom of the pan, surges to one end—the low point. What is the result? The crankpin bearings are starved. If the hill is a long one the bearings may run dry and the result will be that the "brasses" will be melted out, or, at least, the argument based on profuse lubrication will be without a leg to stand upon.

It is quite possible to so fashion the bottom half of the crankcase that this trouble will be aborted and Fig. 3 shows how the design may be carried out. In this illustration, which is a section through the bottom half of the case, the scoop on the boss of the cap is made long enough to dip into a trough, and the trough is so designed that the depth of oil is sufficient to prevent the end of the scoop from being uncovered when the car is going up or down hill and the oil runs to the low level. By means of broken lines the action is clearly indicated so that further discussion is uncalled for.

Strangle Well Located in the Intake Manifold

When a motor is running at high speed for a time, the flow of gasoline becomes substantially a stream out of the nozzle of the carbureter and if this flow is suddently arrested as it will be if the motor is suddenly slowed down or brought to rest, some of the gasoline, due to inertia, will remain in the intake in liquid form and it will remain there long enough to strangle the motor the very next time an attempt is made to use the same. Even under running conditions it is possible for the liquid to pile up and when it does the performance of the motor will be irregular, if, indeed, it is not so bad as to demand drastic attention before much headway can be made. As a suggestion of a way to keep out of this character of trouble reference may be had to Fig. 4, which is a cross-section of the manifold at a point just above the carbureter joint. The extended portion is the strangle well; it is formed by a core during the casting process and the depression just in front of the baffle flange is for the purpose of allowing the liquid gasoline to roll down through the hole into the well below. When the liquid goes into the well it remains there until it is vaporized, when it comes up through the same hole as gas and is swept on to the motor. In this way the action is automatic, and the only time that it becomes necessary to unscrew the cap screw at the bottom of the well is when water accumulates; this should not happen under ordinary conditions of operation.

Motor Serves as a Good Brake on a Grade

It does not take a motorist very long to discover that it is at the price of brake linings that he uses these necessary devices on long down-hill runs at frequent intervals. Many autoists have contracted the habit of allowing the motor to serve in the capacity of a kinetic brake, and how well it will work in this capacity depends upon the design and the manner of its installation.

When a planetary gear is a part of the equipment, by throwing the same into low gear it is possible to go down almost the steepest hill without using the brakes; it is not bad practice to do so and if the hill is a little too steep all that is necessary is to put a little pressure on the brakes to aid the low gear and the descent will be made in comfort and safety.

When a sliding gear system is used instead of a planetary gear, it is just possible that the drag will be below the demand if the hill is steep, and in such cases it is possible that the plan as shown in Fig. 5 will ultimately prevail. This illustration is of a valve, the same to be placed in the intake at a point between the carbureter and the cylinders of the motor.

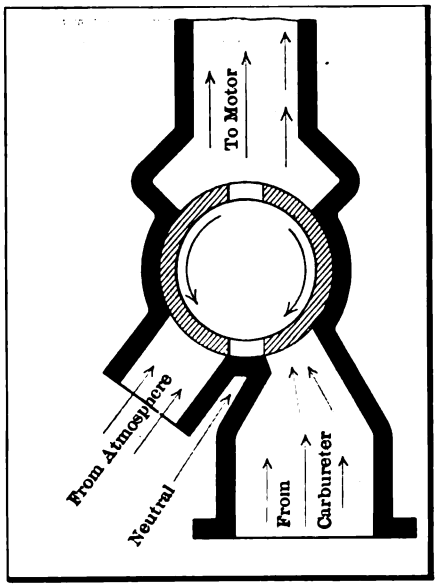


Fig. 5—Valve in the manifold just above the carbureter, placed there to permit of using the motor to slide down hill without using the brakes on the car

When the motor is running in the ordinary way the valve is turned so that the gates admit the mixture to the motor, but when it is desired to go down an ordinary hill the valve is turned so that the gate shuts off the mixture from the carbureter and admits fresh air only. If the hill is very steep the valve is turned to neutral, in which position the valve shuts off communication; the result is that the motor will pull a vacuum and quite an increase in the "drag" will result; in this way the car may be gradually maneuvered down a mountain side with scarcely a chance of having to call upon the brakes.

The fresh air swept into the combustion chambers of the cylinders will help to free the surfaces of any carbon residuum that may be lurking there, and the motor will land at the bottom of the hill clean and cool, ready for a long spurt and a quota of exacting work. A car that is fitted with good brakes and some means that will permit of sliding down hills on a kinetic basis is likely to be more safe to ride in, which is a point in the right direction, and the depreciation, as it is induced by brake-work, will sink to a low level. Even without any special provision, however, the motor may be used to advantage in retarding the motion of a car on a down grade, and the plan is recommended as being superior to the excessive use of the brakes.

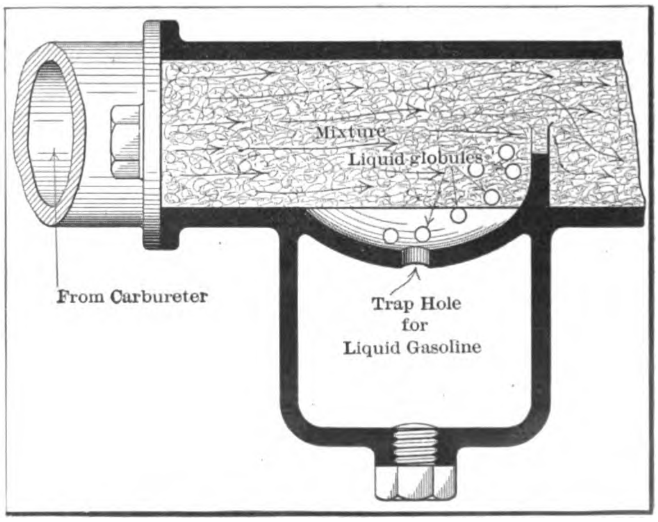


Fig. 4—Trap in the manifold, designed to catch the liquid gasoline and hold it there until it vaporizes, when it will be released

Don't

MORE SHORT-METER ADVICE TO THE TYRO—AND THE EXPERT—THE FOLLOWING OF WHICH MAY SAVE THE MOTORIST HEAPS OF TROUBLE, PERHAPS SOME MONEY, AND PROBABLY A LAWSUIT OR TWO

Don't imagine that color is so fast that it will not fade out if the automobile is stored in a dark room. To preserve the nice appearance of a car it is necessary to store it in a room that is well lighted.

Don't suppose that the varnish will not crack when it gets old; everything does, even the complexion.

Don't suppose that old age is at the bottom of all the cracking that is to be observed; some cars are so abused that the varnish is not all that cracks..

Don't wound a sensitive nature by coarse treatment; highly finished surfaces of bodies are most sensitive; like human characters of the sensitive class, they are easily wounded.

Don't allow soap and dirt to accumulate over the surfaces of bodies unless it is desired to change them to a mottled appearance.

Don't preach fresh air for human beings to the exclusion of the fresh air that will preserve the general good appearance of automobiles; it may appear funny, but while paint and varnish are devoid of the same character of lungs that supports man, they seem to breathe and are poisoned by impure air.

Don't fail to keep coal gas, carbonic acid and sewer products out of the garage; the varnish will mottle up on such feed.

Don't throw away your common sense when you take up with the automobile; there is occasional room to apply it.

Don't fail to add a little horse sense if the supply of the other kind runs out.

Don't imagine that all the "bronco busters" are dead; the way some automobiles are managed would suggest that the supply is inexhaustible.

Don't take two drinks on the ground that your system needs the stimulant, and then spill all your private affairs into the willing ear of the chauffeur—he may leak.

Don't believe all you hear about homes being mortgaged to buy automobiles; the fable tellers of that vintage are crying "sour grapes."

Don't tolerate short measure; you are entitled to every gallon of gasoline that you have to pay for; show the rascal up.

Don't let the repairman put a boy on a man's job; he may do more damage than he is worth; it would be better to pension him off and have done with it.

Don't purchase 10 cents' worth of supplies from a road-side repair shop and then tip the man a quarter; it makes it bad for people who know better than to breed such vermin.

Don't have your tools so handily placed that the light-fingered gentry that infest road houses will be able to relieve you of them.

Inexpensive Portable Garage

DESCRIPTION OF A FIRE-PROOF GARAGE, BASED UPON ACTUAL EXPERIENCE IN AN EFFORT TO SOLVE THE PROBLEM OF STORING A CAR

WITH the great majority of motor car owners, both present and prospective, the garage problem is one of much importance.

To house a car in a public garage involves a very considerable monthly expense; the care taken of the machine is not always satisfactory; and unless the garage is close at hand this arrangement usually presents some little inconvenience, and especially to those owners who operate their machines themselves. Moreover there are large and increasing numbers of autoists to whom the upkeep of their cars is a pleasant diversion, which together with the economies resulting from caring for their machines themselves, are denied when the machines are housed in the ordinary public garage.

On the other hand, to expend several hundred dollars in erecting a private garage even on one's own property is frequently objectionable and the average man hesitates still longer to make such an investment on rented ground which he may not desire to occupy permanently.

To meet this situation and provide an inexpensive private garage which can be moved readily if desired and which will be fireproof so as to meet even the most rigid building and insurance regulations, recourse may be had to corrugated iron or sheet iron in other forms, with results which will be entirely satisfactory.

Under a proper design, using standard stock materials, a substantial and attractive building sufficiently large to house one car and leave ample shop and work room, and which will accommodate a visiting car on occasions, can be secured for as little as $35.00, excluding labor, and if the owner does not care to himself do the work of erection, which is very simple, the whole finished garage, including labor, need not involve an investment of more than $50.00.

The floor plan of such a garage, in which is indicated the space occupied by a touring car of average length and the remaining shop and workroom space, is shown in Fig. 1, while in Fig. 2 the position of such a car and a roadster in addition is outlined. In this particular garage sheet iron, formed to represent rock-faced stone, was used for the sides, with regular corrugated iron for the roof. With drab paint on the sides and red paint on the roof it is difficult at a short distance to distinguish this building from one built of stone, with a red tile roof, and the whole appearance is very pleasing.

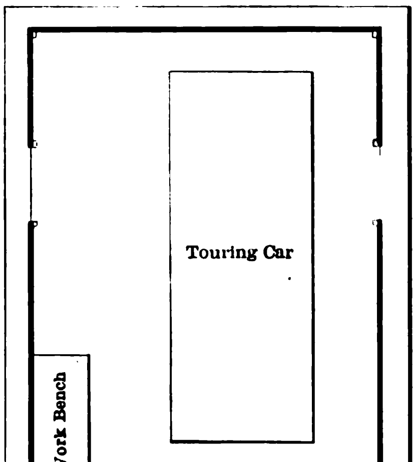


Fig. 1—Plan of the little garage showing the space utilized for the touring car and the working space around it

Fig. 3 shows front and side elevation—in addition to the plan. The more common V-roof would be somewhat simpler to frame and cover than the type shown which is selected because of its being more attractive in appearance. The right door is hung one foot from the corner, while two feet are left on the opposite side, where space is provided for the work bench.

The 9 feet of doorway provide ample clearance for the entrance of the machine, which is substantially 6 ft. wide over the running boards. One window on either side, located about two-thirds back, furnishes ample light and ventilation. The doors should each be 4 ft. 6 in. x 8 ft. high. The size of the windows should be made to suit the size of material used for the sides of the building.

The framing of the structure, which is made entirely of 2 x 4s in standard lengths, will be the same, irrespective of the material selected for the sides and roof. The following pieces of 2 x 4s will be required for the frame: For the uprights eight pieces 8 ft. long; for the horizontal members, four pieces 16 ft. long and four pieces 12 ft. long; for the roof, four pieces 12 ft. long. There will also be required for the stiffening of the roof frame eight pieces of 1 x 3-in. material, 8 ft. long. For the doors, 1 x 3 material will be required as follows: Four pieces 8 ft. long; four pieces 4 ft. 6 in. long; two pieces 12 ft. long.

To erect the frame of the building form a 12 x 16-ft. rectangle on the ground with two pieces 2 x 4s, 16 ft. long and two pieces 12 ft. long. Nail the corners securely with wire nails about 5 inches long, placing the four sills on edge. Then nail 8-ft. uprights inside each corner and nail to their tops a rectangle of two 16 ft. long and two 12 ft. long pieces similar to that formed by the sills. Two additional uprights are then to be placed on the sides, midway from the front to the rear, all as shown in Fig. 4. Two additional uprights are to be used for the hanging of the doors as shown in light lines.

The simplest siding is made of standard corrugated iron, in 8-ft. lengths, with 2 1-2-inch corrugations. If this material in 24 gauge galvanized costing about $4.40 per square (100 square feet) is used two pieces of 1 x 3-in. boards 16 ft. long and two pieces 12 ft. long will be required in the framing of the sides. These pieces are to be nailed to the sides of the 2 x 4 frame half way up or 4 ft. from the ground. The total cost of the corrugated iron for the sides will be about $20.00. For about 10 per cent. more sheet iron, stamped to represent rock-faced stone, can be secured. The strips of the latter run horizontally, however, instead of vertically and with them three nailing strips 1 x 3 in. will be required on each side, calling for six pieces 16 ft. long and six pieces 12 ft. long.

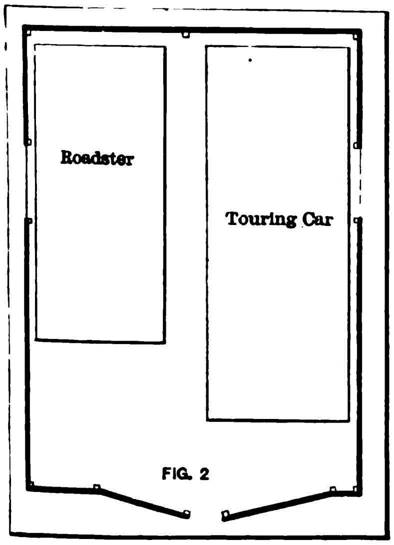


FIG. 2

Fig. 2—Floor plan showing a roadster, and a touring car on the floor, and the room that is left.

With either character of siding the doors can be framed and covered conveniently, but with the rock-faced stone sheeting, which comes in lengths of 5 feet, it is simpler to make each door an even 5 ft. wide instead of 4 ft. 6 in. and this extra width of the doors will be found to be an advantage rather than a disadvantage in the use of the garage. Both kinds of siding are fastened to the frame with special wire nails and washers which are procurable with the sheet metal at a few cents a pound. About one pound of nails will be required for each 200 square feet of siding.

As respects the roof frame, if simplicity and ease of construction outweigh attractiveness the roof shown in Fig. 3 can be modified to a simple V roof for the framing of which six pieces of 2 x 4, 8 ft. long and one piece 18 ft. long will be required, together with two pieces of 1 x 3-in. material, 18 ft. long. The six pieces 8 ft. long run from the peak, which should be elevated 3 ft. to give good drainage to the eaves and provide for an overhang of the roof of about 8 inches, after the fitting at the peak is done. The 16 ft. 2 x 4 is the ridge or peak member and the 1 x 3 are nailing strips to be placed midway between the eaves and ridge.

Galvanized corrugated iron is the best material for the roof, no matter what siding material is selected. It is to be bought in 8-ft. lengths also and nailed on directly to the roof frame. To make the ridge water-tight, a piece of ridge cap 18 ft. long will be required. This is standard material which can be secured with the other iron.

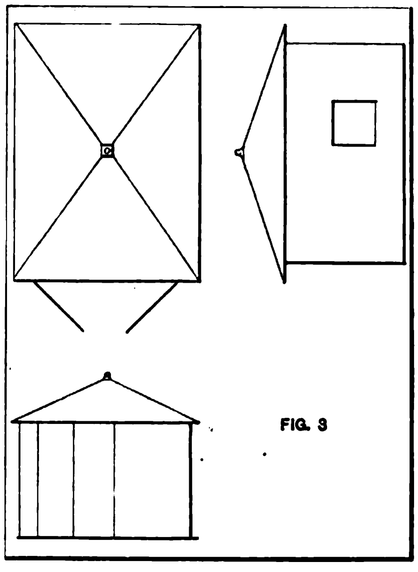


FIG. 3

Fig. 3—Elevation, in two planes, also looking down upon the roof of the little garage

If such a roof as is shown in Fig. 3 is selected, four pieces of 2 x 4, 12 ft. long to run from the central peak, which is 3 ft. above the eaves at the center of the building, to the corners and to project 8 inches for the roof overhang will be required; and for nailing strips two pieces of 1 x 3, 8 ft. long and two pieces of the same material 6 ft. long will be necessary, these to be nailed to the main 2 x 4 frame midway between the peak and eaves. At the peak the 2 x 4s are to be sawed at an angle so as to make a ridge butt joint and opposite members are to be securely fastened together by nailing short 1 x 3 pieces on either side as shown by Fig. 6. The first two members can best be sawed and nailed together at the proper angle on the ground. This pair will then be placed in position and nailed at the corners of the building, when the remaining two members can be fitted and fastened in place.

With this character of roof some cutting of the iron, the 8-ft. lengths of which run from the peak down on each of the four sides, will be necessary, but the roof is designed to be symmetrical, and with reasonable care in cutting the 8-ft. lengths it will be found that only one cutting of each piece will be necessary and that each part will exactly fit at its proper place, so that there will be no waste of material and no extra fitting. This type of roof requires four pieces of ridge cap, 12 ft. long, also a peak ornament which is standard material, to make it water-tight and to give the roof a finished appearance.

In providing windows glazed sash about 24 x 30, as may best suit the width of the siding used, may be found in most lumber yards at from 50 to 75 cents each and may be easily arranged to run in simple slots nailed to the strips.

To provide a smooth and satisfactory floor a cheap concrete made of one part cement, four parts sand and six parts gravel or crushed rock or even cinders, may be employed, this floor costing about 5 cents per square foot; or a light board floor can be laid for a total

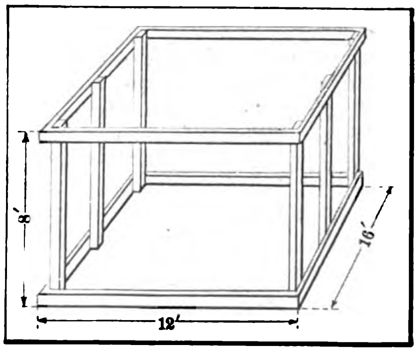


Fig. 4—A skeleton of the building, showing how the framing is joined

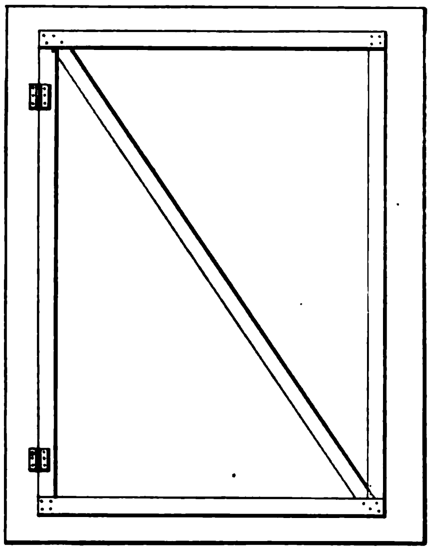


Fig. 5—Big door of the little garage, presenting the plan of the framing, showing the diagonal bracing to prevent the door from sagging

cost of about $10.00. For anything, except indefinite permanent use a couple of loads of cinders, costing about 50 cents delivered, will answer all requirements, providing the cinders are tamped firmly into the ground. This latter character of floor will be reasonably smooth and will absorb oil, water and other moisture, without disturbing the smoothness and without making any mud.

The doors are to be framed to the width selected about as shown in Fig. 5, which provides ample braces to keep the doors from sagging or getting out of shape.

With either construction of the sides or roof mentioned the work will be found to be simple and the results satisfactory. The problem of construction is well within the mechanical scope of any person having the slightest aptitude of mechanical plans and work and the finished appearance, in any case, will be pleasing, especially if the building is painted after completion as suggested.

If portability is desired it will be found entirely possible to dismantle the building at a future date and re-assemble it on another location, without any difficulty and without any loss of material except possibly a few nails, representing an outlay of a few cents.

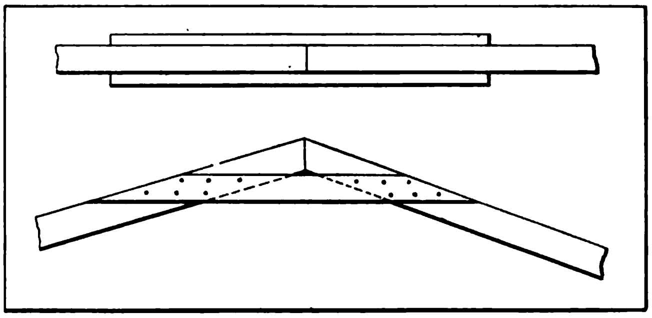


Fig. 6—Roof framing; a simple plan; as strong as it is easy to make

In putting up a building of this character it is well to remember that there are ordinances and insurance regulations that will have to be complied with. In some localities it is necessary to allow a certain distance between the residence and the garage.

Good Service from Dry Cells

JAMES S. MADISON SHOWS HOW A SATISFACTORY IGNITION SYSTEM MAY BE PROVIDED WITHOUT A MAGNETO

THIS article is intended for the autoist whose car is not equipped with a magneto or storage battery. All of the better class of cars are at present provided with magnetos, which give, without question, the most certain and satisfactory system of ignition; but there are many cars that depend upon dry cells as their principal or auxiliary source of electric current. Others are equipped with storage batteries; this is especially desirable in the case of cars provided with a coil that consumes an extravagant quantity of current. In view of the amount of time required to recharge a storage battery, the attention necessary, the inconvenience involved, and the very satisfactory service that may be obtained, by proper management, from dry cells, there does not seem to be any real reason why an automobile of the gasoline type should be equipped with a storage battery unless its coil is so wasteful as to render dry cells impracticable and its owner is willing to go to the expense of purchasing two storage batteries, so that one may be recharged while the other is in use. Of course, it would be simpler and wiser and not much more expensive to put in a new coil and magneto, or, what would be less expensive, a new coil and dry cells. The only way to determine accurately whether a coil is consuming too much current is to test it or have it tested with an accurate ammeter, the scale of which is divided into tenths—the small, low-priced pocket instruments will not do.

The test is made as follows: The wire, connecting the coil and battery, is disconnected from the battery, and the free terminal attached to the binding post of the ammeter; another wire is then connected to the free pole of the battery and the other binding post of the ammeter. The engine is then started and run at low speed. The reading of the ammeter will show the current consumption of the coil at that particular speed. Should the pointer of the ammeter move backward, interchange the two wires connected with the binding posts.

In no case should a coil consume more than 0.5 ampere under the above conditions; it should in most cases use not more than 0.2 or 0.3 ampere to insure economical service.

The writer recently tested the coils—one vibrating, the other non-vibrating—on two cars of different make (two-cylinder cars). In each case the coil consumption was the same, 0.2 ampere. With four and six-cylinder engines the consumption would be greater.

Assuming that the coil shows only a moderate consumption and that the owner is using dry cells without getting a satisfactory mileage, the fault undoubtedly lies in the method of installing the cells, and of taking care of them—a fault that may be easily corrected with gratifying results. While it is true that an occasional coil is defective, the vast majority of them are entirely reliable and free from faulty features. The vibrating coil is often condemned as consuming excessive current, when all that it needs is a simple adjustment of the vibrators.

In order to get the best results from a battery of dry cells, by cutting the cost of ignition per mile to the lowest possible figure, it is only necessary to observe certain simple precautions in buying and setting up the dry cells. But with the best coil on the market and the best battery, satisfactory results cannot be obtained if there are any poor connections. One single, unsuspected poor connection may cut down the battery efficiency 50 per cent.

More than half the battery troubles encountered by users of dry cells is due to ignorance or unwillingness to take a little trouble. If any one is skeptical on this point let him take a look into the battery boxes of a half a dozen automobiles.

There are a number of different kinds of dry cells on the market. Like other articles of commerce, some are good and some are not. For the protection of the consumer there should be stamped in clear letters, on the bottom of each cell, the date it was manufactured. This is of great assistance to the buyer, as it enables him at once to tell the age of the cell. Without the stamp it is impossible even to guess how long the cells may have been standing around on the shelves or in some more objectionable place, unless the accumulation of dust and dirt on the outside should be an indication. One should, of course, test every cell purchased, whether it is dated or not, with an ammeter. Each cell of the usual size should show from 20 to 30 amperes; those reading above or below these figures should be avoided. If the car is equipped with a battery box by the manufacturer it will probably be of the right dimensions to accommodate the proper number of cells; if not it will be advisable to buy a metal box or have a wooden one made. For eight cells of the usual size, 2 1-2 by 6 inches, the dimensions of a wooden box are as follows: Inside measurements—length, 10 1-2 inches; width 6 inches; height 6 inches. It should be made of 1-2- or 7-16-inch boards, preferably of soft wood. There should be a partition 5 inches wide running lengthwise through the center to form two divisions, each of which will hold conveniently four cells. In addition there should be a strip of wood 11 1-2 inches long by 1 3-4 or 2 inches wide to go across the top lengthwise, provided with a screw at each end, for the purpose of holding the cells securely after they are in place. The bottom of the box is lined with one thickness of rubber matting or two thicknesses of Canton flannel or other soft thick material, in order to protect the bottom of the cells from the constant jolting. The cells should be prepared as follows: All the binding screws should be removed and the flat contact surface of each one brightened by rubbing it vigorously across a piece of fine sandpaper or emery cloth. The hexagonal nut on the carbon terminals of some old cells, which may be had for the asking at any dealer's, in case there are none at hand, should be removed and brightened on both sides in the same way, for use on the new cells. It sometimes happens that the terminals of unused cells are partially covered with pitch, or verdigris. This should be removed carefully and thoroughly. Emery cloth cut in strips about 1-4 inch wide, or, what is more convenient, "dental cloth finishing strips" (which are strips of linen covered with sand, that may be obtained from any dentists' supply house), should be used for cleaning and brightening these terminals. After the zinc poles (the small brass projection soldered to the rim of the zinc cylinder of the cell) of all the cells have been cleaned, screw on one of the hexagonal nuts. This is to provide a larger and more effective contact surface. This is an important detail and should not be neglected. The manufacturer provides a sufficiently large contact surface at the carbon pole, but only about one-half as much at the zinc pole. The nut should be screwed on firmly but quietly in order not to loosen the terminal. When all the cells have been treated in this way they are placed in the battery box. To prevent them rubbing against each other or the box, the interstices between the cells is filled by packing in firmly clean, dry, cotton waste or something similar. Small portions should be put in at a time and then packed down with a small rod or screw-driver. If this is done carefully, there will be left no space for any cell to move in—the box, cells and waste will form a solid, firm, compact mass in which there will be no motion of any of the individual parts.

The top strip of wood should then be placed in position, and the screws at each end started but not driven home. For connecting the cells together, the ordinary form of battery connections may be used. One of the most popular forms is slipped on the battery cell poles by a little pressure; it will remain in position indefinitely. This and other quickly adjustable varieties are satisfactory so far as putting them on is concerned, but the objection to most of them is that the contact surface is too small. The kind shown in Fig. 1 is very good. They may be purchased for 25c. per dozen and possess the very decided advantage of having copper terminals with large surface. The ordinary objection urged against them is that they are troublesome to put on and keep in place. This is only a valid objection if one is careless. They can be put on so securely, without any special effort, that they will not loosen during the life of the cell.

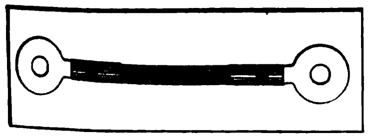


Fig. 1—Ordinary form of battery connection

Whatever form of connections is used, each terminal should be cleaned and brightened with emery or sandpaper. The cells should then be connected together in series or in series multiple, as one may prefer. No matter which method is used, the connections should be attached as follows: One end is placed against the hexagonal nut on the screw forming the carbon terminal, the round nut is screwed on with the fingers and then tightened firmly and carefully with a pair of pliers; the other end of the connection is attached to the zinc terminal of the adjoining cell in the same way, but greater care must be used to secure it, in order not to loosen the soldered joint between the brass screw and zinc cylinder. If the cells are to be connected in series, this operation is repeated until all are connected except the carbon and zinc poles of the last two cells. The carbon pole is then connected with the switch, and the zinc pole with the coil. Experiments have clearly demonstrated that while the connection in series is the most widely used, it is the most expensive and therefore unsatisfactory method of connecting dry cells. The series multiple connection is superior in every way, giving greater mileage at a lower cost.

The following table from "Operation of Motor Cars and Motor Boats," National Carbon Co., shows the comparative results of engine tests with multiple batteries:

Arrangement of Cells	Hours Service	Estimated Miles Service	Estimated Cost per 100 Miles
1 Set of 4 in Series	20	400	$0.25
2 Sets of 4 in Series-Multiple	70	1400	.15
3 Sets of 4 in Series-Multiple	120	2400	.11
4 Sets of 4 in Series-Multiple	170	3400	.08

These figures were obtained by practical tests in actual service with a four-cylinder, four-cycle automobile engine. In each case the battery was required to run day and night continuously until the engine began missing. This continuous service is the severest kind, because the batteries do not have a chance to rest. By using the same equipment and the same size batteries in service having periods of rest, the above figures will be greatly increased and the cost per 100 miles proportionately decreased. There is one other point; the joints should be electrically good; it is rarely that this is true; good joints will always be assured if they are soldered. The average man seems to think that a mechanically tight fastening of the wires to the terminals is all that the situation demands. The electrical resistance of one poor joint is far greater than the electrical resistance of perhaps a mile of wire. The energy, under such conditions, is dissipated at the joints, and the work that the battery will then do is very meager indeed. The time required to properly clean all the terminals and put a drop of solder on them, using a heated soldering iron for the purpose, is but slight. There are fluxes that come in paste form that will help out materially. The real secret of success lies in having the joints quite clean—emery-cloth is a good abrasive—bathe the parts in gasoline to remove every trace of grease. They go ahead.

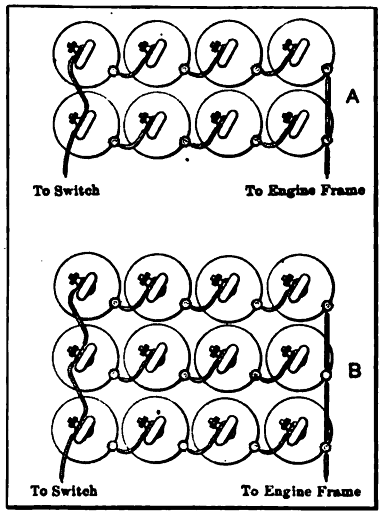


Fig. 2—Method of arranging dry cells when four are used in series; (A) Two sets in series-multiple; (B) Three sets in series-multiple

Repainting the Old Car

M. C. HILLICK TELLS THE AMATEUR HOW TO GO ABOUT THE TASK OF RENOVATING THE BATTERED BODY AND CHASSIS

SHORN of its surface beauty, with bruises and fractures sufficiently deep and numerous to make the work of bringing the car up to a finish a task of no mean importance, the first work consists in cleaning all parts of grease, dirt and miscellaneous accumulations. Then sandpaper the surface of the body with No. 1-2 paper, fetching it in this way smooth and sleek, with all fractures and defects cleaned out. In case of the metal body, scrape over all abrasions, dents and other disfigurements, and sandpaper the surface in the same manner as the wood surface is treated.

Beat up some tub or oil ground white lead in turpentine, adding a suitable coloring pigment, and adjusting it finally to carry, say, one part raw linseed oil to six parts turpentine. Apply this to the wood surface with a bristle brush and slick it up nicely to insure uniform and sure drying. For the metal body, first coat, use, for the most part, a negative pigment so far as its action on metal is concerned.

Make it to carry a strong percentage of raw linseed oil and apply to the surface sparingly but with a uniform film of pigment. Let this first coat of surfacer dry thoroughly, after which, this process completed, go over the surface carefully, and with a hard drying putty, fill up all cavities, and other defects. Any exceptionally rough places should be draw puttied, or putty glazed, as the work is variously designated.

The main thing in puttying, or in putty glazing, is to round up, fill up, and make the defects as little as possible, or, best of all, eliminate them altogether.

After 24 hours prepare and apply to the surface a coat of surfacer, or, as it is known to the trade, rough stuff. This can be shop-made or bought ready mixed, requiring, for immediate use, letting down with turpentine to a proper brushing consistency. This consistency, however, is a good bit heavier, or should be, than ordinary coats of paint. If made in the shop take equal parts, by weight, of any good American filler in dry form and white keg lead, working them up to a stiff paste in equal parts of couch japan and rubbing varnish, then thinning with turpentine to the desired consistency. On the whole, however, it is practically as cheap per gallon to buy the rough stuff prepared ready to use, and in this way you save the cost of mixing.

Apply four coats of the rough stuff in as many days, laying the first coat off lengthwise of the panels, second coat crosswise, so alternating in laying off, thus securing a more dense and compact body of pigment. Next take some of the rough stuff and add to it either enough yellow ochre or Indian red to give the pigment either a shade of yellow or red, and, thinning with turpentine, apply over the rough stuff. This serves as a guide coat to enable the painter, when rubbing the surface down with water and artificial pumice stone, or rubbing brick, to judge more quickly and accurately concerning the condition of the surface—when it has been rubbed enough, quality of rubbing, etc.

The day following this application of "stain" or "guide," rub the surface down to a smooth and level condition, free from all blemishes, with the artificial rubbing stone or brick, and water, using this latter medium plentifully. Rub with straight out and return strokes of the arm, holding the stone firmly upon the surface, and keeping enough water on the surface to prevent the stone from gumming up and scratching the work.

Circular motions of the stone during the rubbing process endanger the quality of the surface. After completing the rubbing process wash with clean water and stand the surface aside overnight for the elimination of moisture.

Next sandpaper the surface very lightly with No. 00 sandpaper, dust off and apply the desired color coat. With one coat of color and a coat of varnish-color, or with two straight coats of color, two coats of rubbing varnish, and a coat of finishing varnish the body surface should be sleek and trim and quite brilliant enough to give a good account of itself in any company.

Meanwhile, the chassis will require attention. After cleaning up thoroughly go over the parts carefully, and all fractured, and shattered, or lightly bruised places, touch up with a pigment composed of, say, three parts white keg lead and one part coloring pigment of any preferred shade, beating the mass up in turpentine containing raw linseed oil in the proportion of one part oil to four parts turpentine. After three days sandpaper the surface of the chassis throughout, and apply with a camel's hair brush a coat of either white lead and some other pigment, or other surfacer, whipped out to a smooth working consistency in turpentine, fortifying the mass with raw linseed oil in the proportion of one part oil to seven parts turpentine. Brush the pigment out clear and fine, and after forty-eight hours putty all surface defects of whatsoever nature with the hard drying putty previously described. Should any coarse patches of surface exist, thin some of the hard putty down with turpentine and glaze all such parts. Let the putty dry for a couple of days and then sandpaper, avoiding, meantime, cutting through the first coat of surfacer. Upon working the putty down to a perfect level with the general surface, clean and dust off carefully and apply a final coat of surfacer composed of white lead and some desired coloring pigment whipped out thin in turpentine, with a bit of raw linseed oil added, say, one part oil to ten parts turpentine, using a camel's hair brush to lay on the surfacer.

Lightly sandpaper this coat in due time and apply color, then varnish-color or glaze, stripe, and over a coat of clear rubbing varnish, finish.

The Badly Shattered and Worn Job

This is the sort of work which the painter dislikes, it being difficult, as a rule, to get a price sufficient to adequately compensate him for services rendered. The old paint is found scaling and flaking off and the surface shows numerous gouges and fractures. The first step consists of burning the old shaky, flaky finish entirely off, using a burning torch or lamp. These lamps use gasoline, and in case their employment renders insurance policies invalid, procure a small rubber tube of the required length, and equipped with the proper devices, one end with small burning point and the other with attachment for gas fixture, affix to the nearest gas fixture, and with this medium—nowise equal in power to gasoline, to be sure—proceed to burn the old, crispy garment of pigment from the surface. In doing this work heat the paint until it becomes soft, and then with a broad-blade, half-elastic scraping knife, held at an angle of about 45 degrees, push the point under the soft paint and lift the pigment from the surface, doing the work as cleanly as possible. After burning the old paint away, sandpaper thoroughly until a clean, solid wood foundation is secured. Then prime with either raw linseed oil and some pigment medium, or with some one of the numerous excellent patent primers. We thus have the badly battered and shattered surface fairly and rightly started toward a new and sound finish. It only remains to carry it through with the several processes provided for such work, which includes rough stuff, color, rubbing varnish, and so on.

It is rarely that the chassis has to be burned off. Simply cut all the running parts down hard and clean with coarse sandpaper, scraping the shattered places down with a steel scraper until a sound, healthy surface condition is reached, after which, upon sandpapering, apply a coat of primer as advised for the body. Bring to a finish upon the order of procedure already detailed.

To Paint Without Burning Off.

With a steel scraper dig away all the scaly and shelly pigment, working down to the solid foundation. Dig out, and clean out the old cavities, after which prime with some reliable material, working the medium into all the holes and fractures. Next apply some second coat material made up of white lead, raw linseed oil, turpentine, and a coloring pigment. Let this coat dry firmly and then apply the following: Dry white lead, three parts; best bolted whiting, one part. Beat to a consistency which lets the pigment work freely from the point of the putty knife in equal parts of brown coach japan and rubbing varnish, letting the mass out a bit with a sprinkle of turpentine. Take a broad knife and plaster the putty over the surface solidly, drawing it out smooth and to a uniform depth under the edge of the knife. Obliterate and face up all inequalities. Permit the putty to harden up several days—four, at least—and then with a rubbing brick or stone dipped in raw linseed oil proceed to rub down the mass, working it out gradually to a smooth, level surface.

Glaze with this same putty and face up all the rough parts of the chassis and in due time bring the proper surface with sandpaper.

Let the body surface, after rubbing, stand 24 hours before applying the first coat of color. Further operations on both body and chassis are identical with those given in connection with painting and finishing them under the systems already described, and are all-sufficient to give about the worst possible looking surface an appearance of which almost any automobile owner may well be proud.

Compact Ignition System

DETAILS OF AN IMPROVED IGNITER A NOVEL FEATURE OF WHICH IS THE COMBINATION OF A SPARK COIL, DISTRIBUTOR AND CONTACT-MAKER IN A SINGLE UNIT

COMPACTNESS is not a virtue to be sneezed at in any of the automobile walks; there is a tendency to disregard this condition in ignition work and it leads to a certain discommoding complication that is more annoying than even more serious happenings, considering the bearing of the average autoist and the fact that electrical equipment is mysterious to him. The B. & S. ignition system, made by Briggs & Stratton Company, of Milwaukee, Wis., is worthy of discussion on the ground of compactness, and other features that lend facility to the plan.

The novel feature of this device is the combination of a spark coil, distributor and contact-maker in a single unit, the entire outfit being contained in a heat, moisture and dustproof metal case only 3 1-2 inches in diameter and 5 inches high.

A single non-vibrator coil is used for any number of cylinders; the coil is enclosed in a heat-proof composition case with bronze spindles at each end and revolves within the outer casing, forming its own distributor, the high tension current passing through segments in the hard rubber distributor block to the secondary terminals.

The circuit is closed and broken by means of a mechanical device, which at certain speeds is assisted in its operation by the magnetism of the spark coil.

The current furnished by six dry cells or a six-volt storage battery is utilized to produce a single spark of intense heat and volume to ignite each cylinder charge.

The igniter is designed to be mounted rigidly on the engine base or supported by a bracket provided for that purpose and the drive obtained from the shaft ordinarily provided for the timer or distributor. The top plate only is shifted for spark advance, therefore secondary wires are not disturbed. A ball and socket joint is provided for connection to spark advance lever, and the spark advance can be arranged to work from any side. The wiring is very simple, the high-tension wires leading directly from the igniter to the spark plugs and two wires from igniter to the switch, one wire from switch to battery.

The secondary terminals are screwed firmly into recesses in the distributor block, making it impossible to short-circuit the distributor with any amount of water. The cover of the igniter may be removed for inspection of contact maker without disturbing any of the wires and is also absolutely water-tight.

Three types of switches are furnished—one providing for two sets of batteries, another for battery and open circuit type of magneto and the third for battery and closed circuit type of magneto. All types are inclosed in a metal case and contain the condenser. Only the switch lever and the flange are exposed, the body of the switch extending directly through the dash, all connections being made at the rear. The lever may be operated either with the foot or by hand.

There are but two moving parts in the contact maker, which is one of the main features of the 1911 model of this igniter—the contact arm and a cam provided with a number of points corresponding to the number of cylinders to be used. In the accompanying illustrations, Figs. 1 and 2 illustrate the operation which up to this point is nothing more than a simple cam and lever contact maker. The lever *B* rests normally in the path of the cam *A*; this cam in its rotation engages the lever, causing the contact points *C* to be brought together, the points being separated by the spring attached to the lever *B* as the cam continues in its rotation.

The use of an entirely new principle in connection with the cam and lever contact maker has been made possible by the peculiar construction of this igniter—the breaker is made to provide a fixed duration of contact regardless of motor speed, and it is impossible for the motor to stop in such a position as to leave the circuit closed. Another feature is that the transformer coil itself is carried in the rotor of the igniter and is so placed that the core of coil rests directly in a vertical line with the cam of the contact maker. In Fig. 4 *H* represents the iron core of the transformer coil carried in the rotor of the igniter. The cam *A* is secured to the plunger *F*, which has a flat head, coming near to the core of the coil. The cam and plunger are so mounted in the driving spindle as to be free to slide up and down in the slots which serve as guides. They are, however, held against the upper

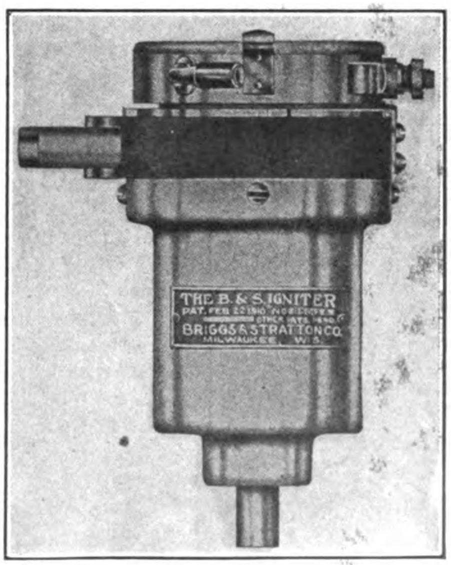
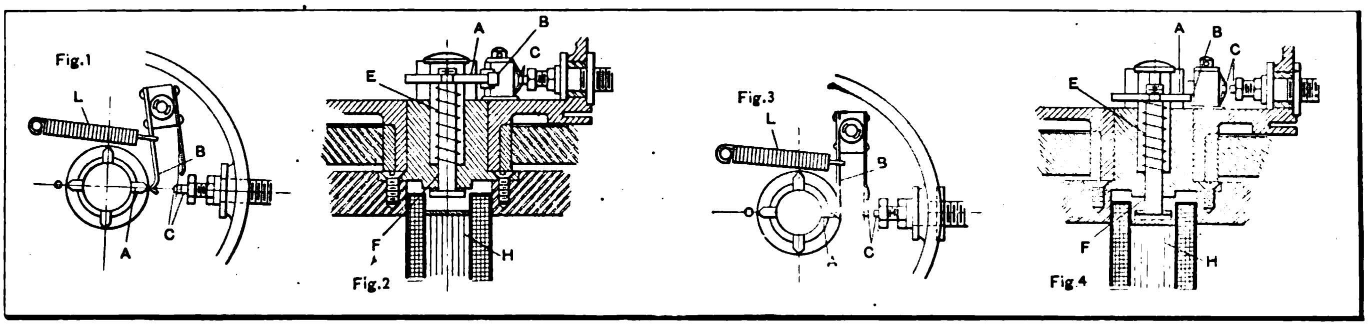


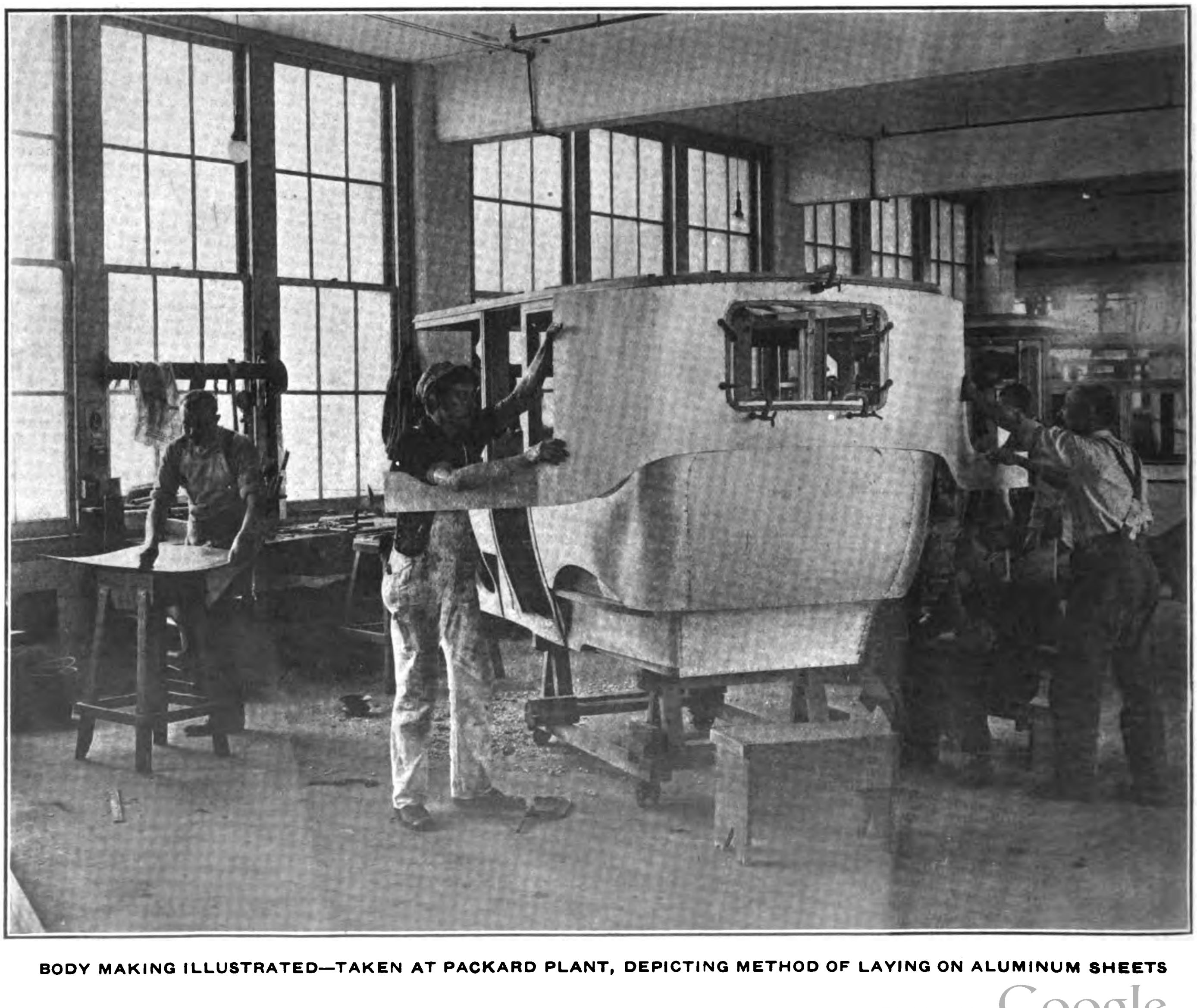
Fig. 5—The igniter as it appears ready to be put in place



Figs. 1, 2, 3, and 4—Illustrating operation of the B. & S. Igniter, Model 10

limit with the cam in the plane of the contact arm *B*, by the spring *E*. With the cam *A* in its normal position in the plane of the arm *B*, rotation of the cam causes the contact points *C* to press together and separate, and without other provision the duration of contact of these points would, of course, vary with the speed of the motor. With this breaker, however, the instant the contact points *C* are brought together, the current passing through the primary winding causes the core of the coil to become magnetized, thus attracting the plunger *F* and drawing it instantly from its normal position. The contact arm is then retracted by the spring *L* pulling the arm over the top of the cam as shown in Figs 3 and 4. The instant the circuit is broken the cam is free to return to its normal position by the action of the spring *E*, provided it has passed in its rotation from beneath the hook. In the event that the motor stops at the instant the contact points *C* are brought together, it is obvious that the magnetic action of the coil will draw the cam from its normal position and the contact arm will be pulled over the top of the cam, thus making it impossible to close the circuit until the cam is rotated by starting the engine. At high speeds, the duration of contact is so short that the magnetic action does not have an opportunity to work. It is, therefore, effective only at low speeds when the duration of contact would be so long as to be wasteful of current, and the balance of the transformer coil disturbed. Hence the spring *E* is required to do no work except at low speeds, while at high speeds the only spring in action is the one marked *L*, and this works only between very small limits.

The construction is such that rotation of the shaft backward will produce no spark, although the company will furnish on special order for two-cycle engines a contact-maker of the same type that will operate in either direction. The igniter, as it appears ready for adjustment, is shown in Fig. 5.



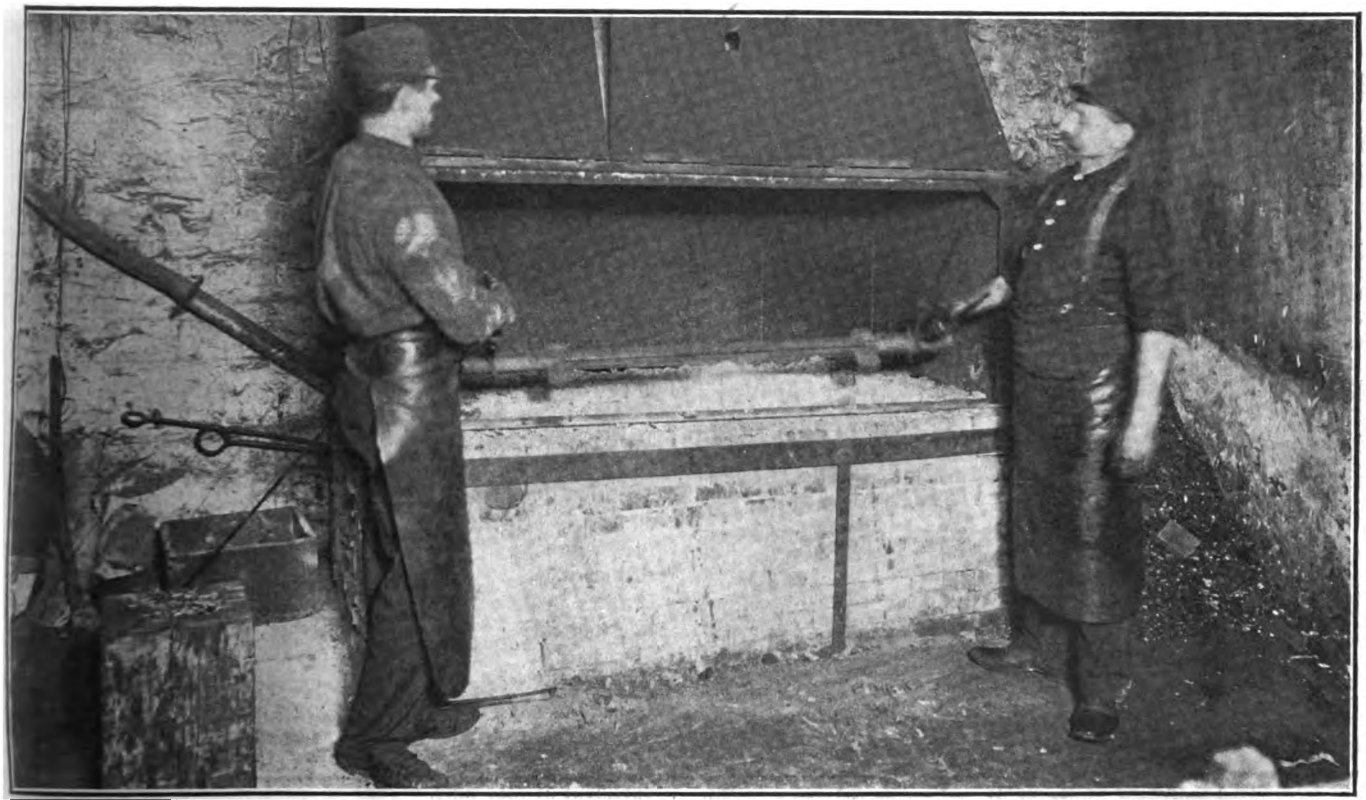
BODY MAKING ILLUSTRATED—TAKEN AT PACKARD PLANT, DEPICTING METHOD OF LAYING ON ALUMINUM SHEETS

Among the Makers

VALUE OF DROP FORGINGS; MARMON AUTOMOBILES FOR 1911; AMERICAN 1911 PLANS; A NEW TYPE OF WOODEN WHEELS; COMMUNICATIONS

THIS year brings notice of refinement that was beyond the dream of the little band of men who first introduced the automobile to a then reluctant and much-scattered clientèle. It will be remembered that when automobiles were first designed the foundry was a very important place, and the maker of patterns in wood was the dictator of progress. But the reason why wooden patterns preceded castings and the latter were utilized was because the procuring of forgings in the shapes required was at a cost that could not be tolerated, moreover it was a long road from the practices in drop forging plants of that time to what the makers of automobiles really had an eye upon.

Gradually the drop forging plants expanded; slowly the sizes of forgings that could be made were increased, and finally the [illegible] ing steel and stamping shapes came into vogue. [illegible] e the quality of steel had to be coped with; the [illegible] drop forgings and for pressed-steel parts must [illegible] characteristics. Even when the material is of [illegible] le grade it deteriorates under the hammer or [illegible] drop forged, unless subsequently treated; *i. e.*, [illegible] s are shaped it is necessary to "correct" them. [illegible] treatment is usually conducted in the form of an [illegible]. It was originally supposed that the forgings [illegible] heat-treated at the drop forging plants; this [illegible] ed out to some extent. The importance of the [illegible] es ultimately reached such proportions that the [illegible] akers of automobiles evidently reached the con[illegible] uld be better to fit out for the work and make it a [illegible] ess in their own plants.

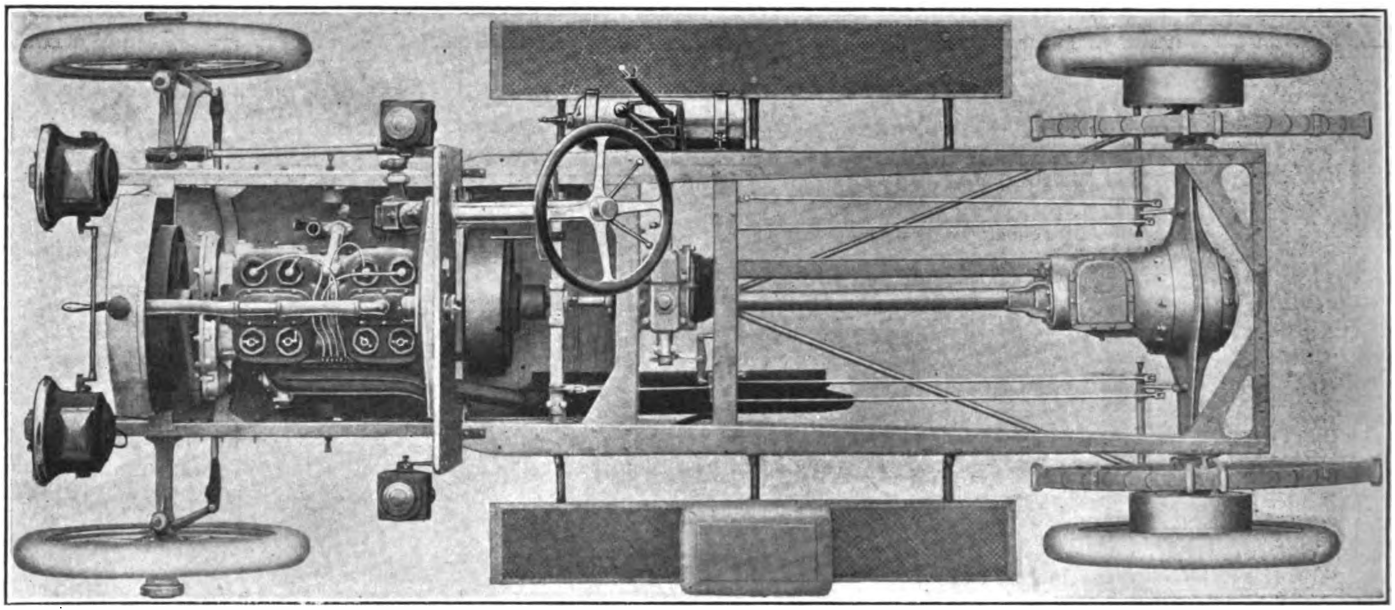


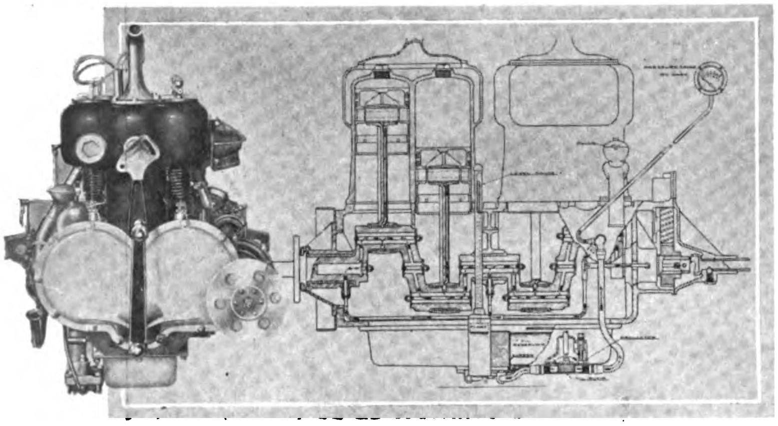
[illegible] A DROP-FORGED SPECIAL STEEL I-SECTION AXLE IN A MOLTEN SALT BATH—WOODS ELECTRIC

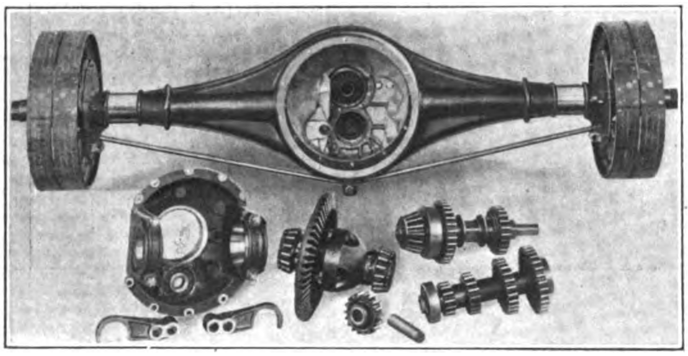
The [illegible] on here given shows one of the most approved ways of [illegible] ing forgings in order to induce in them the original kinetic qualities of the material. In this process the parts are submerged in a molten bath of chloride of sodium and barium in such proportions as will afford the right annealing temperature. The proportions of the salts may be varied over broad ranges, and they are rendered molten by passing an alternate current of electricity through the mass. A pair of iron electrodes are first used; when the salts melt the current of electricity penetrates the mass and the temperature is maintained at a constant level. Any desired temperature can be maintained; true, the proportions of the salts must be regulated to accord with the range of temperature demanded by the character of the work.

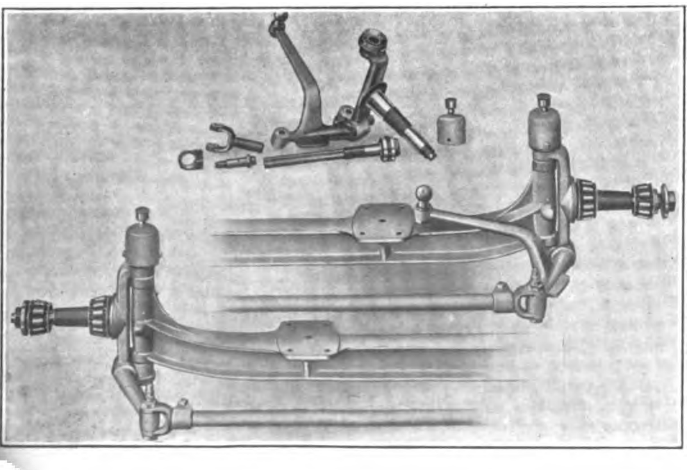
The strength of a drop forging before it is annealed is far below the original strength of the material used in making the forging, and, unfortunately, the forging labors under internal stresses that render it unsafe. Castings, to quite a little extent, have this undesirable property, and this, together with the low strength, generally, of castings, constitutes the reason for desiring to substitute forgings instead. But if the forgings are not annealed and they have, in consequence, the same faults there is nothing to be gained by adopting them.

In many of the plants this heat treatment question is extended to a point where all the steel used is manipulated, and to some extent this plan is made to serve for the purpose of reducing the number of brands of steel that are used in the cars. It is claimed that, by heat treating, it is possible to accentuate the qualities of steel in the several directions; if the parts are to be glass hard they are rendered so; if they are to be soft, they are made soft; likewise they may be brought to some intermediate state that will more or less represent some one of the infinite varieties that lie between the two border lands.









Marmon Presents '11 Li

RACING experience is telling the Nordyke & Marmon Company, Indianapolis, Ind., what it has to do to make its automobiles stand up to the work that has to be done by an automobile to render it thoroughly serviceable when it is placed in the hands of the ordinary user. When a bridge is built the engineers introduce what is termed a "factor of safety," but it must be remembered that a considerable number of bridges fell down before the engineers were able to understand just what constituted this "factor of safety." True, it was the idea of the designers of bridges to make the structure twenty times as strong as it would have to be to just stand up under the greatest possible load that it would be called upon to bear. A thousand unknown quantities intervened, hiding the light of understanding, and it was experience, in the long run, that helped the engineers to arrive at safe conclusions.

That the Nordyke & Marmon Company realized that it was necessary to get experience is shown by the tenacity with which it has pursued the strenuous life. The concern was founded in 1851; it built machinery up to 1905 and organized its automobile department at that time.

For 1911 the output of the company in the line of automobiles will consist of one general design, the motor being rated at 32-40 horsepower. The general design of the Marmon model of 1910 will be adhered to. Few changes of moment were found to be desirable. The most important, perhaps, is the lengthening of the wheelbase to 120 inches. The longest wheelbase for last year's Marmon was 116 inches—this was in the Model 32. The tread is 56 1-2 inches. With one model only, in which every effort is concentrated, it remains to afford to the clientèle of the company a variety of body options which are best described by illustrating from photographs.

What the Power Plant Looks Like with Accessories

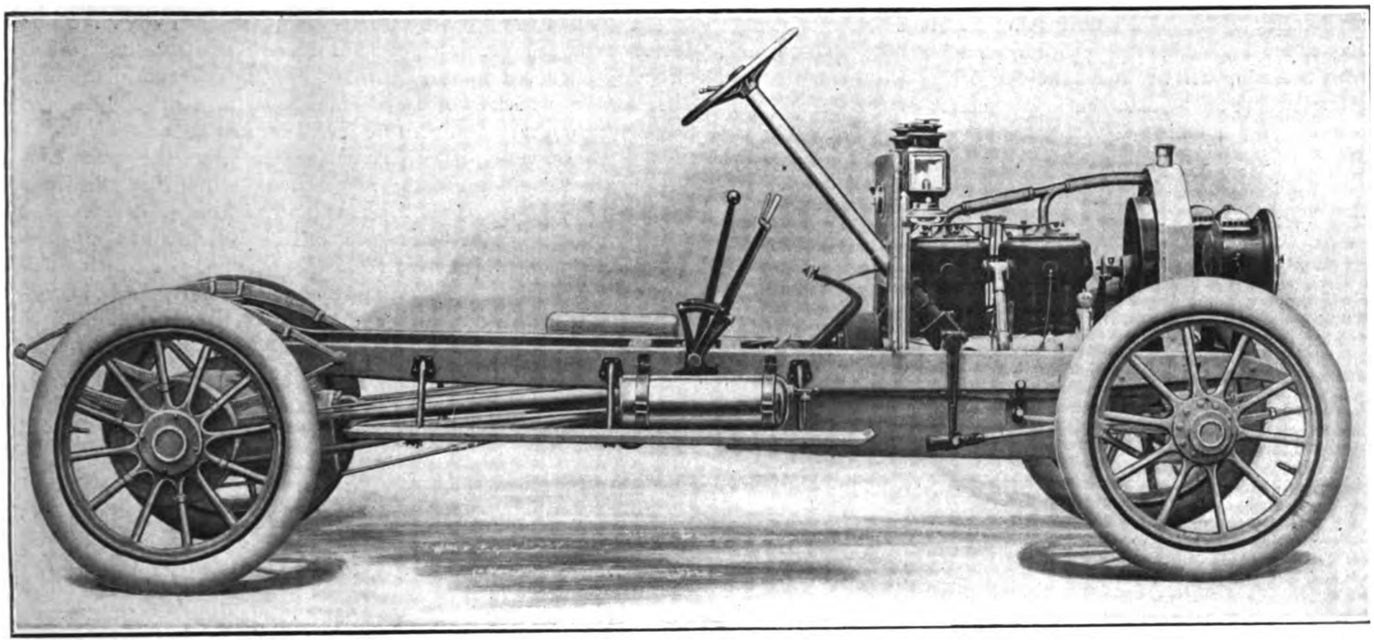
The disposition of the power plant is shown in Fig. 1, which is a plan of the chassis, and amplified in Fig. 5, which is a side

Fig. 1—Marmon chassis plan view

Fig. 2—Marmon "Thirty-two" motor, front view

Fig. 3—Rear system show how differential and transmission gears are removed and replaced through rear of axle housing

Fig. 4—Front axle; weight is carried on ball thrust bearings



REFINED LIVE REAR AXLE; EXCELLENCE OF THE MOTOR; SUBSTANTIAL FRONT AXLE; LUBRICATION MUCH REFINED; COMPREHENSIVE LINE OF BODIES

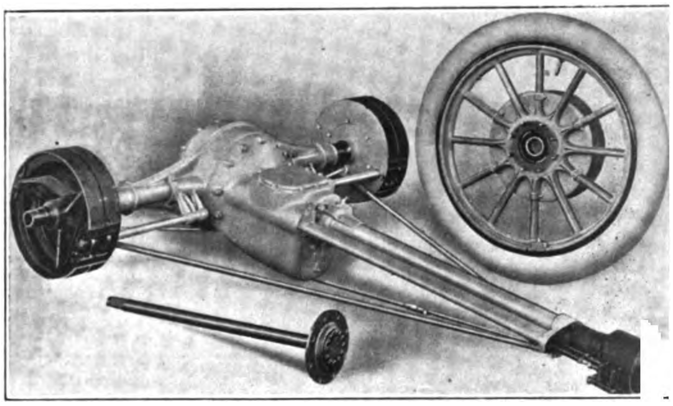
view of the chassis. Fig. 2 is an end view of the motor at the left and a section of the same at the right. Fig. 7 presents right-hand side of motor and Fig. 8 the left-hand side.

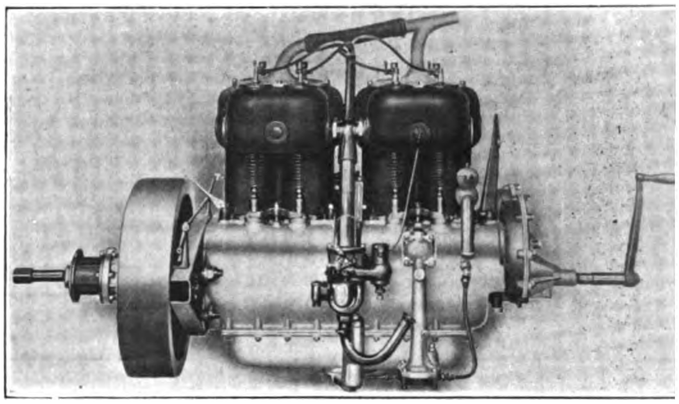
The motor has four cylinders with a bore of 4 1-2 and a stroke of 5 inches. The cylinders are cast in pairs, work four-cycle and are water-cooled. The right-hand side of the motor as presented in Fig. 7 gives the position of the carbureter, to which is attached a one-piece vertical member through which the carbureted air passes to a point between the two pairs of cylinders, which in turn are so designed that the mixture enters transfer ports from the carbureter standpipe, thus eliminating the customary horizontal portion of standpipe construction.

Fig. 8 shows the magneto resting on an extension of the upper half of the case driven by an extension shaft from the water pump, thus bringing the pump and magneto in common shaft alignment, but with a view to ease of installation and practicability in performance a universal joint is placed not only between the magneto and the pump, but also between the pump and the pinion by means of which the shaft is rotated.

The clutch is of the cone type, is nested within the flywheel confines, and the clutch mechanism, including the spring, is enclosed in a protecting housing. By glancing at the chassis plan in Fig. 1 an idea of the compactness of the clutch mechanism will be gleaned, and it will be there observed that a tumble shaft with square ends intervenes between the extremity of the clutching mechanism and the universal joint housing which is supported on a stout cross bar.

The power as it is transmitted through the clutch and tumble shaft to the propeller shaft within the tube is taken up and passed along to the transmission gear, which is a unit with the live rear axle. A general view of this unit is shown in Fig. 6, but a better understanding of the details of design will come from studying Fig. 3. In this it will be observed that a unit plan of assembling is brought into play. The differential gears of the bevel type are shown in a housing to which is attached the





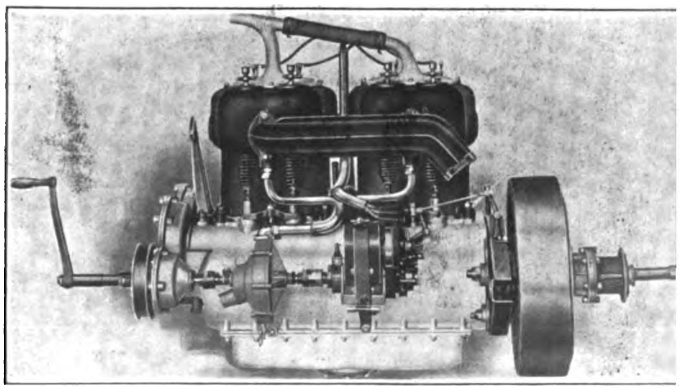


Fig. 5—Marmon chassis, intake side

Fig. 6—Marmon rear system showing brakes and speed gear change box attached to axle housing

Fig. 7—Marmon "Thirty-two" motor, intake side

Fig. 8—Marmon motor showing exhaust side and magneto

large beveled gear, and conical roller bearings are mounted in place on the two ends of the differential housing. To the left of this assembly will be found the supporting grid, which is also contrived to accommodate the bearing back of the bevel pinion on the end of the main shaft of the sliding-gear system. The lay shaft of this system is also in view, and through the good office of the supporting grid, considering the methods of design, the entire aggregation may be assembled independent of the axle housing, after which they may be thrust into place with the assurance that they will be in proper alignment and so related to each other that the intended functions will be performed noiselessly and well.

Lubrication and the scheme of execution will be better understood by examining the section in Fig. 2, which shows a drilled-out crankshaft to which oil is fed under pressure by means of a force pump that is incorporated into the lower half of the crank-case. The oil well is located in the lower half; means are at hand for filtering the oil and the arrangement of piping and ducts is with the view of forcing a continuous stream of oil up through the crankshaft to the connecting rod bearings, thence along the connecting rods to the gudgeon pins, and finally to the cylinder walls. In like manner the main bearings are kept in a flooded condition and means are at hand to take care of the excesses of lubricating oil, all of which finally returns to the oil well in the lower half of the crank-case, properly lubricated and in fettle to begin another cycle.

The front axle design and the attending details are shown in Fig. 4. The axle is of the I-section, liberally proportioned for the work, and the knuckle bearings are especially long, with means for lubrication. Conical roller bearings are used, and besides affording the means of adjustment to take up shake, they are securely locked into place by means of well-designed locking nuts. The steering arm is of stout build, with a large spherical joint, and the details throughout are in keeping with the best practice.

The transmission gear is three-speed selective, with the side levers arranged for a right-hand drive. The steering post is properly anchored to the dash, is given an agreeable rake, and the steering wheel is of large diameter with a properly shaped rim with the spark and throttle levers located above.

The chassis frame is of channel section steel; the spring suspension is full-elliptic at the rear and half-elliptic at the front. The details of the chassis construction are worthy of more than passing notice. At the point of narrowing at the front the flanges are wide, and there are two cross bars coming close to the universal joint so that the lateral strength of the frame is in fullest keeping with the requirement. The flanging narrows toward the back, but large gusset plates are used to tie in the rear cross bar. Trunnions are provided and fastened to the side bars near the rear cross bar by means of which the full-elliptic springs are free to swing by them in response to the motions induced by road inequalities. There is an entire absence of castings on the chassis; pressed steel is utilized as brackets for the footboards and at such other points as experience dictates. From the center cross member forward, the side members have a drop flange to which the mud pan is secured with spring clips accessible from the sides.

SPECIFICATIONS FOR MAR

MODELS	Price	H.P., A.L.A.M.	BODY		MOTOR				COOLING		IGNITION	
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radi-ator	Pump	[illegible]	Battery
Thirty-two......	$2650	32.4	Tour'g.	5	4	4½	5	Pairs..	Cellular.	Cent'fl...	Magneto.	Battery.
Thirty-two......	2650	32.4	Lub'n .	4	4	4½	5	Pairs..	Cellular.	Cent'fl...	Magneto.	Battery.
Thirty-two......	2650	32.4	R'ster...	2	4	4½	5	Pairs..	Cellular.	Cent'fl...	Magneto.	Battery.

If the power plant and the methods of its installation and control may be regarded as representative of the latest Marmon practice, it will greatly facilitate matters along this line to point out that the brakes and the various other means of controlling the road performance of the car are also adequately cared for. Fig. 6 shows the two pairs of internally expanding brake shoes placed side by side upon the axle member; the drums are of large diameter and the shoes are wide, so that the pressure per unit of area as it comes upon the friction bands is kept within the limit, having in view the fact that the best braking performance follows when a fabric is used, if the same is fireproof, and the speed of rotation is substantially that which obtains with road wheels.

Among the several types of bodies offered, the closed-front, for the five-passenger touring car, is especially notable, its straight-line effect appealing strongly to the taste of the critical. A similar body, somewhat shorter, is offered for those desiring a four-passenger toy tonneau effect. This car is offered in an open-front body also, while landaulets, limousines and coupés are built to order. A smart roadster, with gasoline tank, trunk and tire rack at the rear of the seats, is offered with the regular line.

The brakes are very large, effective, durable and absolutely dust-proof, with the most convenient adjustments. Quick detachable rims and 34 x 4 tires are standard, with an option of 32 x 4. One adjusting nut takes up all the play in the irreversible steering gear, an 18-inch wheel insuring ease and comfort in steering.

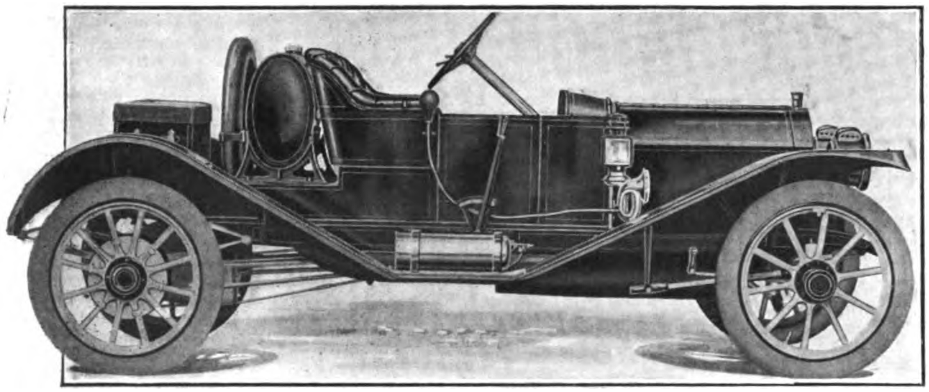


Fig. 11—Marmon "Thirty-two" roadster. Regular equipment as shown except the extra tire

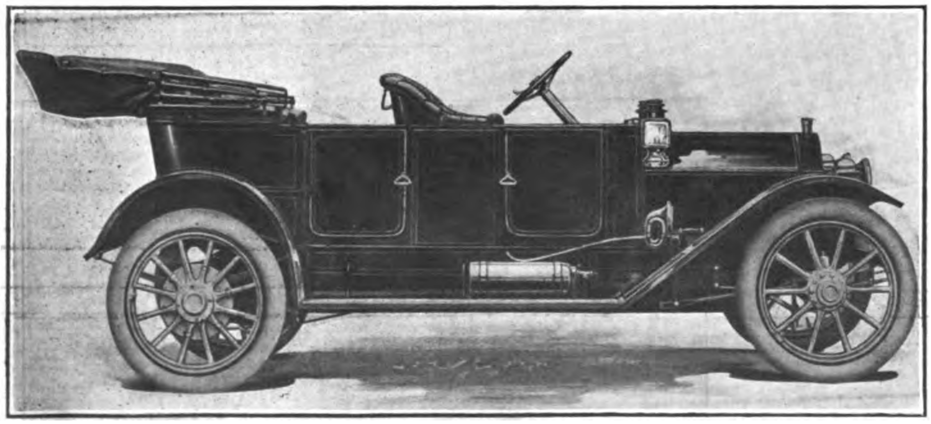


Fig. 12—Marmon "Thirty-two" five-passenger touring car

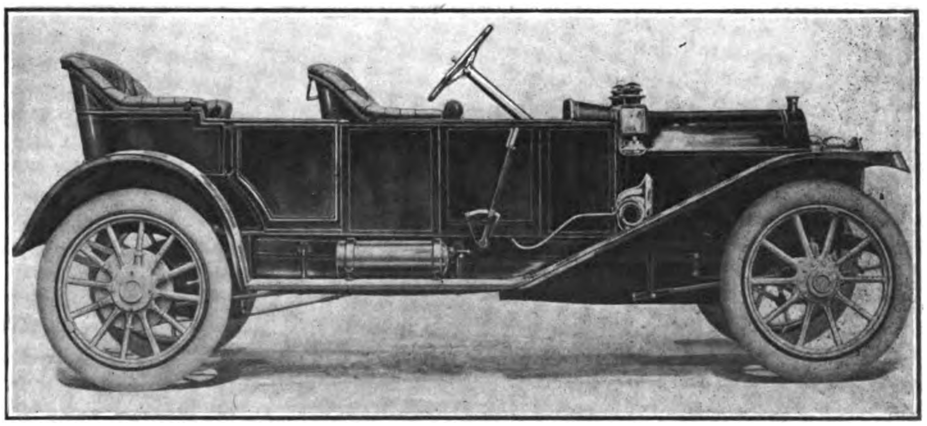


Fig. 9—Marmon "Thirty-two" four-passenger suburban

The easy-riding qualities for which the Marmon has always been noted are maintained by the use of well-proportioned full elliptic rear springs and semi-elliptic front springs.

Bodies are made of special perfected cast aluminum with sheet metal seat backs. Blue black with gray striping is the standard color scheme, although any other combination may be ordered. The upholstering is marked by the best of workmanship, only the best of genuine leather being used, with leather welts and binding. Spring backs, spring edge cushions, white curled hair piled, and clinch tufting buttons are used.

The fenders are of neat and graceful design, substantially made of sheet steel. They are enclosed next to the body, both front and rear and have outside flanged edges. The steps or running boards are of cast aluminum with neat pyramid surface and metal guards close the space back of the steps from the front to the rear fenders, thus confining the rush of air and carrying the dust far to the rear.

CARS AS OFFERED FOR 1911

Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
	Type	Speeds	Location	Drive				Crankshaft	Trans-mis'n	Axle		Front	Rear
	Selecti'e	3	Axle...	Shaft...	116	56½	P. Steel..	Plain...	Ball....	Roller...	2,300	34x4	34x4
Cone	Selecti'e	3	Axle...	Shaft...	116	56½	P. Steel..	Plain...	Ball....	Roller...	2,300	34x4	34x4
Cone	Selecti'e	3	Axle...	Shaft.	116	56½	P. Steel.	Plain...	Ball....	Roller...	2,300	34x4	34x4

Standard equipment includes two 8-inch gas lamps, option of generator or Prest-O-Lite tank, dash and tail lamps, horn, coat rail, foot rest, pump, jack and complete outfit of tools. Top, windshield, speedometer, clock, tire irons, trunk rack, air tank, and any other accessories not specified in the list, are charged extra at current prices.

All three of the Marmon body types for the season of 1911 are listed at $2,650—the Touring car seating 5; the Suburban, 4, and the Roadster, 2.

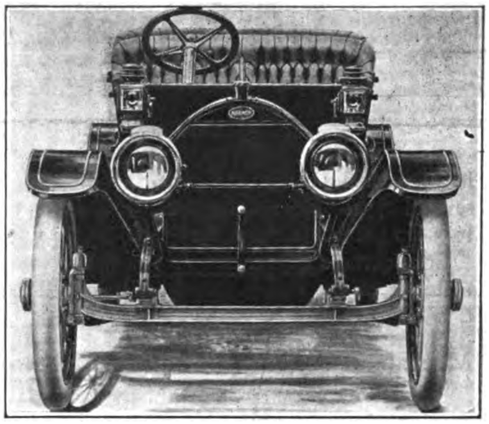


Fig. 10—Marmon "Thirty-two," front view

Front axle assembly, presenting an I-section axle with a drop center, long knuckle bearings, means for lubrication, and refinements

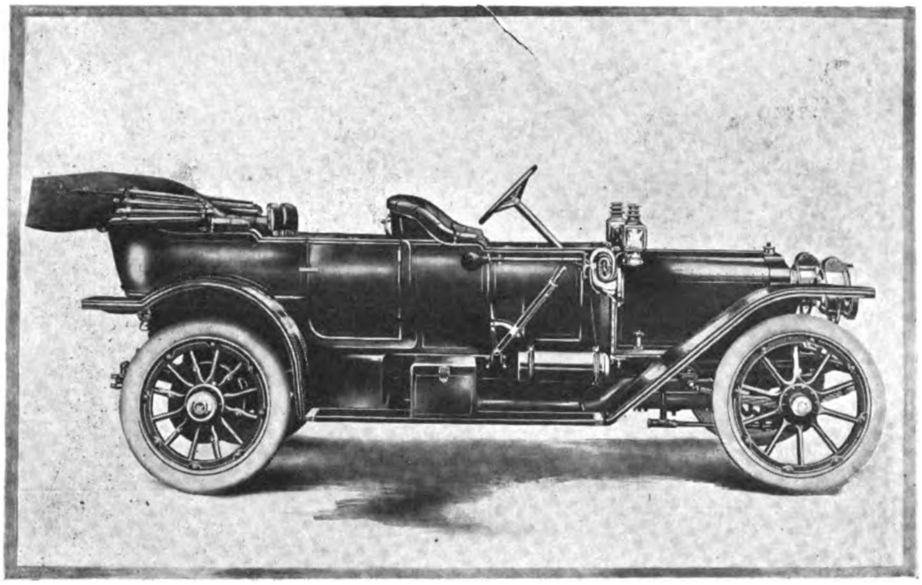
ADVICES from the American Motor Car Manufacturing Company, of Indianapolis, Ind., continue to indicate that the products of this make are holding the interest of a large and growing clientèle; the underslung scheme of design continues to make staunch friends, and large diameter road wheels assure easy riding under severe road conditions, with the further advantage of accentuated tire life. The remaining conditions for harmony are in the form of a long wheelbase, well-balanced weight distribution and ample power. The line of cars is somewhat extended, and in many ways the mechanical details are brought up to a higher state of perfection.

Reserve power has always been the starting point of the designers of this company, and the 1911 motors have been specially designed to bear out the reputation for high efficiency in this respect that the company's product has always borne.

The advantages of the underslung frame are obvious, for besides the minimizing of the tendency to side slip and rear lash at high speeds, a perfectly true straight-line drive is made possible and the occupants assured immunity from harm in the event of a front spring breaking. To these advantages must be added the low center of gravity, which decreases the possibility of turning over almost to the vanishing point.

Of the nine models which will be standard during the coming year the Roadster Special, the Speedster and the Traveler Special are equipped with motors developing 52.9 horsepower A.L.A.M. rating, while the Roadster, Roadster Coupé, Traveler, Traveler Coupé, Tourist and Limousine are all driven by 46.2-horsepower engines.

The Roadster and Speedster types are all two-passenger bodies; the Travelers, with the exception of the coupé, are five-passenger propositions (the latter carrying but four), while the Tourist and the Limousine each has a seating capacity of seven. All the Roadster and Speedster chassis have 112-inch wheel base, the other models measuring 124 inches in this particular—the tread



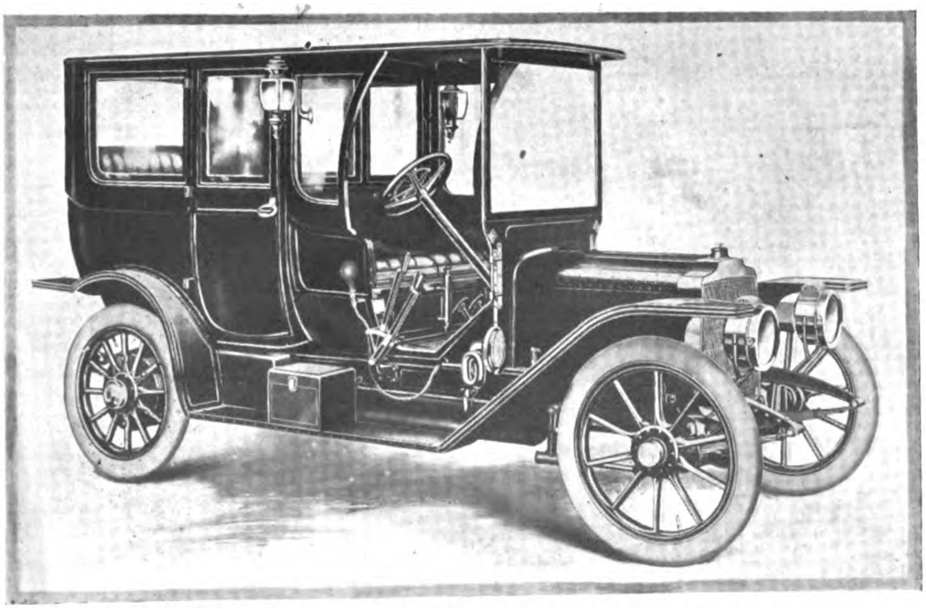
Fore-door type of "American" Tourist

in all models being uniformly 56 inches. The weight of the several types varies from 2,600 pounds in the Roadster Special to 3,600 pounds in the larger cars.

Considerable experience on the road has added stability to the contention that the weight question is on a basis of great stability.

Mechanical Features Brought to a High State

One of the principal objects in utilizing the underslung idea, coupled with a long wheel-base, is to attain perfection under severe road conditions. The center of gravity of the car is brought as close to the ground as possible in order that the turning over speed will be maximum. The factor of safety from the autoist's point of view lies in the difference between the speed at which the car travels and the speed at which it will turn over. This factor of safety is definitely established in this car. With a fixed tread, which is one of the conditions that every automobile must conform to, the turning over speed increases as the center of gravity is lowered. The American Motor Car Company, of Indianapolis, Ind., points out in its literature that the factor of driving safety will be 100 per cent. when the autoist is traveling at 42 miles per hour on a curve with a radius of 571 feet. This is the same as saying that safety terminates when the car is going 84 miles per hour around a curve the radius of which is 571 feet. Of course, it is not recommended that autoists should force the speed up to 84 miles per hour, but it is worth something to know just what the safe limit is.



"American" Limousine

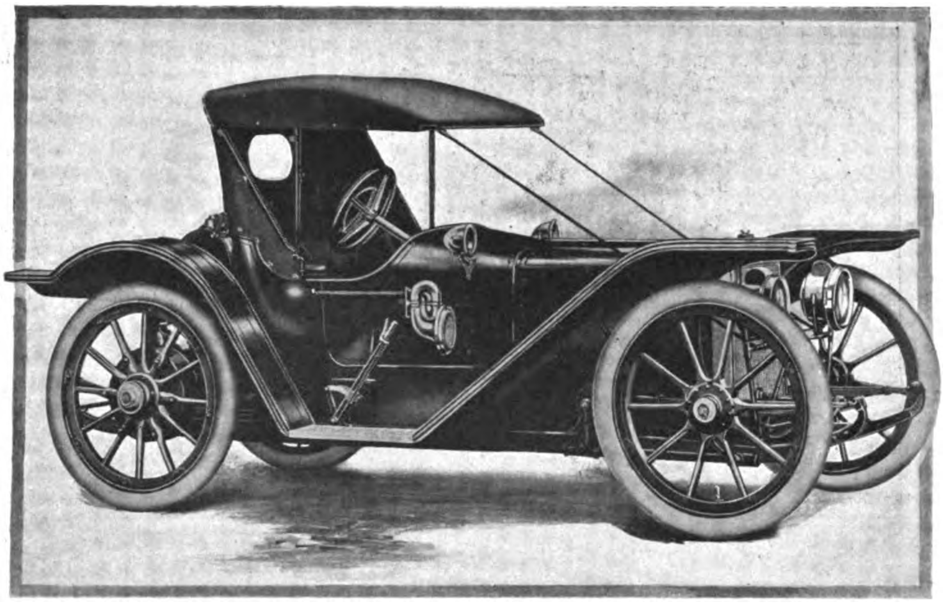
Having in view the necessity of a low center of gravity and the appending conditions, the mechanical equipment of the American cars is along lines consistent with the engineering aim. The motor is identical in the five models, having four cylinders, 5 3-8 x 5 1-2 inches bore and stroke, respectively, cast in pairs, working four-cycle water-cooled. The remaining models are fitted with a larger motor. Lubrication is positive utilizing a pump for circulation. The power is transmitted from the motor through a leather-faced cone clutch of proven proportions to a selective type transmission with four speeds, the same being located amidships on the frame. From the transmission to the live rear axle a shaft drive is used. The wheelbase is 112 inches in the Roadster, Roadster Special, Coupé and Speedster. In the Tourist model, however, the wheelbase is 124 inches, and this length obtains in the Traveler Special, Traveler Coupé, Tourist and Limousine. The tread is 56 inches in each case; pressed-steel side frames are used in all models. The bearing situation is adequately cared for through the good office of three plain bearings on each crankshaft, ball bearings are in the transmission system and throughout the axles. It is pointed out that the weight of the respective models is fixed with a view to good road performance and economy. If a car is too light there will not be sufficient traction and the tires will be worn out by slippage, but if the weight is excessive the tires will be disrupted. Fixing the weight, then, is regarded as an engineering situation of no mean purport.

SPECIFICATIONS FOR AMER

MODELS			BODY		MOTOR				COOLING		IGNITION	
	Price	H.P. A.L.A.M.	Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery
Roadster........	$4250	46.2	R'ster.	2	4	5⅜	5½	Pairs..	Tubular..	Cent'fl...	Bosch...	Storage..
R'ster Special...	5000	52.9	Rac'g..	2	4	5⅜	5½	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage..
R'ster Coupe.....	5250	46.2	Coupe.	2	4	5⅜	5½	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage..
Speedster........	5000	52.9	Sp'ster*	2	4	5⅜	5½	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage.
Traveler........	4250	46.2	T'ring...	5	4	5⅜	5½	Pairs..	Tubular.	Cent'fl..	Bosch...	Storage..
Tr'ler Special....	5000	52.9	T'neau.	5	4	5⅜	5½	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage..
Tr'ler Coupe.....	5250	46.2	Coupe*	4	4	5⅜	5½	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage..
Tourist.........	4250	46.2	T'ring*	7	4	5⅜	5½	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage..
Limousine......	5250	46.2	Limous.	7	4	5⅜	5½	Pairs..	Tubular.	Cent'fl...	Bosch..	Storage..

The tires used are especially large, they being 40 x 4-inch front and rear on the Roadster, 36 x 4-inch front and 36 x 5-inch rear on the Roadster Special, which size obtains with slight variation on three models, while the 40-inch diameter tire holds sway on four of the models.

The motor has two arms extending out from the upper half as depicted in the illustration of the left-hand side of the motor; the magneto M_1 is placed on a shelf that is cast integral with the top half



"American" Torpedo Roadster

also and the drive for the magneto is the same as for the pump P_1 for the circulation of the cooling water. Between the pump and the half-time gear housing H_1 an Oldham joint J_1 is located; by means of this joint all details of alignment are cared for, and in the event it is desired to remove and replace the pump or the magneto, the work may be accomplished without trouble or the fear that the parts will not go back into place and serve as well as when the motor comes from the assembling room of the maker. Among the other nice details of design that show good execution is the fan F_2 for propelling of air; it is driven by a wide leather belt B_1, taking power from a shrouded pulley that is fastened to the same shaft that drives the pump and magneto. The flywheel F_1 is of large diameter and sufficient width to assure an adequacy of flywheel effect; this is a necessity for a well-behaved, sweet-running motor. The lubricating oil is contained in the round oil holder O_1 which is seen between the two pairs of cylinders.

Glancing at the right-hand side of the motor it shows the Stromberg carbureter C_4 and a manifold of good shape M_2 Just above the intake manifold is the exhaust manifold M_3. For the breather B_2 there is an adjustable cap. The lubricating oil passes through the pipe O_2 and is maintained in active circulation by means of a plum that is located in the bottom half of the case. Plates P_1 and P_2 permit of access to the bottom half from the under side for purposes of cleaning and the oil pump is so located there that it can be removed and replaced at a moment's notice.

RS AS OFFERED FOR 1911

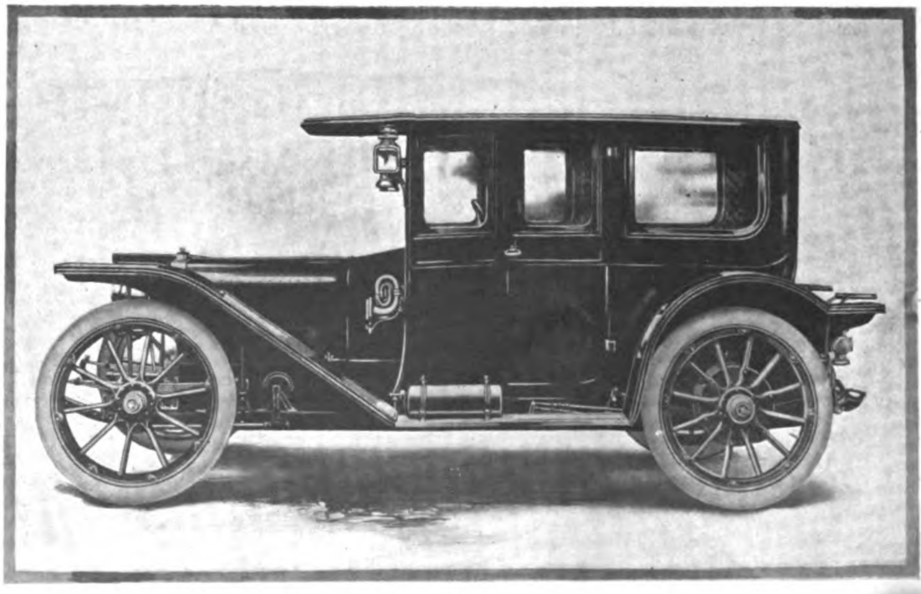
TRANSMISSION							BEARINGS				TIRES	
Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Trans-mis'n	Axle	Weight	Front	Rear
Selecti'e.	4	Frame.	Shaft...	112	56	P. Steel.	3 Plain	Ball....	Ball....	2,900	40x4	40x4
Selecti'e.	4	Frame.	Shaft...	112	56	P. Steel.	3 Plain	Ball....	Ball....	2,600	36x4	36x5
Selecti'e.	4	Frame.	Shaft...	112	56	P. Steel.	3 Plain	Ball....	Ball....	3,600	40x4	40x4
Selecti'e.	4	Frame.	Shaft...	112	56	P. Steel.	3 Plain	Ball....	Ball....	3,600	36x4	36x5
Selecti'e.	4	Frame.	Shaft...	124	56	P. Steel.	3 Plain	Ball....	Ball....	3,200	40x4	40x4
Selecti'e.	4	Frame.	Shaft...	124	56	P. Steel.	3 Plain	Ball....	Ball....	3,200	40x4	40x4
Selecti'e.	4	Frame.	Shaft...	124	56	P. Steel.	3 Plain	Ball....	Ball....	3,600	40x4	40x4
Selecti'e.	4	Frame.	Shaft...	124	56	P. Steel.	3 Plain	Ball....	Ball....	3,200	36x4	36x5
Selecti'e.	4	Frame.	Shaft...	124	56	P. Steel.	3 Plain	Ball....	Ball....	3,600	36x4	36x5

ype

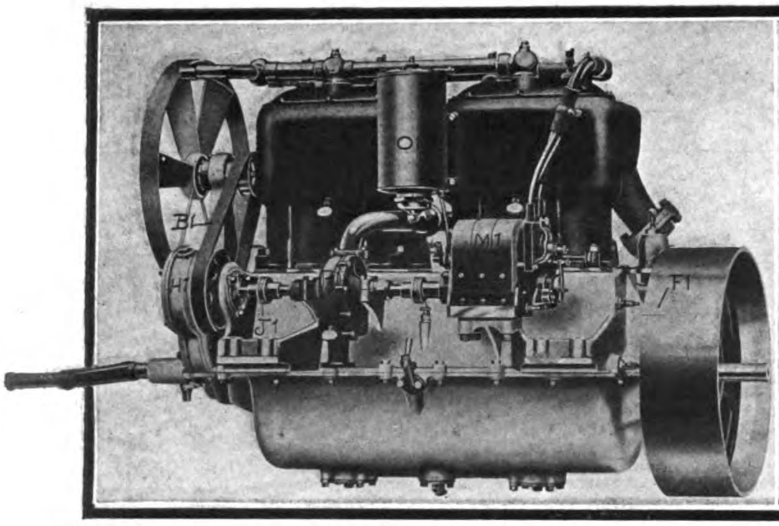
The front axle is of the I-section as shown in the title illustration. The shape is such as to afford great strength, and the knuckle bearings are large for the work with ample means for lubrication.

The steering equipment in addition to the use of a steering gear of the worm-and-sector type, with long and substantial bearings, a grease-tight case and a means for lubricating is rendered more substantial by the liberal yoke type of joints that are securely fastened to the cross and drag rods, through which steering is done. The material employed in these important members is selected with discrimination and the method employed in the fashioning of the parts is with the distinct idea of security. Instead of depending upon the ordinary keying methods at the various points in the transmission system, flanging is resorted to wherever it is possible; as an illustration of the working out of this idea, the floating axle members are flanged at the outer end and are milled around the periphery of the flanges to form integral claws that engage mates in the hubs of the wheels. At the other extremity of each floating member a fluted drive is used, and it is so designed that the floating members may be withdrawn at will. Moreover, the driving faces are on integral metal with four pressure points, whereas with a key there would be but one.

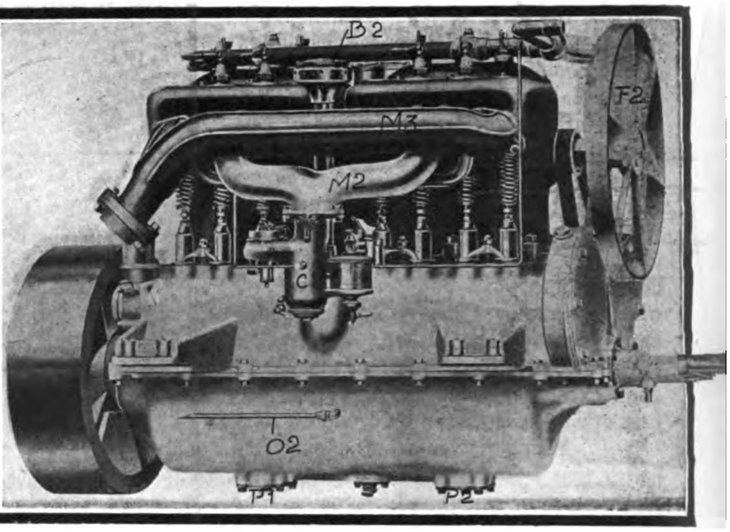
In the design of the clutch account is taken of the ills of inertia so that flywheel effect is reduced to a minimum. This is brought about by using the least possible amount of metal consistent with strength. But there is another innovation in the clutch, which takes on the form of air propeller veins, so that the clutch, in addition to serving for its normal purpose, adds its quota in the direction of keeping the motor cool. The clutch spring and the relating parts are protected by a dust-proof housing with means for introducing lubricant. The four-speed transmission gear is designed for strength, the spindles being short, and the gears of sufficiently wide face, considering the



"American" Traveler Coupé, with left-hand drive and center control



Magneto side of "American" Traveler and Roadster engine



Intake side of motor used on "American" Traveler and Roadster

excellence of the material, to withstand the exigencies of service during the life of the rest of the car. In the selective system the pick-up levers and yoke with guides and plungers are made into a separate unit, thus assuring perfect alignment. Provision is made for safety, it being impossible to have more than one

(*Continued on page 422.*)

Communications

VERY FEW HOUSES MORTGAGED TO BUY AUTOMOBILES; WANTS A NATIONAL LICENSING LAW FOR AUTOMOBILISTS; AFFORDING THE LATEST VIEWS IN RELATION TO THE EXPEDIENCY OF OWNING AN AUTOMOBILE

The Parson's Tires and Taxes—My little study set in the peaceful frame of a country parsonage is not often the theater of revulsions against the existing order, and it is with deep consciousness of the errors to which the human mind is prone that I venture to broach a subject so essentially worldly as to lie perchance beyond the province assigned to me. I feel, however, that I must bestir myself. This turbulence must be removed from my mind before I shall be able and fit to assuage sorrows and allay tribulations among my simple and honest parishioners who have learned to look to me for remedial powers over their troubles through the grace of divine faith. Let me initiate you in the situation. Scarcely a twelve month has lapsed since my good friends tendered me, out of their good will and after careful counsel of the proprieties, a mechanical vehicle by the aid of which it was believed I might be able to reach the sick and disconsolate in need of ministration. And I have greatly appreciated this thoughtful and modern gift. It has permitted me several times to meet and speak to the elders of neighboring towns, where the pure word is seldom heard, and my hired man Benjamin, who attends to agricultural and horticultural work at the parsonage and receives a half share of the income vouchsafed me through this source, assures me that a gain not wholly immaterial may be attributed to the uninterrupted employment of two horses whose services were formerly frequently required by me for parochial visits.

As it did not appear seemly that a man of the cloth should travel with a rapidity that partakes of haughtiness and engenders resentment, my parishioners manifested no little wisdom in selecting a mechanical vehicle resembling a buggy and having four high and thin wheels. With this I am enabled to travel in becoming modesty and I notice with much satisfaction that the dust, which unfortunately lies thick over our country thoroughfares, lanes and causeways, does not rise in opaque and rolling clouds following my progress and heralding my arrival.

For the quiet errands of mercy in which my friends particularly intended this vehicle to become instrumental, the rush and roar which, as I have occasion to observe, usually attend the employment of mechanical locomotion on our roads, would seem to be poorly in accordance with the command that thy left hand shall not know what thy right hand is doing.

I come now to that which has perturbed me. A printed notice was sent to me through the mail ordering me to forward the amount of the "automobile tax" duly and lawfully levied against me by reason of my possession of the mechanical vehicle above referred to, and I have taken pains to ascertain by careful inquiry that the amount which I am required by law to pay into the treasury of the commonwealth is exactly equal to the amount assessed against owners of vehicles which are equipped with large and thick tires and which, as I have personally observed, are enabled by means of these tires to travel, with comfort to their occupants and discomfort to others, at high speed. It was told me, and I have since verified this contention by correspondence with competent authorities on the questions of fact, that the chief reason which induced our legislators to impose a special financial burden upon the owners of mechanical vehicles resided in recognition of the injury done to all roads when mechanical vehicles are driven over them at high speed, it being needful to repair such injury and to levy taxes for defraying the expense of the repairs upon the taxpayers at large. My authorities inform me also, however, that the high speed which may be said to be potentially present in high motive power is never released in practice, unless such release may be indulged without discomfort to those seated in the vehicle. and that broad air-filled tires constitute the only known and practicable means by which discomfort at high speed may be effectually removed and, indeed, turned into an exhilaration of almost intoxicating powers over the human mind. Refraining from all comment to which I might be tempted, I quote these statements almost in the words of my legal informant.

Having been reared to apply logical processes in reasoning about the affairs of the world, while taking reason captive under the obedience of the faith in those greater things which transcend all comprehension, I am now moved to direct to you this earnest inquiry: Should not, in true justice, the taxes which are now levied upon mechanical vehicles and against the owners of such be levied, instead, upon rubber tires of the description known as pneumatic, from being intended to be filled with compressed air, and should not the amount of such tax be regulated according to the size and width of these air-filled tires?

In the comparative seclusion of my work and calling, the broad round tire, fat, rotund, as it comes bounding and swaying and softly undulating curves out of a cloud of the fine white powder of the macadam or from the murky effervescence of the country road, has come to be to me as an offensive symbol, not of mere opulence which is the distribution of Providence for ends we know not, but of a heathenish voluptuosity which recks little of aught but its own satisfactions. Believe me, I do not wish to entertain this turbulent bitterness, and I feel it should be possible to divorce it from my views by communicating with those who know the subject most intimately. Anticipating that the light which I confidently hope will reach me through your columns will cause a radical revision of my present standpoint with regard to tires and taxes, I would ask you to kindly omit my name if you allow me space for this letter in your valuable periodical.

Extravagance and Luxury vs. Economy and Necessity.—The telephone to-day is seldom classed as an extravagance and rarely as a luxury; on the contrary it is an economy and a necessity under modern conditions. The railway train and the electric car have also become necessities and are now recognized as economies if time is indeed a consideration. The argument that these modern means of transportation encourage more travel and the expenditure of a greater amount of money in traveling is refuted by the fact that in effect they reduce distance and save time, making possible undertakings otherwise impracticable.

Mayor Gaynor, of New York, said in a recent statement that the use of the motor car had increased the capacity of city streets six-fold over that of horse-drawn vehicles, which can be further reckoned as a saving of five-sixths of the time, an equivalent of reducing the distance to one-sixth. Would not travel by motor car be economy even with the mileage cost as great as by other means, notwithstanding the fact that the ease in traveling and the saving of time might induce an increase in travel?

It cannot be disputed that the motor car has greatly increased property values, making accessible remote localities, bringing the city to the farm, and the farmer to the markets. It encourages more time being spent in pure air by those confined to offices under the great pressure of modern business, and is of far greater benefit to the owner and his family than would be the annual interest on the same amount at 3 or 4 per cent. It would be quite as reasonable and practical to consider abandoning the electric car to return to the horse car, or giving up the steam railroad car to return to the prairie schooner, as to abandon the motor car.

It would be difficult to conceive of a banker refusing to make a loan on a responsible business merely on the ground that some portion of this money might be exchanged for an article which has astonished the world on account of the practical way in which it has effected a marked saving of time, being the equivalent of reducing distance. It is perfectly true perhaps that men have been known to mortgage their homes or to borrow on life insurance policies to buy machines, and as an indication of reckless extravagance and shiftless foolishness such a performance is to be deprecated, but there is no logic in blaming the automobile maker or denouncing his business as the cause of a silly act.

As a matter of fact there is less of this going on than some critics would have the public believe. A farm located an hour from the market, reckoned on the basis of horse travel, can be brought so much nearer in effect by the saving in a practical way of two-thirds of the time necessary to travel the distance, and why should the privilege be refused, or the farmer censured for employing a modern agent of economy any more than for the use of the modern self-binder in the harvesting of his grain. He is not criticised if he places a mortgage on his farm in order to purchase advanced equipment to carry on his work.

Unofficial statistics have been obtained which are interesting for they indicate that a possible 75 per cent. of the motor cars purchased are bought by those who have previously owned private conveyances, or are using the former in a commercial or semi-commercial way; it has also been shown that the wealthy almost invariably buy expensive cars and more than one car, and on a fair estimate 85 per cent. of the money invested in automobiles is expended by this class.—Harold O. Smith, president Premier Motor Manufacturing Company.

Mester editer af automobil paper Nujork—I ban tenking mester editer tenk dat Swede fello no gude. I get gude yob for dat mester editer sa in mine advertising derefor I pa 80 cent dat I vas gude shofer & I haf not rote tu tank mester editer. Vel I rote now. Ban in yob yoost 10 daes. Der is mester Hues & messes Huoes. Dey wa 400 pown. Der is 3 mamsel Hues & 2 yong Hues wit short pans. I tenk dey all wa 1000 pown. Sunda dey all get in kar an draiv tu Koniailen. Man from neks dore kom tel me kom fiks tire. He go wit me & fine dem were dey was. Dey all go hom with strit kar. I fiks tire & draiv kar. I go slo. Spring war bust. Gude littel Kar wit rum fer 3. Mamsel Kati yoost neks dore lern me inglis over fens. Kati sa yoost rite samma wa I tawk. Fikst spring yestidda an tenk I vill fiks it som more.—Eric Ericsson.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL CLIMBS, ETC.

Dec. 1............Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11.New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 16-21, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11, '11.Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Mch. 4-11, 1911...Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.

Races, Hill-Climbs, Etc.

Sept. 5-10........Minneapolis, Minn., Track Meet at State Fair.
Sept. 7-10........Buffalo, N. Y., Reliability Run, A. C. of Buffalo.
Sept. 9-10........Providence, R. I., Track Meet.
Sept. 10..........Los Angeles, Cal., Mount Baldy Road Race.
Sept. 10..........San Francisco, Cal., Golden Gate Park Road Race, Automobile Club of San Francisco.
Sept. 10-12.......Catskill Reliability Contest and Hill Climb, Motor Contest Association.
Sept. 10-12.......Seattle, Wash., Race Meet.
Sept. 15..........Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Sept. 16-26.......Asbury Park, N. J., Aviation Meet, Aero Club of America.
Sept. 17..........Syracuse, N. Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept. 24..........Belmont Track, Narberth Race Meet, Norristown Automobile Club.
Sept., middle of...Chicago, Commercial Car Reliability Contest of Chicago Automobile Club.

Foreign Shows and Races

May 1-Oct. 1....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
Aug. 1-Sept. 15...French Industrial Vehicle Trials.
Oct. 15-Nov. 2....Paris, France, Aeronautical Society Show.

THE AUTOMOBILE

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Long Distance Telephone - - - - - - - - - - - - - 2046 Bryant, New York

SUBSCRIPTION RATES
United States and Mexico - - - - - - - - - - - - One Year, $3.00
Other Countries in Postal Union, including Canada - - - - One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

FOREIGN SUBSCRIPTION AGENTS
ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

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RACING, if it is classed as a sport, interests the supporting public in one way if it is clean sport, and in quite another way if it is conducted on a scurvy basis.

* * *

THE better class of citizen wants clean sport, and is for the square deal. This character of man can be taken in once simply because his natural inference is that a sporting event will be conducted in a clean way, for he assumes that men are sane, and he knows that it is suicidal to conduct a sporting event otherwise than on a clean basis.

* * *

THE other class of citizen, of which America has mighty few, is out for the dollar, and he doesn't care a hang whether he gets a clean one or not. It is this class of man that provides first-class material for the making of a "short-change" artist—he permeates every grade of society, and the automobile industry has seen enough of him.

* * *

HOW to get rid of the alleged sport, or, better yet, the "blackleg," is a serious problem. The supporters of the automobile industry relied upon the rules as promulgated by the "Contest Board" to accomplish this considerable undertaking. Are the rules equal to the task?

RULE 78 on page 24 of the official edition as issued by the Contest Board is as follows: "78. Records—The Contest Board shall pass upon all records and may decline to accept any claim which, in its opinion, would not promote the interests of the sport.

* * *

"NO claim for a record of one mile or under and up to five miles will be considered by the Contest Board, unless the same is taken by an automatic electric or mechanical timing device approved by the Contest Board, and the actual printed evidence taken by such timing device is submitted to the Board together with the claim for the record."

* * *

IF rule 78 debars the Contest Board from accepting a claim for a record, if the same is made in the absence of an electrical or mechanical timing device, has the Contest Board any right to sanction a meet if it knows that the race is to be run in the absence of any suitable provision for carrying out the terms of the rules?

* * *

THE law says that it is a crime to commit murder. A judge passes the death sentence on a convicted murderer; would a judge have any right to help the murderer commit the crime?

* * *

CAN the Contest Board afford to sanction a race if the public is to be "taken in"? Is it not true that the public relies upon the Contest Board to protect it against unclean sport? Is it clean sport to conduct an event and put up a set of conditions that are in absolute violation of the recognized rules?

* * *

IF the Contest Board believes that an electrical or mechanical timing device is necessary in order to ascertain the real time that a car may make, how can it be claimed by anyone that an event recorded in any other way is sufficiently accurate to be worthy of serious consideration?

* * *

MANY of the best citizens who are vitally interested in the success of the automobile industry voice the sentiment which has for its foundation the fact that the racing situation is far from healthy and a detriment to the art. How can it be otherwise if races are to be sanctioned despite the fact that the conditions under which they are to be run are known beforehand to be in absolute violation of the rules?

* * *

IT was stated over the 'phone by a representative of the Contest Board to the Editor of THE AUTOMOBILE on September 6 that there would be no racing to speak of were the Board to decline to give sanctions for events that do not conform to the rules. Does the Contest Board willingly accept a position that is equivalent in every sense of the word to the foxy "bull" that is used at the slaughter house in Chicago to lure cattle to slaughter? Is the public to be treated as cattle?

Jarred Editorial Brains

DISCUSSING THE FEASIBILITY OF HAVING THE EDITOR'S BRAINS PUT IN A JAR FOR SAFEKEEPING WHILE A SELF-APPOINTED SUBSTITUTE DOES THE REST

THE advertising of locomotives in a journal devoted to dressmaking—it not being a kindred subject—litters up the pages of the paper and adds absolutely nothing of value from the subscriber's point of view—in fact, such practice insults the intelligence of the reader.

But in a paper devoted to the automobile, if advertising is confined to the subject that is kindred, it stands to reason that the subscriber is benefited to whatever extent he will be able to improve his knowledge of the subject along constructive lines. Naturally enough, the reader of the paper devoted to the automobile subject would see nothing of value in an advertisement of some grade of whiskey, no more than he would were he confronted by an advertisement of caskets and other funeral trappings.

Of course advertising is placed in a paper for remunerative reasons; certainly, the income of the paper is substantially from advertisers. But a fact is not reduced to the level of a fallacy because it is stated in the advertising pages of a paper. One more point: the paper, if it is well edited, costs more to build than is received from subscribers—considerably more.

This being true, advertising is valuable to the reader; first, on the ground that it states interesting things and relates constructive facts that the reader is interested in, and, second, it affords the means for enterprise, bringing about a condition which permits the editor to reach out and pay for matter that the reader cannot get by perusing the advertising pages.

True, a paper that publishes nothing but puffs for the advertisers offers nothing in return for the subscription price but the same character of information as will be contained in the advertising. Equally true, a paper edited along such lines is more than likely to take advertising that may not be confined to facts.

Is it the proper business of the editor of a paper to censor the material that is to be used in the paper? Take for example:

> "Wanted—A promising yeggman, who is not afraid of consequences; one who can shoot straight; a man, in fine, to be depended upon in an emergency."

In view of the brevity of advertising language it is frequently desirable to editorially comment upon the matter advertised; what comment would a self-respecting editor make were he to take up the subject as it is portrayed in the above specimen of advertising?

But if the same editor were to take an interest in some device that is briefly announced in the advertising pages of a paper that does censor the material that ultimately finds a resting place within the confines of its two covers, is he not doing the very thing that the reader pays his subscription price for? Is the advertiser receiving a special concession?

No. The editor works for the reader of the paper; he is the servant of the reader; his business is to be faithful to the subscriber. If the advertiser gets any benefit at all it is because he has the good sense to do the kind of business that is worth talking about from the reader's point of view.

On this account the paper that employs an honest servant for the subscriber becomes the best medium to advertise in. Why? Because the reader will be a man of influence and discriminating intelligence, and, what is equally to the point, the dishonest advertiser will find the other character of paper in which to expose his wares.

The value of advertising matter to the reader then depends upon the competence of the reader's servant—the editor. If the servant is faithful to his plan the reading matter in relation to the state of the art will be as good as the editor can honestly make it, and the advertiser will be of that class which, having real things to dispose of, selects the medium that commands respect.

When a man elects to purchase an automobile, whom does he consult first? The advertiser? The least intelligent person in his immediate locality? Does he send out to the newspaper stand and buy a copy of a paper devoted to banking, for instance?

Would it be too much to believe that he might ring up his respected friend, or even casual acquaintance, and say: "Hello! Is this you, Mr. Jones? Say, I'm Houseanlot; I want to buy an automobile; don't know a thing about 'em; I see you have a car; it seems to give you satisfaction; what would you do were you in my place?"

Other end of the line, "Well, I'll tell you; the car I have has done very well; it's three years old; I intend to sell it this year and then I will buy a ——— car. I see by the paper which I read that things are growing a little better from time to time, and I am able to place reliance in what my paper says; in your case, the demand will be a little different from mine; why don't you subscribe to my paper and get coached up—it will help you to judge better of the possibilities."

In all fairness, considering the situation broadly, it is scarcely to be taken for granted that advertising litters up the pages of a paper unless the advertiser clubs the editor into insensibility; in that event it of course follows that the editorial pages will be but a poor form of advertising, given as a premium by the editor who surrenders his right to think.

Would an advertiser patronize a paper that could not command the notice of readers? Not after the point is made clear. Would readers put in time perusing a paper that comes from a hobbled pen? Not unless they are brainless. Could an editor get rid of his brains any more effectually on a surgeon's table in a well-appointed hospital than he could by allowing an advertiser to club him into submission? Why go further in this vein?

How may a capable medium be known? How does a Mason know another Mason? You say he gives a sign! Does he not display his intelligence? Swapping editors for Masons for the moment, would an editor display any intelligence were he to go to a hospital and say to the surgeon: "Remove my brains from their present abiding place and put them in a glass jar for safekeeping; I do not need them just now; I get money for letting other people think for me."

How long do you imagine that these "thinkers" would support the industry? Let me tell you: just long enough to convince readers that the editor's brains are in a jar on a shelf in the hospital.

What is the sane conclusion? Let us reach it together: The readers of a paper that is edited by "jarred" brains, were they to go to the hospital to have an operation performed upon them, would fool the surgeon and the jar would remain empty. Such readers would have no purchasing power, hence they would be of absolutely no value to an advertiser.

If the advertiser can reap no reward by patronizing a paper, how is the subscriber to get his money's worth out of it? The cost of reading a worthless medium is more than the subscription price; the time consumed is worth something; but, more, the lost opportunity is not to be thrust aside—it might represent whatever it would cost to be decoyed into buying an automobile that it not fitted to the intended service.

But if a man purchases that which he cannot use, no matter what the cost of it might be, he still has to purchase what he wants, and the cost of it must be added to the money wasted; such are the ramifications; they, in a measure, indicate the responsibilities of the character of editor who prefers not to call upon the surgeon.

Doings in the East

PHILADELPHIA CLUB PREPARING FOR FALL RUN—AUTOCAR COMPANY ESTABLISHES SCHOOL FOR DRIVERS—PREPARATIONS COMPLETED FOR SYRACUSE RUN—TRADE ITEMS

—Edwin Swartley, Philadelphia manager for the KlineKar, has resigned.

—William F. Adams has been appointed manager of the Grout branch in Boston and Allie McKenna has been made assistant manager.

—The Moon car is again represented in Boston after a lapse of two years, this time by the Linscott Motor Company. It was taken on to fill out the line.

—F. Wallis Armstrong Company, of Philadelphia, announces that on September 1 the company assumed the assets and liabilities of Powers & Armstrong Company, of the Quaker City.

—President H. O. Smith, of the Premier Company has rewarded Henry L. Johnson, who has so successfully managed the Boston branch for the past few years, with an important factory position.

—The Fanning Motor Company, Philadelphia distributer of the Thomas Flyer, has secured new and more attractive quarters in the Scottish Rite building, southwest corner of Broad and Race streets.

—The Petrel car, a product of Milwaukee and a newcomer to the Philadelphia field, will be represented there by Reamer & Haines, 2214 Spring Garden street, which firm now handles the Baker Electric.

—Boston will have two additional motor chemical wagons if the new fire commissioner, Francis M. Carroll, has his way. He asks for them in his estimate just made up and puts the price at $11,000.

—Jay B. Cothran has been appointed manager of the New York branch of the Fisk Rubber Company to succeed E. H. Broadwell, who has been named vice-president and general manager of the Hudson Motor Car Company.

—The American Automobile Company, of Boston, has secured William P. Barnhart for its manager. He had been manager of one of the big taxicab companies for a couple of years and succeeded in correcting many abuses.

—The Amos-Pierce Automobile Company, of Syracuse, N. Y., will be succeeded in a few days by The Standard Automobile Company, of which C. Arthur Benjamin is the controlling spirit. C. L. Amos and H. C. Pierce have constituted The Amos-Pierce Automobile Company.

—F. G. Seitz, until recently assistant sales manager of the Olds Motor Works, of Lansing, Mich., has been appointed by that company as manager of its Philadelphia offices. His territory will embrace Eastern Pennsylvania, Southern New Jersey, Maryland, Delaware, Virginia and part of West Virginia.

—According to announcement of the S. B. R. Specialty Company, of East Orange, N. J., action has been commenced against the S. Toffler Company in the United States Circuit Court of New York praying for injunction and damages on account of alleged infringement of a muffler-cutout patented by the complainants.

—A 40-horsepower motor chemical has been installed at Belmost, Mass., having successfully passed the required test for efficiency. It will carry 10 men, but on the test more than a score were whisked along over a mile course in four minutes. Previously the machine went 300 feet and had a stream playing in 15 seconds.

—One of the latest additions to Philadelphia's automobile row is the Owen car, the agency of which has been secured by E. R. Jackson and W. H. Walter, under the firm name of the Jackson-Walter Company. The company is temporarily transacting business from the Bellevue-Stratford garage, pending the securing of suitable quarters on North Broad street.

—The Autocar Company, of Ardmore, Pa., has recently inaugurated an unique school for instructing drivers at its factory, where each purchaser of an Autocar truck may send his driver to secure a complete course in the knowledge of all vital parts of construction and the first rudiments of repairing, shifting of gears, application of brakes and general points on the care and use of the car. T. H. Dwight, an auto expert, delivers daily lectures on the cooling and oiling systems, etc. The object is to make assurance that the driver thoroughly understands his car and helps to protect the general public by eliminating the novice from the steering wheel of the commercial truck.

—Arrangements are being perfected for the Fall run of the Automobile Club of Philadelphia, which is scheduled to take place on Saturday and Sunday, September 17 and 18. The only definite thing known at present concerning the route is that of the distance—approximately 120 miles on each of the two days. The following have signified their intention of participating: Chalmers, Harvey Ringler, driver; Stevens-Duryea, Frank Hitchcock; Pierce-Racine, D. Walter Harper; Stoddard-Dayton, W. W. Randall; Stearns, Mrs. H. B. Ullman; Stanley, Mrs. D. Walter Harper; Buick, Mrs. Edward Wilkie; Jackson, Ira L. Brown; Cadillac, H. R. Shoch; Buick, Edward Wilkie; Buick, Thomas Wilkie; Marmon, Joseph Hudson; Owen, E. R. Jackson; Locomobile, Howard McTurk; Pullman, W. C. Longstreth; Premier, Alan Sheldon; Brush, Charles Kammerer; Interstate, M. Wertheimer; Palmer-Singer, Chas. Miller; Premier, H. E. Grant; Stevens-Duryea, F. W. Eveland; Mitchell, Walter Cran; Elmore, Frank Hardort, Sr.

—The date of the Syracuse *Herald* Sociability Run has been definitely fixed for Saturday, Sept. 24. It is the second annual run promoted by this paper. The route has been determined; Syracuse to Camillus, to Elbridge, to Auburn, Owasco, thence to west shore of Skaneateles Lake, Skaneateles Village, Marcellus, Camillus, Syracuse, in all 75 miles. The run is through a beautiful region, and the start will be made at 1:30 P. M. and the run will be finished about 5 o'clock. The secret time allowance will be placed in the hands of Mayor Edward Schoeneck. The winner will receive the *Herald* solid silver trophy, valued at $100. Like all the other prizes, this will be for permanent ownership. The Syracuse Automobile Dealers' Association will give the second prize, a silver cup valued at $50. The other prizes, all donated by the *Herald*, include gold medal to third and silver medal to fourth and gold and silver medals to the second and third women drivers coming closest to the secret time. The Automobile Club of Syracuse donates a silver cup to the woman coming closest to the figure establshed.

New Jersey Only State That Don't Reciprocate

ALBANY, Sept. 3—The Secretary of State announced last night that in conformity with the supplementary opinion rendered to him by Attorney-General O'Malley, the list of States now exempt from registering here under the Callan law is as follows: California, Connecticut, Delaware, Florida, Illinois, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Maine, Nebraska, New Hampshire, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Virginia, Washington and Wisconsin.

The Province of New Brunswick, Canada, is also exempted under the new law. The other Canadian provinces are not as they require auto tourists to register.

New Jersey is the only Eastern State now that does not have reciprocal relations with New York's automobile laws.

Overland Wins the U. S. M. Test

PHILADELPHIA, Sept. 3—The Overland car was victorious in the United States Mail automobile efficiency test which started last Monday and continued during the week under the joint direction of the Philadelphia Post Office officials and the Quaker City Motor Club. Each day the cars made the first delivery of mail to Bustleton and Torresdale, near-by suburban points. The primary object of the test was to demonstrate that the mail could be carried more rapidly and reliably, as well as more economically, by this modern method than by the old-time and antiquated system of horse and buggy delivery.

Incidentally, there was competition between the different makes of cars, for which a prize will be given. The complete returns of the run, from August 29 to September 3, inclusive, were announced to-day as follows:

Date	Car	Driver	P. O. Station	Mileage	Start	Fin.	St'ps	Time
8/29	Bergdoll	Vaughan	Torresdale	19 2-10	7.05	8.58	102	1.53.
	Maxwell	Smith	Bustleton	18 2-10	7.30	9.37	79	2.07*
8/30	Hudson	Yerger, F.	Torresdale	19 2-10	7.08	8.49	102	1.41
	Oakland	McGee	Bustleton	18 2-10	7.25	9.29	79	2.04
8/31	Overland	Greenwood	Torresdale	19 2-10	7.03	8.38	103	1.35†
	Kline Kar	Morton	Bustleton	18 2-10	7.40	9.15	79	1.35
9/1	Kline Kar	Morton	Torresdale	19 2-10	2.11	4.03	102	1.52
	Pullman	Bitner	Bustleton	18 2-10	7.30	9.10	79	1.40
9/2	Reo	Yerger, I.	Torresdale	19 2-10	7.13	4.40	102	9.27
	Parry	M'Cullough	Bustleton	Failed to report for run				
9/3	Mitchell	Bishop	Torresdale	19 2-10	7.16	8.54	102	1.38‡
	Haynes	LaRoche	Bustleton	18 2-10	7.48	9.26	79	1.38

(*) Five minutes off, blocked at railroad crossing.
(†) Two minutes off, extra stop in Bucks County, off route.
(‡) Four minutes off, extra stop in Bucks County, off route.
Overland wins. Time, 1.33.

Contest Board Awakened to Action

The glaring fault in the present plan of sanctioning meets was called to the attention of Chairman Butler of the Contest Board by THE AUTOMOBILE; it was admitted that the situation is a menace to clean sport, the following notice resulting:

> Attention is called to Rule 78 of the 1910 Contest Rules in regard to "Records," which provides that the Contest Board shall pass upon all records and may decline to accept any claim which, in its opinion, would not promote the interests of the sport; that no claim for a record of one mile or under and up to five miles will be considered by the Contest Board unless the same is taken by an automatic electrical or mechanical timing device approved by the Board; that no record will be recognized unless claim for same is made within ten days of its accomplishment, unless the Contest Board consider that the circumstances warrant a delay, and that no claim for record will be considered unless the sworn statements of the referee, chief timer and surveyor of the track or course are presented to the Contest Board.
>
> It should be clearly understood that no performances of one mile or under and up to five miles which are timed by stop watches only will be accepted by the Contest Board or recognized as breaking existing records for such distances.
>
> It is a well recognized fact that in the timing of cars at high speeds the personal equation of the individual watch-holder is too variable a one to permit of the results so obtained being made the basis of award of speed supremacy when the dividing line between existing and new records is narrowed down to a few fifths of a second.
>
> The considerable publicity which has recently been given certain track speed performances timed by stop watches in the hands of individual timers is wholly without official recognition or acceptance.

Silent Knight Patents Gone to Issue

Some of the controversies in relation to the basic character of the Knight patent may now be extended without the reader being wrongly informed. While the general design of the Knight motor as it is used in the British Daimler and certain other foreign cars is quite well understood, the fact remains that the patent has been held as a secret up to a day or two ago.

Middle West News

COLUMBUS LEGISLATING AGAINST OPEN MUFFLERS—OHIO'S ATTORNEY-GENERAL HOLDS THAT JUSTICES OF THE PEACE HAVEN'T FINAL JURISDICTION IN AUTOMOBILE CASES—NEWS OF ALL SORTS

—Frank B. Willis, of the Willis-Holcomb Co., will succeed Frank Staley as manager of the Studebaker Brothers Company of Indianapolis.

—At Washington C. H., Ohio, enterprising citizens have subscribed $50,000 of $75,000 necessary to secure the Pilot Automobile Company for that place.

—The Adams Bros. Company, of Findlay, Ohio, has been formed to build commercial trucks, and a large plant at that place has been leased by the concern. L. A. Adams is president of the company.

—The Columbus Buggy Company, of Columbus, Ohio, has completed its models for gasoline cars for 1911. The company announces eight models, which will include the full line of touring cars, runabouts and landaulets.

—The McLeary Engineering Company, of Toledo, has been incorporated with an authorized capital of $25,000 to manufacture and sell motors for aeroplanes and automobiles and to do a general automobile repairing business.

—Creditors of the Indiana Motor and Manufacturing Company, which makes the Continental "35," have decided that the plant shall remain in operation. The company has its principal offices in Indianapolis and its factory at Franklin.

—The automobile manufacturers of Indianapolis have agreed to test their cars on the Motor Speedway, instead of in the streets and on country roads. At the Speedway a man will be assigned to keep a record of the work of each test car driver.

—Announcement has been made that the recently organized Auto Sales Company, of Indianapolis, has taken over the business of the Auto Motor Company at 23 Kentucky avenue and with it the Fuller, Cutting, Monitor, Jackson, Westcott and Demot agencies.

—The Hudson Sales Company, of Columbus, Ohio, of which Levi R. Smith is manager, has been organized to take the 1911 agency for the Hudson in Central Ohio. The concern has located at 241 North Fourth street, and consists of a partnership of Levi R. Smith and William Gaither.

—The Great Western Automobile Company has announced that it will guarantee its 1911 "40" model against defects for one year from the time of purchase, and has authorized its agents and dealers to sell with that provision.

—An ordinance was introduced in the Columbus, Ohio, City Council by Councilman Ernest M. Baldridge providing that every automobile, motor-cycle or other self-propelled vehicle, excepting automobiles operated by electricity, must be provided with a muffler when operated on the streets of the city in order to make less noise.

—A number of improvements are to be made at the Indianapolis plant of the Premier Motor Manufacturing Co., which has bought considerable property in Georgia street, opposite its present plant. An immense machine shop and several other buildings are to be erected immediately, the contracts for these having been let.

—In an opinion recently handed down by Attorney-General U. G. Denman, of Ohio, to William Brown, Cleveland justice of the peace, it is held that a justice of the peace has not final jurisdiction in a prosecution for violation of the State automobile law unless the accused either pleads guilty or waives the right to trial by jury.

—The Case Motor Car Company, capital $50,000, has been incorporated at New Bremen, Ohio, by J. H. and Edmund Grothaus, J. F. Laufersieck, Otto J. Doesel, Louis Huenke and others. The former plant of the Grothaus-Laufersieck Company will be fitted up for the manufacture of commercial motor trucks.

The Week in Detroit

ORGANIZERS AT WORK UNIONIZING THE AUTOMOBILE FACTORY HANDS—NEW CARS ON THE MARKET—NEW FACTORY AND AGENCY BUILDINGS—TRADE AND PERSONAL NOTES

DETROIT, Sept. 5—Automobile interests are viewing with mixed emotions the operations of six international union organizers who have been working among the various branches of skilled labor in the factories here. While other lines are involved, the automobile industry has been given the most serious consideration by these organizers, who express themselves as gratified at the progress made. For years trades unionism flourished here. Then it fell into decadence, workingmen preferring to go it alone. Then the building trades council was wrecked while fighting the employers, and since that time the open shop has prevailed in most quarters, a man's affiliations with labor bodies not being taken into consideration by employers. The automobile industry has furnished employment to thousands of skilled mechanics. Not less than 50,000 men gain a livelihood from the motor car and allied interests in this city. They receive the highest wages and are content. It is due in no small degree to this happy state of affairs that the industry has grown to such proportions. Whether these conditions are to be disturbed and whether the advent of labor organizers will inject a discordant element, is what is causing employers and the great majority of the workmen themselves to watch developments with more than passing interest. The men working here are Thomas H. Flynn, general organizer for the Federation of Labor; Clarence Dowd, Amalgamated Association of Machinists; L. D. Redding, Amalgamated Association of Meat Cutters and Butcher Workmen; Martin Ludwig, International Metal Polishers; John J. Hynes, Sheet Metal Workers; Harry T. Ajax, Journeymen Tailors.

John N. Anhut, former president of the Anhut Motor Car Co., whose absence from the city at a time when the affairs of the company were in a chaotic condition caused some little gossip until he was finally located in Europe, returned home last week and has been busy with his campaign for renomination for State Senator ever since.

The Faulkner-Blanchard Motor Car Co. has been organized to manufacture the Faulkner-Blanchard "Gunboat Six," designed by Frederick W. Blanchard. M. A. Faulkner is president and manager of the company, which has not as yet decided upon a location.

Detroit's automobile fire engine, which has been in active service for some time, demonstrated its value one day last week when it made a run to Grosse Pointe, a fashionable suburb, in response to a call for help. The distance traversed on the outbound trip was 10 1-4 miles, this being covered in exactly 19 minutes, including one full stop and several slowdowns, demonstrating the value of the engine in the event of reinforcements being required in distant parts of the city.

The E-M-F Company has purchased two acres of additional ground adjoining its plant on Clark avenue, which will enable it to double the size of buildings it will shortly erect at this point.

The big Buick factory in Flint has resumed operations on a conservative basis, and, with several new car and parts factories nearing completion, plans are under way for still further extensions before snow flies.

The Bower Roller Bearing Co., makers of roller bearings for automobiles, railroad cars and all kinds of rolling stock, now located in Dayton, O., will begin work immediately on a large new factory at Goethe avenue and Hart street, plans for which have been prepared by Architect Albert Kahn and Ernest Wilby, associate.

A group of buildings that will double its present capacity is being erected by the Kelsey Wheel Co., 1208-1250 Military avenue. The plant, when the additions now going up are completed, will represent an investment of $200,000, and still further improvements, to cost not less than $100,000, are contemplated.

A building permit has been taken out by the Packard Motor Car Co. for a $10,000 power house, to be used in connection with its foundry and forge shops. The company is also putting in loading tracks at its No. 8 plant, on Bellevue avenue.

The "Suburban Limited," which will be manufactured here by the DeSchaum Motor Car Co., made its appearance on the streets last week and attracted considerable attention. It is a light car, of from 16 to 20 horsepower. All parts are Hecla steel and practically all of them are under the hood. It will sell from $900 to $1,000. The company is composed of 10 Detroit business men, including W. Andrew DeSchaum, designer of the car. They expect to turn out 500 cars next year.

The dedication of the completed portion of the immense new plant the Warren Motor Car Co. is building on Holden avenue, last Thursday night, was a most enjoyable affair. Two orchestras furnished music for dancing, which was participated in by some 300 couples, including employees and their ladies. Postmaster Homer Warren, president of the company, gave a brief talk, in which he thanked the employees for their hearty co-operation.

American Cars for 1911

(*Continued from page* 416.)

pair of gears in mesh at one time, and the means of locking are not only positive, but of such a rugged nature as to assure this positive action for all time.

Passing beyond the question of universal joints at the several necessary points, they being well represented, it is pointed out that the brakes, of which there are two sets, located in large drums in the rear wheels arranged alongside of each other, internally expanding, have large surfaces and a means for expanding the shoes and are such as to give the maximum braking effect. The drums are protected by plates to keep out foreign matter and each pair of brake shoes in each drum is assembled as a unit.

This unit assembling idea obtains throughout the car. The live rear axle with its brake drums, including the torsion tube up to the universal joint, constitute a complete unit; the transmission gear represents a unit; the clutch and its mechanism another unit; the motor and its accessories form a unit, and so on. This unit system is again handled in the form of sub-units so that a proper description of the plant would include the idea that there are units within units.

Forty-inch wheels continue to be features of the Roadster, the Roadster Coupé, the Traveler, the Traveler Special and the Traveler Coupé, the remaining types being equipped with 36-inch wheels. The large wheel tire equipment is uniformly 40x4 front and rear, the cars fitted with the smaller wheels being shod with 36x4 tires on the front pair and 36x5 on the rear. The American standard equipment on the Roadster, Roadster Special, Traveler, Traveler Special and Tourist includes: Top and slip cover, shock absorbers on rear, Continental demountable rims (two spare), Prest-O-Lite tank, spare tire irons, full lamp equipment, horn, tool kit and jack.

There will be a slight change in prices of American cars for 1911. The Limousine, $5,250; Tourist, $4,250; Roadster, $4,250, and Traveler, $4,250, will cost a trifle more than last year, the prices of the Roadster Special, $5,000, and the Traveler Special, $5,000, remaining unchanged. The Roadster Coupé is listed at $5,250; Traveler Coupé, $5,250, and the new Speedster at $5,000.

Indianapolis Races

(Continued from page 387)

Five miles—231 to 300 cubic inches—

26	Marmon	Harroun	2:25.82	4:35.66
15	Falcar	Pierce	2:26.28	4:35.95
16	Falcar	Galnow	2:20.76	4:41.49
22	Marmon	Dawson	2:32.44	4:41.85
37	Great Western	Endicott	2:31.80	4:50.56
34	Cino	Fritsch	2:33.40	4:56.54
24	McFarlan	Clemens	2:39.45	4:58.25
23	McFarlan	Barndollar	2:42.87	5:08.12

Five miles—301 to 450 cubic inches—

9	National	Aitken	2:11.02	4:05.97
10	Marmon	Dawson	2:11.64	4:07.56
18	National	Greiner	2:16.70	4:14.97
11	National	Merz	2:14.30	4:15.37
5	Speedwell	Clemens	2:18.15	4:17.31
15	Falcar	Pierce	2:20.09	4:22.91
16	Falcar	Galnow	2:27.26	4:41.50
29	Midland	Ireland	2:32.74	4:52.54
31	Firestone-Columbus	Frayer	2:38.80	4:59.14

Free-for-all—Ten miles—

			5 Miles	10 Miles
3	Benz	Hearne	3:36.74	7:03.41
7	National	Merz	4:02.17	7:47.05
2	Fiat	De Palma	4:29.07	8:02.52
8	National	Aitken	3:57.22	8:06.12
14	Matheson	Basle	4:18.10	8:24.94

Free-for-all—Handicap, five miles—

No.	Car	Driver	Handicap	Time 5 Miles
6	Cole	Edmunds	.16	5:01.66
14	Matheson	Basle	1.04	5:16.74
24	McFarlan	Clemens	.16	5:20.51
27	Westcott	Knight	1.04	5:23.30
29	Midland	Ireland	.34	5:26.01
25	Parry	Hughes	.34	5:29.35
34	Cino	Fritsch	.34	5:32.88
18	National	Greiner	1.24	5:35.21
37	Great Western	Endicott	.44	5:36.24
33	Cole	Endicott	.16	5:38.94
28	Black Crow	Stinson	.44	5:42.94
11	National	Merz	1.24	5:46.21
19	Herreshoff	Emmons	0	5:48.74
21	Herreshoff	Smith	0	5:50.85
23	McFarlan	Barndollar	.16	6:03.32

Note—The handicaps given are the times at which the cars started, from which the real handicap time may be computed.

Free-For-All, 100 Miles

No.	Car	Driver	Cyl.	Bore	Stroke	10	20	30	40	50	60	70	80	90	100
3	Benz	Hearne	4	6 1-10	8	7:56.23	15:47.28	23:49.75	32:00.67	39:95.67	47:15.10	55:24.94	1:03:21.82	1:11:48.76	1:19:58.09
27	Westcott	Knight	4	4 3-4	5	8:37.09	16:48.21	25:06.79	33:24.09	41:39.76	49:55.75	58:10.55	1:06:23.59	1:14:43.39	1:23:01.52
7	National	Livingstone	4	5	5 11-16	8:05.99	16:05.35	23:58.89	33:54.48	41:34.20	49:16.64	58:40.90	1:06:31.09	1:15:23.89	1:24:50.15
32	Marmon	Harroun	4	4 1-2	5	8:36.65	16:50.47	24:44.25	32:29.85	42:04.91	49:53.61	57:38.29	1:05:20.02	1:15:52.32	1:25:27.60
15	Falcar	Pierce	4	4 1-8	5 1-4	9:17.91	18:02.07	27:28.09	38:32.65	47:20.49	55:58.37	1:04:21.54	1:12:51.78	1:21:20.02	1:27:40.49
16	Falcar	Galnow	4	4 1-8	5 1-4	9:08.72	18:05.54	27:04.11	36:02.92	45:01.48	53:57.96	1:06:30.33	1:15:24.66	1:24:19.30	Out in 39th lap
14	Matheson	Basle	6	4 1-2	5	9:37.80	26:15.94	34:38.57	42:52.31	51:08.80	59:81.25	1:07:57.01	1:16:24.14	1:24:19.30	Out in 38th lap
36	American	Jenkins	4	5 3-4	5 1-2	8:35.94	16:47.80	24:46.87	36:35.03	44:16.70	56:17.41	1:04:17.56	1:12:07.51	1:23:25.96	Out in 38th lap
31	Firestone-Colum.	Frayer	4	4 1-2	5	10:07.94	Out								
10	Marmon	Dawson	4	4 1-2	5	3 laps	6:02.77								
8	National	Aitken	4	5	5 11-16	2 laps	4:10.74								

Remy Grand Brassard, 100 Miles

9	National	Wilcox	4	5	5 11-16	8:30.40	16:49.03	25:37.34	33:33.21	41:23.16	49:31.66	58:05.14	1:06:42.63	1:14:53.30	1:23:03.56
11	National	Merz	4	5	5 11-16	8:42.36	17:03.51	25:29.78	33:43.17	42:01.65	50:18.30	58:33.36	1:06:44.05	1:14:56.24	1:23:12.51
5	Speedwell	Clemens				8:37.20	17:02.68	25:43.80	35:04.85	43:22.92	51:52.56	1:31:00.01	1:08:38.96	1:17:01.10	1:25:11.19
29	Midland	Ireland	4	4 1-2	5	9:29.72	18:42.71	27:45.68	36:54.47	45:58.77	55:02.36	1:04:02.36	1:13:02.60	1:22:04.68	1:31:14.54
24	McFarlan	Clemens	6	3 5-8	4	9:40.35	18:59.39	28:09.94	37:19.14	46:27.68	55:48.56	1:04:50.39	1:13:48.89	1:22:47.11	1:31:42.44
28	Black Crow	Stinson	6	4 5-16	4 7-8	9:40.88	19:00.26	28:10.27	40:04.36	49:11.81	58:08.56	1:07:03.59	1:16:02.97	1:24:59.12	1:35:17.24
23	McFarlan	Barndollar	6	3 5-8	4	12:20.62	21:46.20	31:14.35	40:42.40	50:09.55	59:34.49	1:08:56.89	1:18:22.92	1:27:43.35	Oue in 38th lap
34	Cino	Fritsch	4	4 3-8	5	9:53.93	19:43.54	29:40.43	39:25.44	49:12.54	59:09.75	1:09:10.25	1:19:17.94	1:29:28.21	Out in 37th lap
15	Falcar	Pierce	4	4 1-8	5 1-4	10:27.80	29:35.19	37:52.25	46:11.30	54:26.89	1:02:39.17	1:10:50.81	Out in 31st lap.		
10	Marmon	Dawson	4	4 1-2	5	8:30.84	16:49.56	25:28.07	33:30.61	41:23.70	49:32.55	Out in 25th lap.			
31	Firestone-Colum.	Frayer	4	4 1-2	5	11:59.83	Out								

LABOR DAY SUMMARIES

Five Miles—160 cubic inches and under—

No. Car.	Driver	2½ M.	5 M.
19—Herreshoff	Emmons	3:07.23	6:01.33
21—Herreshoff	Smith	3:07.50	6:01.75
20—Herreshoff	McCormick	3:28.21	Out

Five Miles—161 to 230 cubic inches—

30—Firestone-Columbus	Frayer	2:33.00	4:47.87
33—Cole	Endicott	2:34.16	4:50.41
17—Staver	Kiefer	2:40.77	5:07.48

Five Miles—231 to 300 cubic inches—

26—Marmon	Harroun	2:29.67	4:38.27
15—Falcar	Pierce	2:23.47	4:39.76
16—Falcar	Galnaw	2:30.67	4:45.20
23—McFarlan	Barndollar	2:32.80	4:45.23
24—McFarlan	Clemens	2:37.20	4:54.94
37—Great Western	....	2:36.87	4:59.87
34—Cino	Fritsch	2:38.02	5:01.27
25—Parry	Hughes	2:58.60	5:15.49
22—Marmon	Dawson	2:33.27	

Five Miles—301 to 450 cubic inches—

9—National	Aitken	2:12.57	4:10.22
10—Marmon	Dawson	2:13.23	4:10.56
18—National	Greiner	2:13.50	4:10.90
4—Marmon	Harroun	2:12.90	4:11.15
5—Speedwell	Clemens	2:17.62	4:17.85
16—Falcar	Galnaw	2:26.22	4:39.68
31—Firestone-Columbus	Frayer	2:26.99	4:42.07
15—Falcar	Pierce	2:25.95	4:51.85
11—National	Merz	2:27.54	
29—Midland	Ireland	2:42:75	

Five Miles—451 to 600 cubic inches—

		5 M.	10 M.
1—Fiat	De Palma	3:29.06	6:48.30
3—Benz	Hearne	3:30.50	6:48.33
32—Marmon	Harroun	4:05.45	7:59.60
7—National	Merz	4:09.70	8:00.37
14—Matheson	Basle	4:20.90	8:25.14
8—National	Aitken	One lap only	

Free-for-all Handicap—Five miles

		Handicaps	
23—McFarlan	Barndollar	.50	5:08.32
30—Firestone-Columbus	Frayer	.40	5:09.65
24—McFarlan	Clemens	.20	5:13.65
6—Cole	Edmunds	.35	5:14.00
25—Parry	Hughes	.40	5:14.30
5—Speedwell	Clemens	.10	5:19.00
33—Cole	Endicott	.40	5:19.35
14—Matheson	Basle	.10	5:19.68
18—National	Greiner	Scratch	5:23.20
11—National	Merz	Scratch	5:28.40
19—Herreshoff	Emmons	.70	5:33.37
16—Falcar	Galnaw	.25	5:35.42
37—Staver	Kiefer	.25	5:37.37
28—Black Crow	Stinson	.35	5:37.90
34—Cino	Fritsch	.35	5:40.93
29—Midland	Ireland	.35	5:41.35
21—Herreshoff	Smith	.70	

Free-for-all Open—Ten miles

9—National	Wilcox	2:12.25	4:09.89
14—Matheson	Basle	2:15.15	4:16.08
11—National	Merz	2:15.62	4:16.54
18—National	Greiner	2:17.95	4:17.68

Free-for-all Open, 50 Miles—

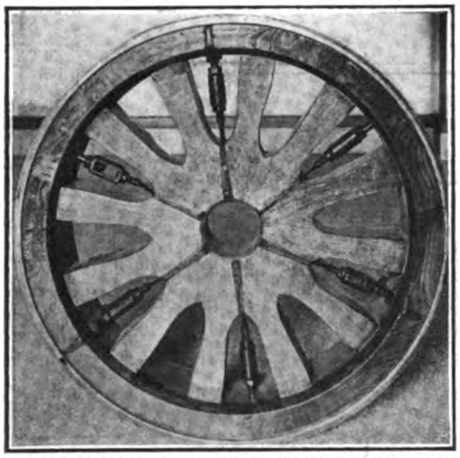
No. Car	10 mi.	20 mi.	30 mi.	40 mi.	50 mi.
3—Benz	7:34.67	15:06.52	22:47.45	30:21.62	38:02.85
32—Marmon	7:43.57	15:07.10	24:23.02	31:56.25	39:32.47
7—National	8:03.90	15:50.13	23:42.52	32:09.40	40:57.09
1—Fiat	7:38.15	16:53.21	24:36.65	33:56.12	41:17.22
9—National	8:03.18	15:49.77	24:51.23	35:11.70	43:19.52
14—Matheson	8:29.47	18:50.20	27:04.22	39:52.27	
27—Westcott	8:30.07	16:51.78	25:11.65	Out in 15th lap	
31—Firsetone-Col. ...	9:51.46				

Two Hundred Miles—600 cubic inches piston displacement or less. Minimum weight, 2,300 pounds

No. Car	Driver	20 mi.	40 mi.	60 mi.	80 mi.	100 mi.	120 mi.	140 mi.	160 mi.	180 mi.	200 mi.
9—National	Aitken	16:46.02	34:41.42	51:15.46	1:07:34.05	1:24.15.49	1:40:03.35	1:56:21.28	2:12:31.24	2:29:01.23	2:47:54.74
7—National	Livingstone	16:57.80	33:45.77	51:42.32	1:09:12.77	1:25:19.22	1:42:46.40	1:59:24.10	2:13:12.80	2:34:21.80	2:53:26.30
23—McFarlan	Barndollar	18:43.93	36:52.05	54:46.00	1:12:37.33	1:30:32.12	1:48:11.80	2:06:00.08	2:19:22.44	2:43:41.10	3:03:29.13
18—National	Greiner	17:03.34	34:08.07	52:30.22	1:09:33.10	1:26:37.69	1:43:24.42	2:00:10.63	2:12:53.67	2:35:15.73	3:05:56.85
24—McFarlan	Clemens	19:06.14	37:50.85	56:38.03	1:19:49.85	1:38:26.80	1:57:03.70	2:16:00.40	2:30:16.00	2:53:50.00 run. at fin.	
28—Black Crow	Stinson	19:05.70	37:51.00	1:00:51.29	1:19:26.90	1:39:25.55	1:57:39.30	2:15:59.90	2:36:32.64	Was running on 78th lap at finish of race.	
10—Marmon	Dawson	16:58.17	33:46.10	52:03.65	1:11:22.07	1:27:47.90	1:43:48.80	1:59:47.17	2:20:29.48		
32—Marmon	Harroun	16:45.25	32:02.56	49:20.69	1:08:03.87	1:24:15.50	1:40:05.85	1:56:27.74	2:12:33.95		
5—Speedwell	Clemens	16:52.12	36:40.35	52:45.83	1:12:53.67	1:30:25.00	1:47:15.92	2:03:30.34			
16—Falcar	Galnaw	20:07.72	49:28.92	1:08:05.44	1:26:46.42	1:45:19.77					
14—Matheson	Basle	17:25.00	34:30.75	56:17.37	1:13:33.29	1:30:40.95					
29—Midland	Ireland	19:08.04	38:25.82	57:21.57	1:16:15.15	1:35:42.05					

Prominent Automobile Accessories

THE ADJUSTABLE WEDGE WHEEL



New Turner patent wheel for heavy duty; by means of adjustable wedges it is possible to tighten up the wheel on the road

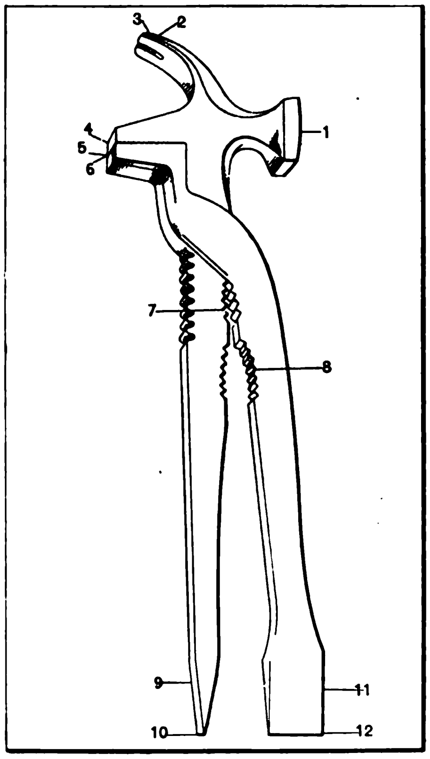
The new Turner adjustable wedge wheel, an English invention, which may now be seen running on General and Vanguard omnibuses in London, is about to be introduced in this country by Chas. G. Norris, who for the present is to be found at the Engineers' Club, New York. The "staff" photographer of THE AUTOMOBILE photographed one of the new Turner wheels and an illustration of it is given here. Mr. Norris states, in relation to the qualities of this wheel, that "the main idea of this invention was to do away with the unpleasant creaking noise by producing a wheel in which the structural elements could be tightened up from time to time without removing the wheel from its axle, and obviously saving the expense of sending same to the wheelmaker to deal with, which operation is expensive, as under present methods of dealing with a creaking wheel all gearing and tires have to be removed before efficient repairs can be made, to say nothing of loss in running and carriage expenses."

Shocks are spread over the entire wheel, instead of two or three spokes having to take the strains; in this wheel the structural elements are in compression and tension. Further, the soles of the felloes are not burnt and charred, as is the case when steel bands are put on hot. These burnt and charred portions in a wheel, it will be easily understood, are the primary cause of wheels becoming creaky and loose, viz., by the charred portions, together with scales formed on inside of rims, working into powder and escaping from under the rims, thus leaving space for the wheel to start working loose. Of course another great cause of wheels getting loose is the introduction of unseasoned timber, which when exposed to dry weather shrinks up and leaves spaces. When this happens with the present type of wheel there is nothing left to do but rebuild the wheel again. But with the new system of interposing a series of wedges between the wood elements of the wheel it is possible to take up all space so created by simply using a spanner to turn the nuts and couplings, which may be done in a garage, or even on the road by the drivers.

There is no limit to the tightness attainable in this wheel, as is the case when contracting the rims on hot, when 7-8 inch contraction is the most that is obtainable by this method; and, taking into consideration that generally about 3-8 inch on the sole is burnt away and 1-4 inch joint at least should be left to draw up, there is really only 1-4 inch effective tightness in the wheel, to say nothing of the rim being made unserviceable after two or three times of so contracting the same.

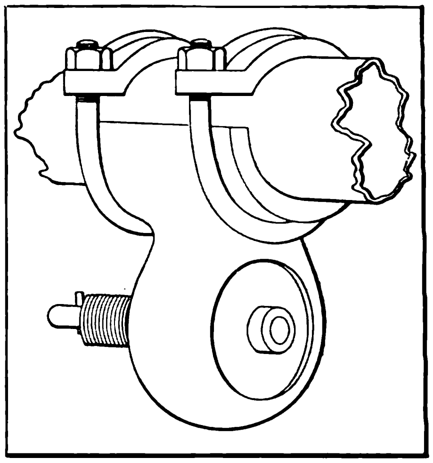
A TOOL OF MANY USES

Combination tools, if the autoist is not to clutter up his tool-box with a multiplicity of implements, are highly desirable. In this connection the "Rex," made by the Perfection Tool and Accessory Company, 1777 Broadway, New York City, is the acme of compactness in the varied uses to which a single implement may be put. The illustration shows no less than a dozen different ways in which this handy tool may be used.



New combination tool—can be used as: 1—Hammer; 2—tack puller; 3—valve lifter; 4—riveting mallet; 5—wire-puller; 6—monkey wrench; 7—1-2" pipe wrench; 8—1" pipe wrench; 9—tire iron; 10—screwdriver; 11—tire iron; 12—chisel

EASILY APPLIED MUFFLER CUT-OUT



A new muffler cut-out which may be easily applied; it is also a carbon-catcher

In the accompanying illustration is shown the muffler cut-out now being marketed by the S B R Specialty Company, of East Orange, N. J. In applying it all that is necessary is to saw a small piece from the underside of the exhaust pipe and clamp it into position. Once applied it acts not only as a cut-out, but also as a carbon catcher, for it contains a pocket into which most of the residue from the engine falls, this being forced out by the exhaust when the cut-out is opened. To prevent leakage the valve is made to open against the exhaust pipe's pressure.

SINGLE-TUBE FOUR-TONE HORN

A new model of Gabriel Horn, made by the company of the same name at its Cleveland, O., factory, was recently placed on the market. It is styled the No. 4 Four-Toned Horn, and although having but one tube it gives four distinct mellow notes. It is 3 x 32 inches in dimensions, making it very convenient to attach to any style of car. The stock finish is highly polished brass, but on special order the horn will be furnished with oxidized, black lacquer or nickel-plate finish.

TO KEEP THE CAR LOOKING NEW

The owner of a high-priced car can lose the prestige which goes with its ownership by allowing it to become dingy and dirty in appearance. An excellent aid to a continued glossy and new appearance of the body, metal and leather parts is Auto Renew Gloss, manufactured by the Superior Specialty Company, 418 South Third Street, Louisville, Ky. This preparation cleans and polishes at the same time, preserving woodwork, tops and cushions from becoming dry and cracked and acting as a surface-food to the finishing coat. It dries instantly.

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THE AUTOMOBILE

1911 Laboratory Prospects

PURCHASING PUBLIC INTERESTED IN LABORATORY WORK; A. C. A. PERFECTS ITS LABORATORY; MANY MAKERS INSTALLING TESTING EQUIPMENT

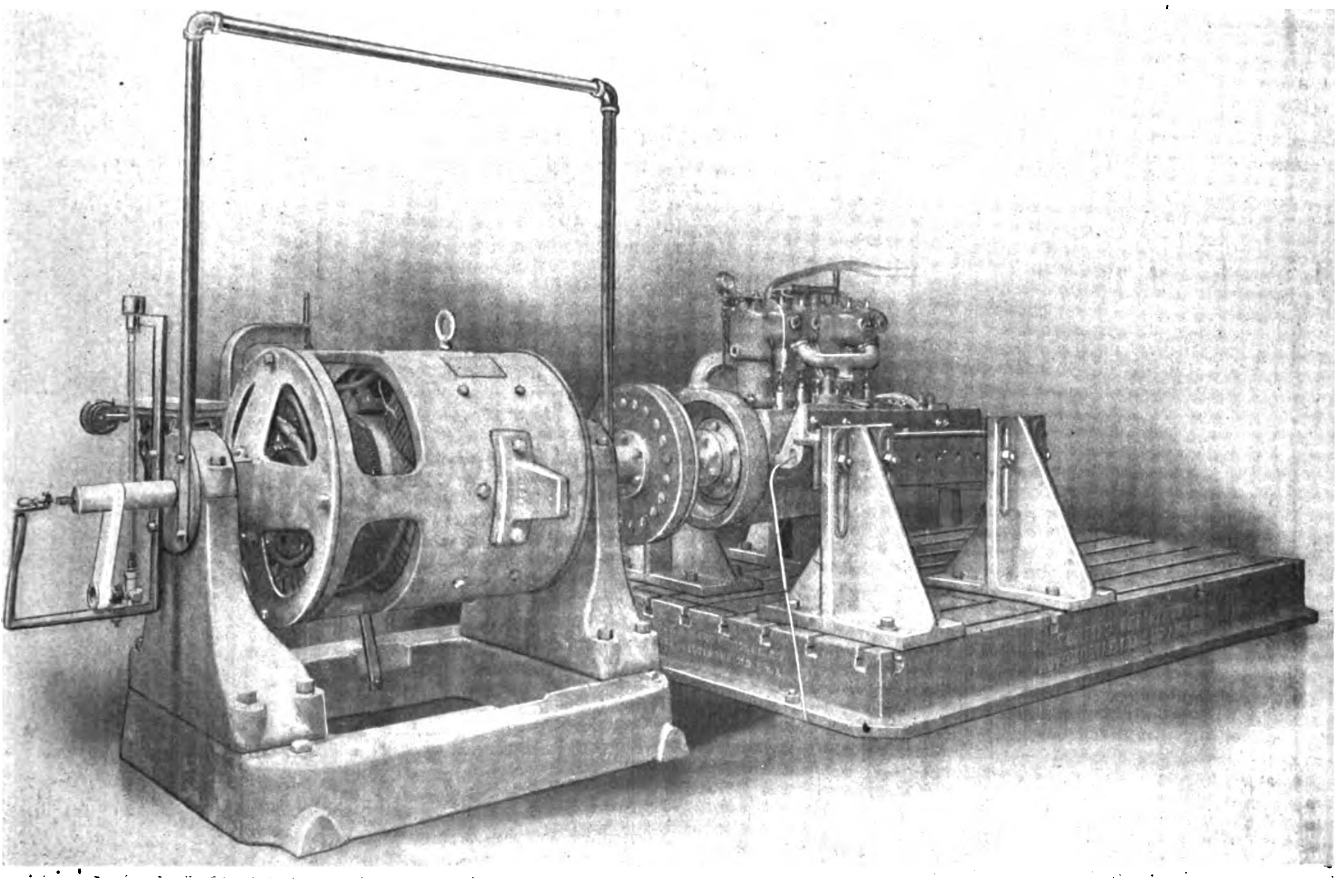


FIG. 1—MOTOR MOUNTED FOR DYNAMOMETER TEST IN APPARATUS INSTALLED BY AUTOMOBILE CLUB OF AMERICA

CONTRARY to accepted belief in the haunts of the average man, natural laws are fixed, unalterably so, and fortunately they are beyond the pale of the influence of the character of man who labors under the impression that the result of his handiwork is the absolute standard. The real situation is quite different from that of popular belief. When an apparatus is designed and constructed, it then remains for the designer to find out how many natural laws the equipment violates, and to what extent the design offends these laws. The laboratory problem may be divided into three fundamental classifications, *i.e.,* (a) for the investigation of the raw materials that are proposed for use in the construction of machines, as automobiles, (b) for the purpose of determining the extent of compliance of component units with the laws. (c) in the conduct of final tests of the completed automobiles leading up to a better understanding of the harmony of relations of the component units. These are all matters with which manufacturers are primarily concerned, but it still remains to determine as to the fitness of the completed automobiles from the point of view of road performance and in the light of the intended service. This latter consideration is a paramount issue with the purchaser, and on this account users of automobiles, as they are banded together in clubs, combine their individual efforts as a unit with the expectation that the cost of a (common) user's laboratory will not be too much of a burden to carry, but that it will be the source of much light on a relatively dark subject, and beneficial (a) to the user since it will tell him if the automobile he may select is in accord with the promises made for it by the maker, (b) to the maker in a measure depending upon his willingness to listen to the voice of experience.

It would be a great misfortune were the makers of automobiles, taking them broadly, to find themselves in the predicament which would be in evidence were they to be laggards in the matter of the installation of suitable laboratory equipment, and find themselves in the position of having to listen to disgruntled users. This unfortunate situation is likely to be brought about if clubs install capable laboratory equipment and put it under the charge of skilled physicists, provided the makers build their cars by rule of thumb at the command of coarse practice, rather than in the enlightened atmosphere of the laboratory, at the instance of men who learn what the natural laws portray and bow to the inevitable.

Fortunately, the wheels of progress are not all being turned by the users of automobiles; the clubs, made up of enthusiastic autoists, that spend a part of their surplus by way of the laboratory, in hunting out the bottom facts about the automobiles they ride in, are most likely to discover, when their excellent undertakings are concluded, that they are treading a path that was blazed by the makers' engineers in works laboratories.

The growth of the automobile industry owes much of the rapidity of its expansion to the interest that is displayed in the automobile by the men who have to pay the bill. When the owners of cars elect to spend hundreds of thousands of dollars in laboratory research, it goes to show that they will recognize merit for what it is worth. In other words, the time is rapidly approaching when these owners will know a good automobile when they see it, and what is more to the point, they will know just why it is good.

On account of the rapid strides that are being made and the fact that laboratory equipment is being installed in the shops that were not heretofore equipped in this way, and in the automobile clubs of importance, it would seem to be a good subject to enlarge upon at some length, perhaps, the idea being to advise the makers of cars of the preparation that is being undertaken by users to enable them to find out where they stand, with the further understanding that users of automobiles, since they appreciate the utility that resides in a well-equipped laboratory, be put in possession of the latest facts as they refer to laboratory practice.

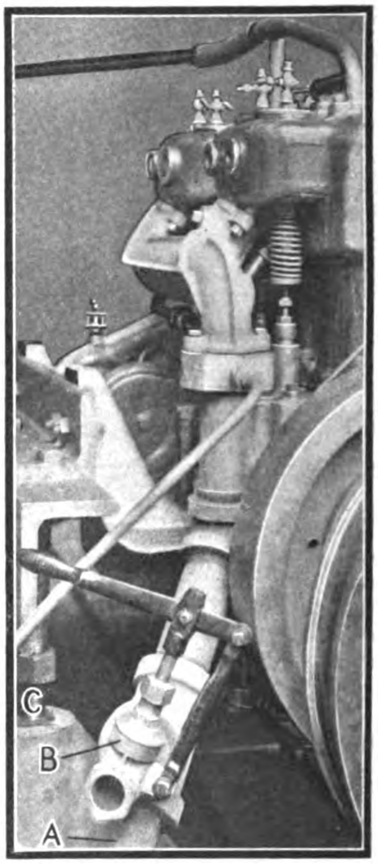


Fig. 3—Exhaust pipe A leading to flue with branch attachment B for taking samples of the exhaust gases. To the left one of the jackscrews C of the supports for adjusting the height of angle irons

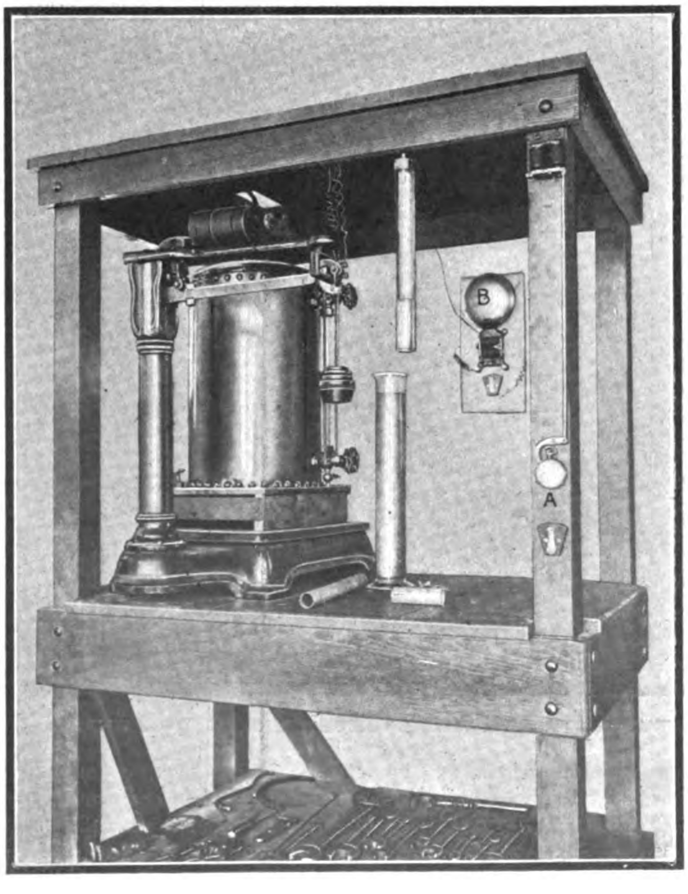


Fig. 2—Gasoline dispensing apparatus and scales with electrically operated stop watch attachment A, and bell B; feed pipe to carbureter not shown

A new apparatus has been installed in the testing laboratory of the Automobile Club of America under the direction of A. L. McMurtry, chairman of the Technical Committee, by means of which it is possible to obtain accurate determinations of the power of any motor submitted for examination, of its fuel consumption, with one carbureter or with another, and of the friction losses in a transmission operated at one gear or another. The torque may be measured at any number of revolutions between 500 and 2,000, and the fuel consumption at any adjustment of the carbureter which produces any given number of revolutions with a certain load, and, so far as fuel consumption is concerned, the speed of the motor may be below 500 without interfering with the accuracy of the measurement. The present arrangements provide for coupling the armature shaft of a Diehl dynamo with the flywheel of the motor by means of a coupling plate and suitable joints, and is applicable to a large number of motor flywheel equipments without change. In the case of motors provided with fan-spoked flywheels or with multiple-disc clutch, or when connection should be made with the shaft of the transmission gear, these arrangements may have to be modified somewhat in each instance.

If it is desired to measure the power of an automobile at the rims of the rear wheels, including all the variations which may be due to tire qualities, different degrees of inflation of the tires, slippage, and some other factors, which are usually of less interest to the owners or makers of automobiles than the efficiency of motor and transmission mechanism, the club's old and more complicated testing apparatus may still be used, and the difference in the results obtained by the new apparatus measuring the efficiency of the motor or the motor with the transmission alone, on one side, and, on the other side, those obtained by the old apparatus measuring the driving power of the same motor and transmission, after this power has undergone the reductions due to the factors referred to, may sometimes be of interest, mainly as a means for determining the value of those latter factors under different circumstances.

The main elements in the new testing apparatus are: The bed plate in which the supports for the motor to be tested are adjustably secured; the adjustable supports; the coupling, or means for connecting the motor shaft with the armature shaft; the dynamometer; the spring scale for sight readings of the torque.

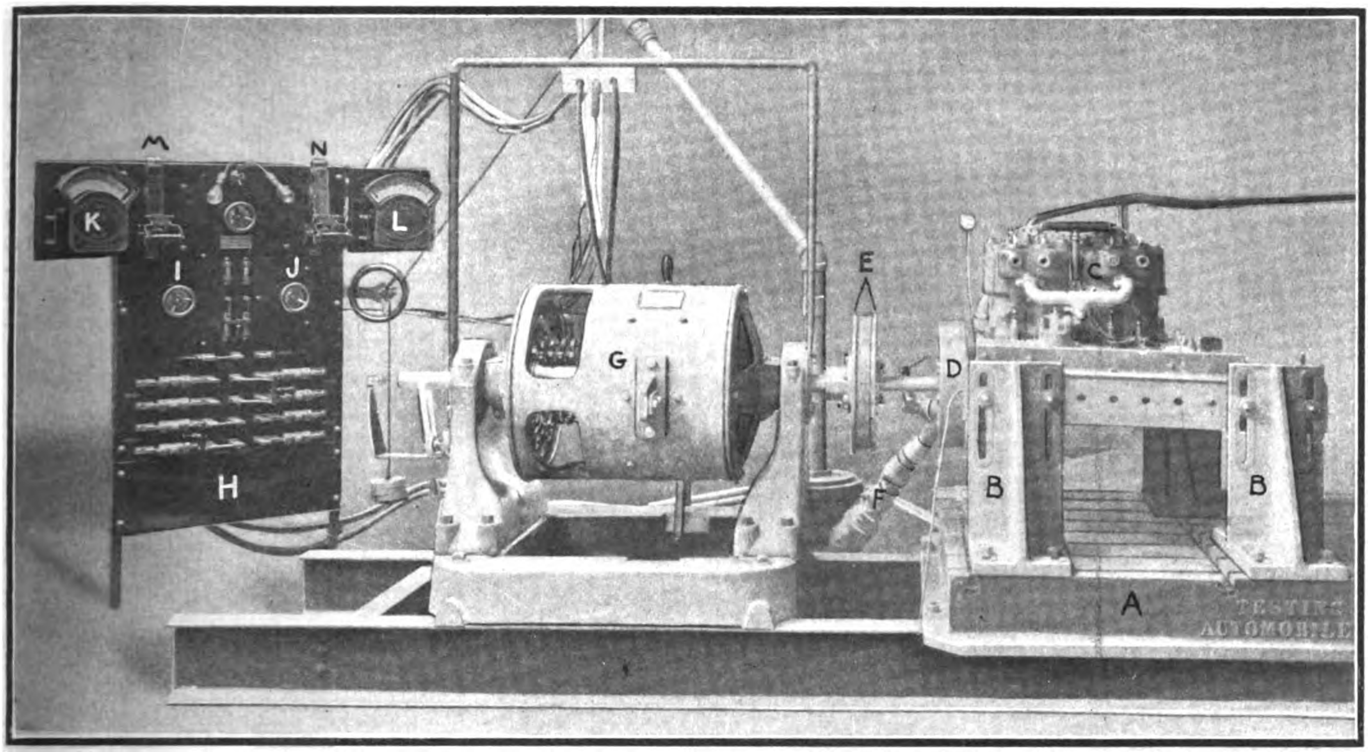


Fig. 4—Testing apparatus showing motor mounted for testing, the coupling device, the dynamometer and the switchboard. A, bedplate; B, supports; C, motor; D, flywheel; E, studded plates driving connection; F, exhaust pipe; G, dynamometer with wiring to switchboard; H, switchboard with rheostats I and J, voltmeter K, ammeter L and interrupters M and N

the Fairbanks scale for determining the same factor with precision within one-tenth of one pound; the Warner tachometer for sight readings of the motor speed; a Veeder counter with a trigger device for positively counting the number of revolutions for a given time; switchboard for regulating resistance to operation of the dynamo and incidentally permitting experimenting with the carbureter and throttle; a tank with water and soda in which the current produced by the motor under test is taken from the switchboard and dissipated in the work of separating the water into its constituents; a gasoline weighing and dispensing apparatus with stop-watch attachment permitting to ascertain the exact weight of gasoline which flows to the carbureter in a given time, such as one minute or twenty minutes, the latter being a standard period for one test.

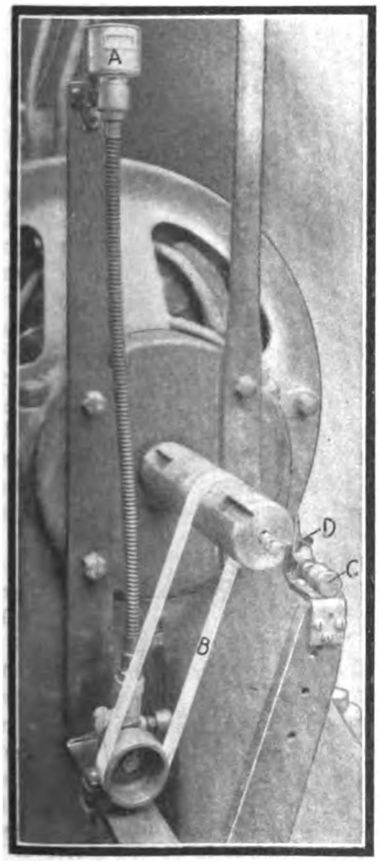
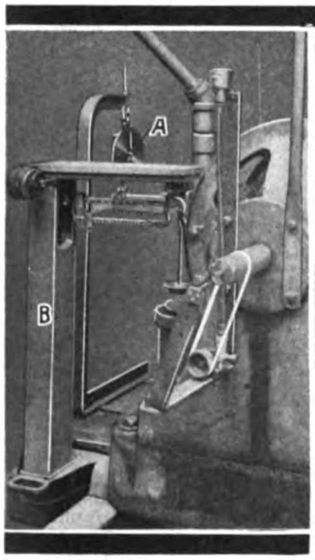
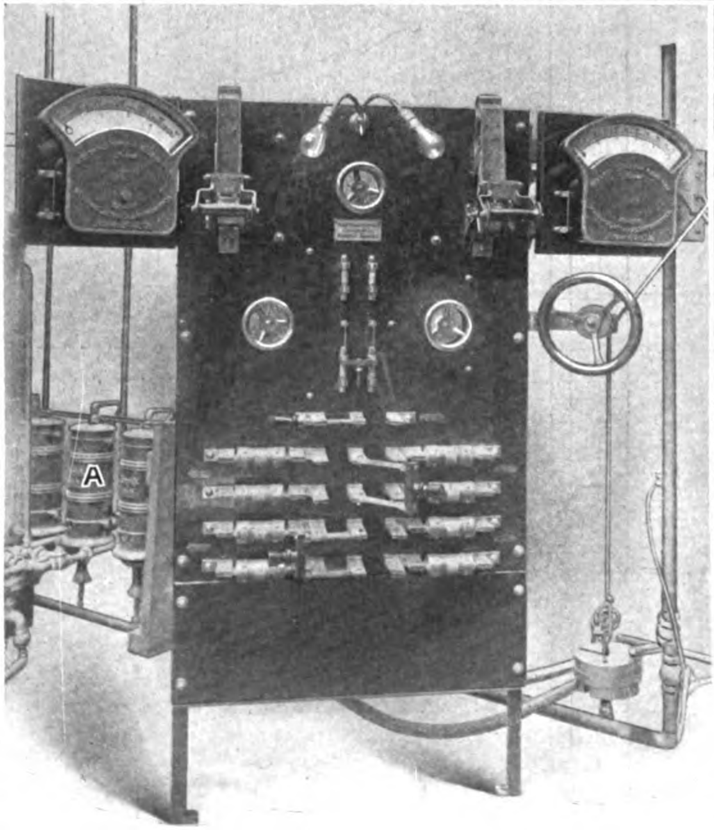


Fig. 5—Free end of armature shaft with tachometer A operated by belt B and counter C connected with or disconnected from shaft by trigger D

Suitable printed blanks for registering the various measurements and the exact conditions under which they are taken also form a part of the equipment, and a sharp distinction is made between blanks provided for non-certified tests which may be carried on by the owner of a motor, a carbureter or a transmission mechanism with the assistance of the laboratory engineer, but which may not be published or in any manner used for trade purposes, and, on the other hand, the fully certified tests in which all steps are taken under the direct and constant supervision of the laboratory directors.

The bed plate is a very substantial cast-iron structure on a wooden foundation and measures about six and one-half feet in length by five feet in width, as estimated by the eye, affording room for even very large motor plants. The upper portion of this bed is crossed lengthwise with nine T-grooves and crosswise with three, the T-portion being downward so as to afford room for the heads of the bolts by which the supports are secured, while permitting the bolts to be slid from one position in the grooves to another, according to the place where the supports should be fixed, first in order to fit with the crankcase brackets of the motor, and, in the final adjustment, to produce perfect alignment of the shafts. The dimensions of all the parts, including the bolts and nuts, are designed with a view to obviating or absorbing vibration. Adjustment of the supports is facilitated by having the bolts work in slots in the supports as well as in the bed plate. An angle iron plate connects the pair of supports on each side of the motor and may be secured higher at one end than at the other, for the case that the crankshaft has a downward tilt and is not parallel with the resting faces of the brackets. To the angle-iron plate with flat top may be bolted another angle iron, as in the illustrations, for the more substantial mounting of motors designed to be mounted in this manner in an automobile frame or subframe. The height adjustment is facilitated by jackscrews in each support, the screws impinging against the lower angle iron, and the adjustment being secured by bolts working in vertical slots in the supports, as plainly shown in the illustrations. By the means described it is possible to bring the center of the motor shaft in exact continuation of the armature shaft, provided there has first been secured to the face of the flywheel a true, concentric flange plate, fitting over the coupling plate which is part of the device employed for uniting the motor with the dynamometer shaft. The driving connection between these two elements consists in two studded plates fitting together so as to stagger the studs of the driving plate in relation to the studs of the driven plate and winding a leather belt or a rope in and out, and over and under the studs. To this well-known, slightly flexible form of coupling there has been added a circumferential leather strip, as shown in the illustrations, which, however, plays no part in the coupling, but may serve to prevent the clothes of operators from being entangled with the revolving plates. The end of the armature shaft is provided with a cylindrical sleeve surrounding the joint connecting with the coupling, and the latter is provided with a cylindrical flange fitting loosely to the said sleeve, so that the height of the two axes will remain the same while adjustments are made and after. It is stated that no appreciable heat is generated in any part of this coupling arrangement, and that consequently there is no loss of work there.





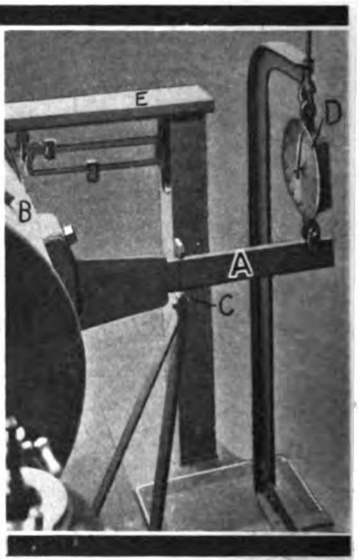


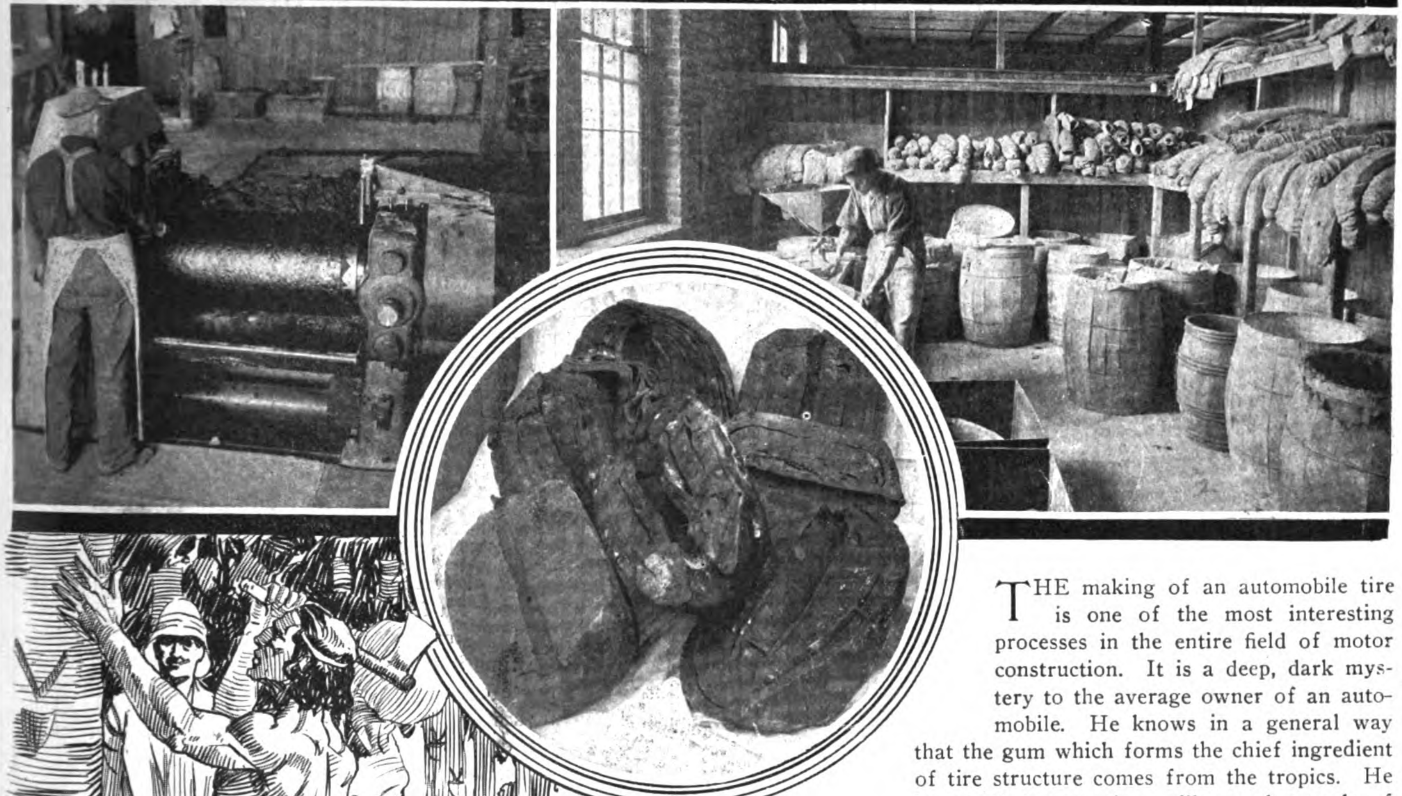
Fig. 6—Showing spring scale A mounted on Fairbanks scales B
Fig. 7—Switchboard with water heating apparatus A
Fig. 8—Showing adjustable arm A of the dynamometer field housing B with stop C and spring scale D mounted on Fairbanks scale E

The dynamo is a Diehl, type 10, rated at 230 volts and 196 amperes, and consequently capable of handling slightly more than 45 kilowatts or about 60 horsepower. Its efficiency is guaranteed to remain constant between 500 and 2,000 revolutions. The free end of the armature shaft projects about one foot, and at this end are connected the Warner tachometer which permits a close estimate of the speed at a glance, and the Veeder counter which is operated only when a trigger is pulled establishing the connection with the shaft. By operating the trigger at the same time as the gasoline meter records a certain weight in the gasoline tank and disconnecting the counter after a certain elapsed time, when the meter again records the weight, the fuel consumption may thus be ascertained for a given number of revolutions and may be compared with the power rating recorded at the scales under the same conditions.

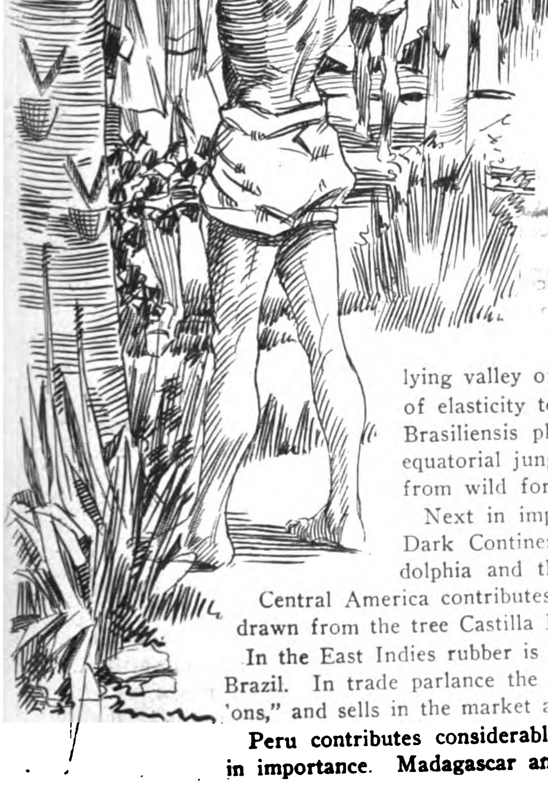
The housing of the dynamo field is provided with two diametrically opposite arms, one of which at a certain adjustable distance from the axis of the dynamo is attached to the operating rod of the spring scales, depressing it and producing a scale reading which may be observed in its variations from time to time, if such variations occur. The motion of the field and of the two arms is limited by an upper and lower stop, but within these limits the power of the rotation corresponds, of course, to the torque developed, and the scale-reading in conjunction with the radius at which it is produced and the known efficiency of the dynamo enable the operator to determine at a glance the horsepower developed. For greater accuracy the spring scales are mounted upon a Fairbanks scale, and the spring scale pull may, therefore, at any time of the test be balanced to within one-tenth of a pound. It is this latter reading which is used exclusively for deciding the power in certified tests, and it may furthermore be checked by the readings in amperes and volts at the switchboard, or more directly in kilowatts. The switchboard is equipped with the meters giving these measurements, and has obviously large switch contacts, being made by Diehl especially for use in connection with the dynamo and with a view to great variations in the power developed. It has two rheostats, one quite coarse in its adjustments for ready approximation of the resistance required for producing any desired motor speed with a given torque or vice versa, and another with very fine adjustments corresponding in nicety almost with the one-tenth pound accuracy of the Fairbanks scales. In practice, the usual way of operating is to use the rough rheostat for getting approximate motor speeds and powers and to check carbureter adjustments by means of the finer one. Under the present arrangements the current produced is taken away by an electric motor connected with the power shafts used in the garage work of the club, but it is the intention to take it instead, to a tank with water to which is added washing soda and to let the energy be expended in a chemical reaction, and it is stated by the laboratory engineer, Mr. Reilly, formerly of the Massachusetts Institute of Technology of Boston, that soda is preferable to salt which has been used for the same purpose, as the fumes are harmless, while chlorine fumes resulting from the use of salt as an admixture are obnoxious.

One of the illustrations shows the arrangement of the gasoline dispensing meter, with thermometer and the usual appliances for measuring the specific gravity of the fuel. When the scale on which the gasoline tank is placed has been balanced and a reading taken of the total weight of the tank and its contents for the beginning of a test, it is possible to work the apparatus so that the stop watch will indicate the periods after each of which the automatic scales shall indicate the loss in weight, the actuating means being the electrical connection which also rings the bell at the end of each predetermined period. But it is simpler in practice to have the automatic scales indicate the withdrawal from the tank, and consumption in the motor, of a given quantity of the fuel while at the same time causing the electric connection to operate the stop watch, so as to indicate time elapsed in the consumption of a given weight of gasoline

A Day with the Tire Makers



Left—First process in washing. Center—Pure Para rubber. Right—Store and cutting room



THE making of an automobile tire is one of the most interesting processes in the entire field of motor construction. It is a deep, dark mystery to the average owner of an automobile. He knows in a general way that the gum which forms the chief ingredient of tire structure comes from the tropics. He knows that some tires will run thousands of miles without giving their owner any trouble whatever and that precisely similar tires will vex the spirit, tax the resourcefulness and test the amiability of the owner by their likelihood to blow out or puncture at inconvenient moments.

Only a few years ago the structural strength of automobile tires was so uncertain as to form the principal element of chance in touring. To-day, like everything else in the line of development in motordom, the tires are stronger, more dependable, more uniform and more is expected of them than ever before.

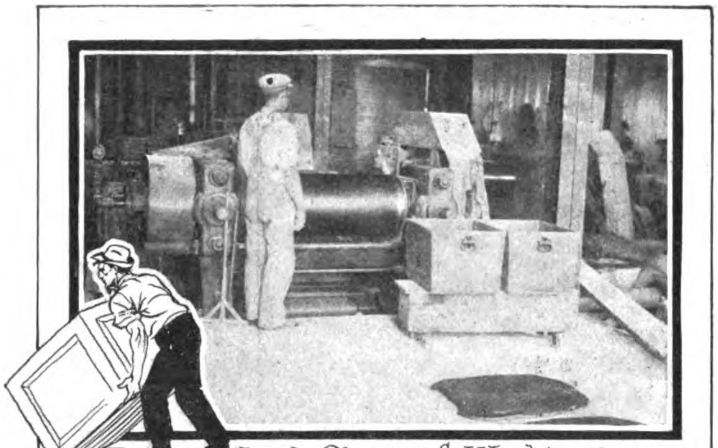
The rubber from which tires are manufactured comes chiefly from the Para district of Brazil, which includes a considerable portion of the low-lying valley of the River Amazon. The Para rubber is said to possess the elemental quality of elasticity to a greater extent than any of the other varieties. Two species of the Hevea Brasiliensis plant are the sources of supply in the Para country. The trees flourish in the equatorial jungles of the Amazon and at this time crude rubber from Para is practically all from wild forest trees.

Next in importance as far as bulk of supply is concerned is the African field. In the Dark Continent there are two distinct varieties of crude rubber supply: the vine called Landolphia and the tree, Kickxia Africana, which flourishes in West Africa.

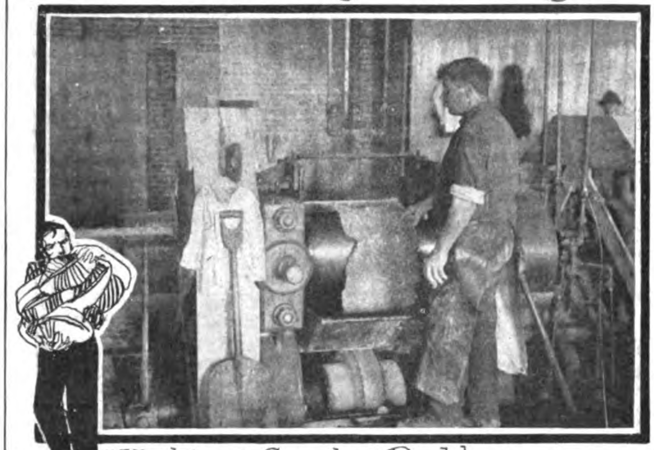
Central America contributes a large quantity of rubber, called "Centrals" in the trade, the supply being drawn from the tree Castilla Elastica.

In the East Indies rubber is being cultivated on a large scale, the plants having been transplanted from Brazil. In trade parlance the rubber coming from the cultivated fields of the East Indies is called "Ceylons," and sells in the market almost at the level set by the Para product.

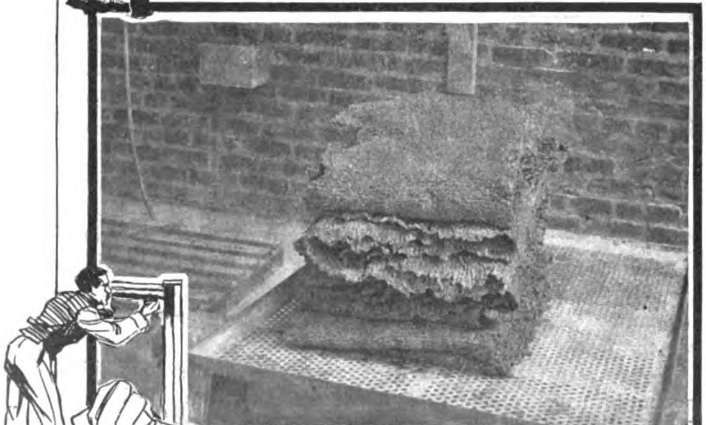
Peru contributes considerable rubber to the general supply, and Brazil, south of the Amazon, is gaining in importance. Madagascar and other tropical islands also produce some rubber.



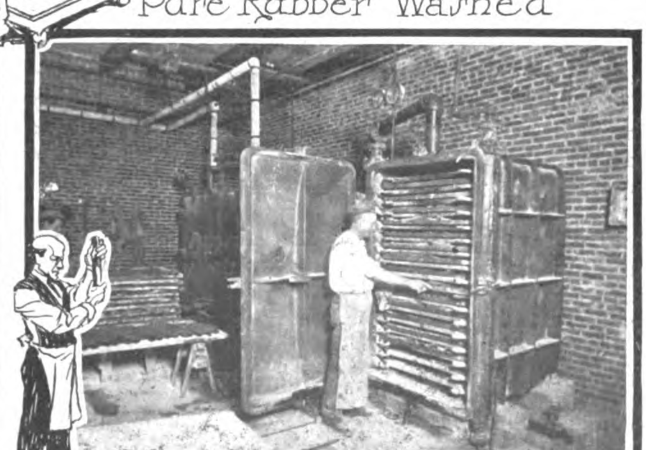
Last Stage of Washing



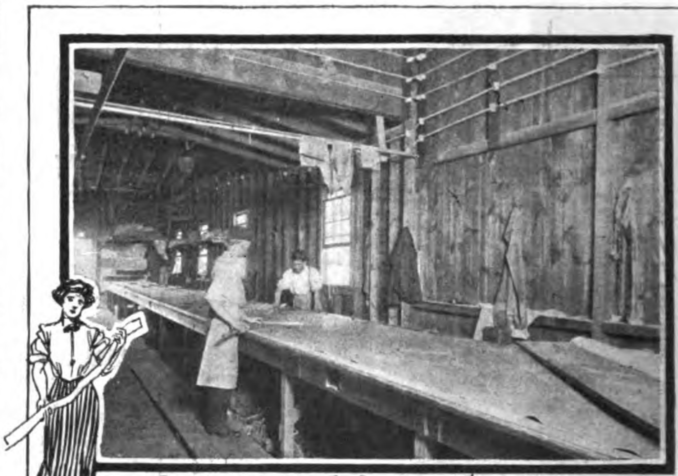
Washing Crude Rubber



Pure Rubber Washed



Drying Rubber After Washing



Cutting Fabric for Tires

Save in the cultivated plantations of the East Indies and to a certain extent in Central America, the process of drawing and collecting the latex or milk of the rubber-producing plants is the same as it was in ancient times. The laborer simply slashes selected trees with his machete, places half a cocoanut shell where it will catch the milk when it exudes from the wound and proceeds on his way. At regular or irregular intervals the workman goes over his route through the forest and collects the contents of the shells.

Contrary to the statements published in prospectuses issued by get-rich-quick concerns, rubber trees are not really mature until they are from 10 to 12 years old, despite the fact that vast returns are frequently promised after five or six years from the time of planting.

The rubber collected from individual trees varies in amount during a season and but a few ounces of the precious latex flows from the gashed bark into the ready shell between the time it is placed and the time it is collected.

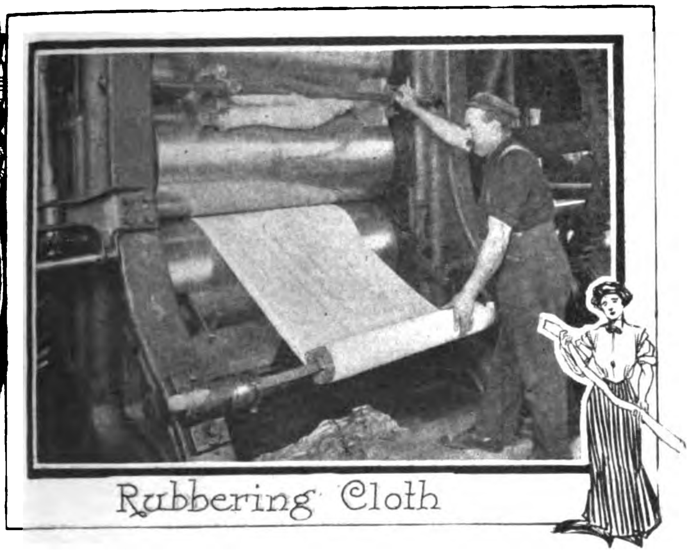
But in the course of his day's work it is not unusual for one man to bring in as much as 100 pounds of the milk.

Of course this does not apply to the plantations where the trees are cultivated, and the crop harvested by scientific means. There, modern machinery has been called into service and the yield of this variety of rubber is constantly increasing.

When the milk has been collected and brought into camp, the next step toward building an automobile tire is the process of smoking and shaping for shipment. A fire of certain grasses and nuts is built and the native workman dips a stick into the milky mass and then exposes the rubber to the action of the smoke and mild heat of the nut-fire. The surface of the rubber is hardened to a certain consistency by the fire and the workman plunges it again into the milk and replaces it in the smoke once more. This process is continued until the ball has grown to weigh from 100 to 200 pounds. When these balls are sliced in two to determine the quality of the rubber and to discover the presence or non-presence of foreign matter, such as stones, sticks, small animals or large vegetables, it is seen that the masses of rubber are in layers of various thicknesses, depending on the consistency of the milk when the mass was dipped and other factors.

Contrary to general belief, vast quantities of this raw rubber are imported directly from the Para fields into the United States. The idea that practically all the raw rubber of the world is shipped to England, Antwerp and Bordeaux is founded in error, for the customs statistics of the United States show that an increasing amount is brought here direct each year.

Rubber is bought by the tire factories, largely by sample, but sometimes on a definite guarantee as to what it will accomplish. With the terrific demand that is being exerted in the market the tendency is to emphasize the former practice and as a result, the buyers of tire-making houses are required to be the keenest sort of experts in their line.



Rubbering Cloth

Having received a shipment of crude rubber at his factory, the superintendent subjects it to the following processes: The split balls are first washed. This process is considerably more involved than the term might seem to imply, for the material comes to hand in the shape of masses that often weigh 100 pounds, when the work is being done with Para rubber. In the case of Africans, the form of the crudest stuff is irregular, varying from small balls to slabs and strings and somewhat similar shape as regards "Centrals."

The washing machines consist of a series of warm cylinders and the cleansing material is pure water. The appearance of the rubber before it goes into the bath is dark brown, with fairly smooth surface and a pungent odor that was given it in the smoke of the nut-fire.

It is rolled and washed and washed and rolled in the machines until all the sand, sticks, dirt and other foreign substances have come away, and then it issues forth in a band that may be as much as four feet wide. Coming from the rolls, the crude rubber takes the trade form of "crepe." It may be half an inch thick and is porous to a degree, somewhat sticky and is considerably lighter in color. This last quality, however, is temporary, for upon exposure to the air the "crepe" darkens somewhat under the action of atmospheric oxygen.

It then goes to the drying machines, where a percentage of the moisture contained in the "crepe" is extracted by gentle heat.

Coming from this process, the rubber is in the form of irregular masses and looks only remotely related to the perfected article.

The third step in manufacturing is to subject the product to the process of mastication. This is done with friction rolls, which reduce the mass to a condition of plasticity.

Having been reduced to small grains and shreds, the rubber is run between warm rolls and the admixture of sulphur and other vulcanizing chemicals is introduced. The mass is then rolled out and taken to the calenders or hot presses, where it is shaped into sheets. It is still crude rubber and at this stage of manufacture is called "mixed stock."

From there it goes to the making room, where workmen are ready to convert it into tires and other merchantable articles. In the process of tire-making there is another important element. By weight, automobile tires are composed of from one-quarter to one-third of the stoutest, heaviest kind of cotton fabric.

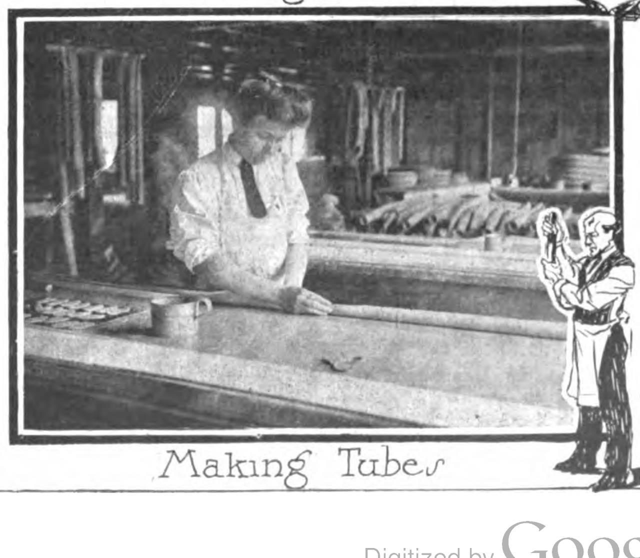
This fabric is not woven in the tire factory, but is purchased from the cloth weavers in large quantities. Each tire contains from four to six plies of this material. It is made of the longest and strongest fiber of sea-island cotton and in its condition prior to manufacture into tires it seems strong enough to turn buckshot.

Before the actual work of making the tires commences, great quantities of this cotton fabric are associated with "mixed stock"

Stretching Fabric on Tire Form

Vulcanizing

Finishing the Tire



Making Tubes

The Moulds

Putting on the Tire

Joining the Tube

under the pressure of the rolls. When it is ready for tire-making, the cotton fabric is thoroughly impregnated with the rubber and each layer of the material is exceedingly sticky on one of its surfaces. It is called "friction cloth" at this stage.

The process of building a tire is then taken up. A layer of the friction cloth is laid on an iron mould and shaped to meet the various convolutions of the tire. Another is placed upon it and another and another, until the required thickness is secured. This, as has been said, is from four to six plies. On top of the cloth a thick layer of mixed stock is applied and then another single ply of the friction cloth. On top of this mass the main body of the rubber is placed. Tires vary in weight from about ten pounds to thirty-five pounds, depending upon size and amount of material involved.

The tires are shaped on the moulds by the workmen and when the correct size and shape have been given the tire is inspected by the superintendent and taken to the vulcanizer. This is simply a steam press where live heat can be applied to the articles to be made. The action of the heat is to change the chemical status of the rubber.

In the process of vulcanizing, quite a wide range of heat pressure and composition are used. A certain degree of heat is necessary for a certain length of time under certain pressure to get the best results from some of the varieties of work, while there may be a material difference in the treatment of others. The exact details are carefully guarded by the officers of tire factories with regard to the proportion of sulphur used and the intensity of heat applied in the process of manufacture.

Crude rubber freezes at about 40 degrees Fahrenheit and melts at about 120 degrees, but when the heat and sulphur have acted in conjunction to vulcanize the mass, the rubber is made almost impervious to ordinary temperatures. Of course it will still melt if enough heat is applied to it, and it will freeze under some circumstances, but the process of vulcanizing lends to the crude rubber the quality of permanency. It also increases the elasticity. While it is doing this, however, it has likewise taken away a large degree of its convertibility.

Experts say that once rubber is vulcanized it can never be reformed with the ease and satisfaction that were possible before. For this reason, automobile tires made of revulcanized rubber must of necessity be inferior to the goods made of crude rubber.

The finished tires are subjected to a searching examination at the factory and the usual percentage of defective tires so discovered is about 2 in 100.

Tires are tested with a pressure of about 400 pounds to the square inch in several of the well-ordered factories before being sent to the stock-room. It is said that the new tires will withstand a pressure of 1 500 pounds, but such a test is given them only on special occasions.

The making of inner tubes is a much simpler process than that of making the tire-shoes and outer tubes. The inner tubes are made of a single layer of pure rubber. While the delicacy of inner tubes has always been more or less of a problem to motordom, and while strength approximating that of the tire-shoe would be very desirable, such a thing has never been accomplished. A layer of cotton fabric, enclosed between two layers of rubber, would make a marvelously strong inner tube, but unfortunately the presence of the cotton in the mixture would defeat its own ends. The porous fabric would not be gas-tight for any length of time, if at all, and as that one quality is the foundation stone upon which all inner tubes rest, the idea is not regarded as practical.

In the fiscal year of 1909 33,000 tons of rubber, two-thirds of which was from Para, was imported into the United States During the fiscal year ending June 30, 1910, the imports into this country amounted to 44,000 tons, with the percentage from Para slightly less, although much more in actual pounds. The price this year touched $3.10 for the commercial grades of Para and at present the market is strong at about $2.

The accompanying illustrations were furnished through the courtesy of the Ajax-Grieb Rubber Company

Foreign News of Interest

CONCLUSIONS OF INTERNATIONAL ROAD CONGRESS—RACE FOR LONG-STROKE MOTORS—EXPERIMENTING WITH THE GNOME MOTOR

MEETING for the second time, the International Road Congress has drawn up a number of conclusions relating to automobiles and the highway. It is of the opinion that touring cars do not cause abnormal damage to the roads providing their speed is moderate. No definition of moderate speed was supplied. Public service vehicles do not cause damage to the road if their speed is kept below 15 1-2 miles an hour, if the greatest axle weight does not exceed four tons, and if the charge does not exceed 330 pounds per centimeter width of rim, for wheels of 39 inches in diameter.

It was believed that commercial vehicles did not cause any damage to properly made highways whenever the following conditions were complied with: for vehicles on which the greatest axle load is 4 tons, where the speed does not exceed 12 miles an hour, and when the weight on the road wheels is not more than 330 pounds per centimeter width of rim for wheels of 39 inches diameter. Where the axle load is between 4 and 7 tons and the weight on the road wheels does not exceed 330 pounds per centimeter width of rim, no damage is done if the speed does not exceed 7 miles an hour. Where wheels of more than 39 inches diameter are employed, the load per centimeter width of rim shall be calculated according to the following formula:

$$c = 150 \sqrt{d}$$

in which d = the diameter expressed in meters, and c = the load expressed in kilogrammes. The congress believed that experiments should be undertaken to determine the maximum width of rim possible on motor vehicles in order to give an even distribution of the load on the road surface.

Ribbed metal tires were condemned as destructive under all circumstances. It was not believed that motor vehicles did any damage to curves provided the road was properly banked at these points and the speed was reasonable.

Long-Stroke Motors to Be Tried Out

The finest collection of long-stroke motors ever gathered in a single race will be seen at the Coupé des Voiturettes speed test to be held at Boulogne-sur-Mer, on Sunday, September 18. The entries are only 13 in number, with little probability of an important increase before the final closing; but what they lose in quantity they gain in quality. The race, which will be run over a hilly triangular course measuring 24 miles, with a total distance of 289 miles, is open to cars with a limited bore. Single cylinders must not exceed 3.9 inches cylinder diameter; two cylinders are limited to 3.1 inches bore; and four-cylinder models must not be bigger than 2.5 inches. Stroke is unlimited, and it is largely owing to this limitation that 2 1-2-inch motors will be produced capable of developing 40 to 50 horsepower, and able to hold their own against racers of three or four years ago having a bore of 6 to 7 inches.

Lion-Peugeot is favorite. The firm has two sets of cars ready, one of them being last year's models composed of two single-cylinder racers and one twin-cylinder V motor. The second set is entirely new and has not yet been seen on the road. The motors have the maximum bore of 2 1-2 inches and a stroke of 11 inches. This is a ratio of 4.3 to 1—the highest ever adopted for an automobile motor.

If there is time to properly tune them up for the race the new four-cylinder models will undoubtedly carry all before them. In view of competition, the firm has very little to say about the power they have been able to get on the bench. It is known, however, that the motor has its cylinders in one casting, multiple valves, and that it runs at over 2,500 revolutions a minute, with a piston speed of not less than 46 feet per second.

The most dangerous rival of the French car is the Hispano-Suiza, built in Spain. Like the Lion-Peugeot it has four cylinders in a single casting, with the maximum bore of 2 1-2 inches. The stroke, however, is slightly shorter, being only 7 4-5 inches. A very high engine speed is maintained, the makers admitting a piston speed of 45 feet.

The only other four-cylinder cars in the race will be supplied by Calthorpe, of Birmingham, England. While having the maximum bore, it is known that their stroke is short compared with that of the French and Spanish cars. They are not expected to make more than a regularity showing. De Bazelaire, Corre La Licorne, and D. S. P. L. will all put single-cylinder cars in the race. A formidable competitor is expected in the Corre La Licorne, with a motor built by Chapuis & Dornier, small motor specialists, and having a stroke of 11 inches for a bore of 3.9 inches. The others will use De Dion-Bouton motors of 3.9 by 10 inches bore and stroke.

Gnome Motor Being Renovated Mechanically

Experiments are now being made at the Gnome factory with a revolving air-cooled motor having mechanically operated intake vales. Up to the present all Gnome motors used on aeroplanes have been fitted with automatic intakes carried in the head of the piston. They have given satisfaction in working, but have the disadvantage of being inaccessible. To dismount them it is necessary to first lock the piston by means of a special tool, then unscrew the intake valve, together with its seating, by a special type of box key. This operation is naturally performed after the detachable cylinder head has been dismounted. As it is possible to screw out the intake without first locking the piston, it sometimes happens that mechanics do not follow the exact instructions for this work, with the result that whenever extra force has to be applied to move the intake valve the connecting rod is bent and the entire engine has to be dismounted. According to the makers, it is to overcome this difficulty, and not because of any dissatisfaction with the way in which the intake valves have done their work, that the mechanical type has been evolved. This latter has not yet completed its tests, and may, therefore, be further modified before being offered to the public.

The makers of the Gnome have secured two patents in connection with their valve mechanism, the first dealing with the method of mounting the valve in its guide and the second the operation of the two valves by a single overhead rocker arm. As on the standard type of motor, the cylinder heads are screwed home. The main rocker arm does not operate directly on the valve stems. It is composed of two parallel members united by transverse pins, and its outer extremity is balanced to equalize the weight of the push rod. Between the two members of the main rocker, and mounted on the same axle, are two auxiliary rockers of very open V-shape, one extremity of which carries a transverse pin acting as counterweight, and also reposing on the two arms of the main rocker; the other extremity receives the stem of one of the valves. The outer extremities of the auxiliary rockers are kept in contact with the main rocker by means of a four-blade flat spring; with the main rocker in a horizontal position both valves are, therefore, closed. The operation is as follows: On the upward lift of the push rod the outer extremity of the main rocker arm is raised, and by the same movement the auxiliary rocker is tipped, opening the intake valve. The pressure of the overhead spring keeps the exhaust seated. On the downward pull of the rod the inner end of the main rocker is raised and with it the secondary rocker operating the exhaust valve.

The cam mechanism has been entirely changed, for in place of the seven male and seven female ring cams, the valves are operated by means of a disc having on its face two concentric cam grooves into which fit "shuttles" carried on the face of the tappet rods. The disc is mounted on the extremity of the mainshaft, within the crankcase, and is driven by means of suitable internal gearing in practically the same way as the ring cams on the standard type of motor. This is a cam mechanism which has already been employed for automobiles, notably by Daimler, and for which no patent is possible.

Instead of the gas entering the crankchamber and being aspired through the valves in the pistons, on the new model it passes along the hollow crankshaft as far as the end plate, where it is aspired through the seven radiating intake pipes in the same plane as the cylinders, and connected to these latter by an aluminum elbow. This, by the way, is the only occasion on which aluminum is employed for the construction of the motor. The lubricating oil pipes are continued along the shaft to the bend, where they discharge their lubricant on the connecting-rod ends. Mechanical intakes should lessen consumption of lubricating oil.

New Epoch in Steel*

ELECTRICALLY REFINED STEEL IS REPLACING ACID OPEN-HEARTH PRODUCT, AND THE IDEA THAT THE CRUCIBLE PROCESS IS EXCLUSIVE FOR TOOL STEEL IS GIVEN A SEVERE JOUNCE

THE dawn of a new era in steelmaking is being heralded abroad, and automobile engineers who have struggled with this problem are awakening to the fact that "jewelry steel," so-called, is to be a regular product before the electrical process is, as might be stated, well in hand. In order to appreciate what the electric furnace is doing for the automobile steel situation, it will be necessary to relate the headway that is being made abroad, and to point out that nearly all German automobiles are now "sporting" electrically refined steel. But if the foreign fabricators of steel are taking kindly to the electrical process, it is also true that the American steel producers of this great commercial necessity are doing the same.

Just how the electric production of steel is to be of benefit to the makers of automobiles is a matter that cannot be elucidated without describing the process at some length, and stating the difference between it and the methods that were formerly relied upon for the fabrication of the better grades of steel. Steelmaking is conducted in the several ways as follows:

(A) Bessemer process.
(B) Basic open-hearth.
(C) Acid open-hearth.
(D) Electric furnace.
(E) Basic open-hearth with subsequent electric refining.
(F) Bessemer process with subsequent electric refining.

The reason why inferior steel is inflicted upon the maker of automobiles is because it is cheaper to produce, and the automobile man, if he is imbued with the economy idea, allows the price to run away with his judgment, or, if he is not well informed, the vendor of the poor grade of steel is enabled to reap a larger profit by selling the same, stating the while that it is amply good for the proposed work.

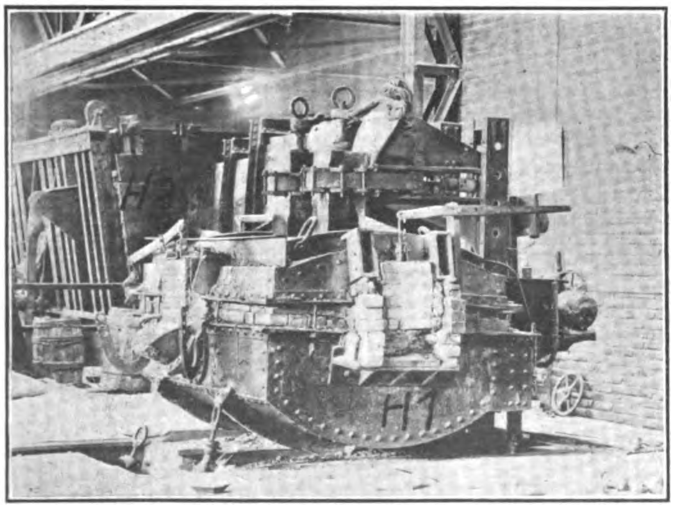


Fig. 1—View of a Héroult furnace. In the background is seen the tiltable acid open-hearth furnace from which the electric furnace is charged with molten steel

It is a fact, even if it is not well appreciated, that (in the absence of the electric refining, scavenging process) Bessemer steel ranks lowest in the scale of quality, but it is the most prevalent product and the easiest to procure. Basic open-hearth steel ranks next in the scale of quality, and next to Bessemer steel it is the easiest to obtain. Acid open-hearth steel ranks basic open-hearth steel about as much as the latter ranks Bessemer steel. Crucible steel, if it is as carefully produced as the process will admit of, takes rank with acid open-hearth steel, but if it is made in small quantities, under the most exacting conditions, may even excel. Electric furnace steel is not only taking high rank in the production of superlative brands of steel, but it is doing more. As a scavenging process, in an auxiliary capacity to the basic open-hearth furnace, or to the Bessemer process, this newer way of production is making great headway.

In times gone by, the electric process of producing steel was looked upon as a possibility, but there were many difficulties to be surmounted. A brief résumé of the history of the electric production would be incomplete without referring to one of the very earliest attempts, which was based upon the fact that electric energy may readily be converted into heat energy. It is of course known that:

$H = I^2 R\,t \times .24 =$ heat in calories.

In which,

$I =$ the current in amperes.
$R =$ resistance of the circuit in ohms.
$H =$ heat units measured in calories.

It may also be stated that:

$$I = \frac{E}{R}$$

$E =$ electromotive force in volts.

If an alternating current is used, the value of E must be taken as the square root of mean square of the instantaneous voltages, and the value of I will be represented by the square root of mean square of the instantaneous values of the current. The power factor must be noted and represented; it is 100 per cent. when a direct current of electricity is used, and less than this value when an alternating current is employed; just how much less is the point that must be determined; the power factor is equal to 100 per cent. minus the wattless component.

It may be taken for granted that a current of electricity offers a ready means of generating heat. The next point is to remember that the electric arc offers not only the source of heat but the necessary high temperature as well.

Merely having a high temperature available is scarcely enough for the best result. The electric arc offers more; the temperature is not only high but it may be localized; in other words, by proper manipulation the temperature in the slag may be brought to a higher level than that in the body of molten metal.

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*Illustrations and data furnished by Jos. Shaeffers upon his return from Germany.

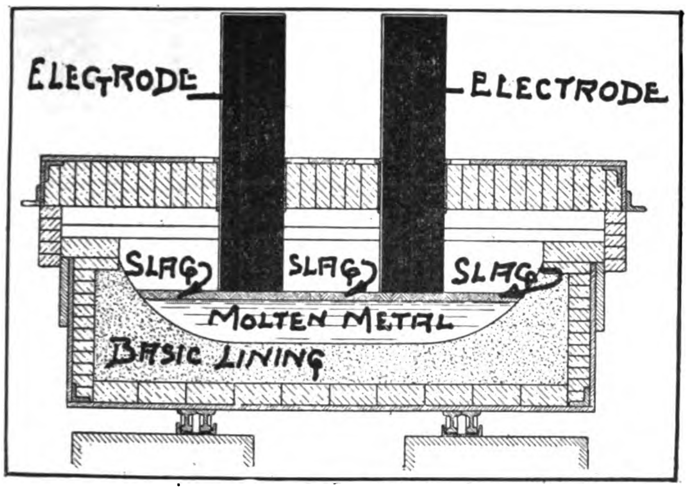

Fig. 2—Sectional view of Héroult furnace, showing layers of metal and slag during refining process.

From the experiments of 20 years ago as conducted in England, down to the process of Héroult, includes the history of a long series of experiments by the most advanced thinkers in the metallurgical field, calling into play a wonderful talent involving the application of the principles of electricity.

The general appearance of the Héroult type of furnace is shown in Fig. 1. This particular equipment is what is known as a 2-t Héroult-Lind furnace. It has the general appearance and many of the characteristics of a tilting type of open-hearth furnace. A section of this furnace is shown in Fig. 2. The two electrodes are each 8 inches square and 48 inches long; they are made of Acheson graphite. The length of the electrodes is sufficient to reach through the cover and dip into the slag, and it is obvious that by lowering the electrodes it is possible to cause them to dip deeper into the slag and even into the metal, and by this process change the main path of flow of the electrical current so that the greatest temperature may be either in the slag or in the body of the metal.

Referring again to Fig. 1 the Héroult furnace is marked H1, and just back of it a tilting acid open-hearth furnace H2 is located, the same being employed as a primary step in the process; the charge from the tilting open-hearth furnace is transferred to the Héroult furnace, where it is electrically refined.

The operation of the open-hearth furnace is no different from ordinary open-hearth work excepting that the process is stopped off as soon as the metal is reduced to the molten state. When the charge is transferred to the electric furnace the real refining begins and by way of a suitable precaution the bath is covered by a suitable thickness of slag which shields the bath from the carbon of the electrodes, some of which (in the process of wasting) remains, but it is mingled with the slag and thereby prevented from dissolving in the molten bath.

As Fig. 2 shows, the normal setting of electrodes is such that the arc is formed between the two electrodes, using the slag as the connecting medium. The heat of the arc is therefore at maximum, due to the high electrical resistance of the slag, and the distribution of heat is through the body of the slag, thence to the molten metal, thus affording a certain uniformity in the heat distribution. An automatic regulating device takes care of the distance between the electrodes and the bath; in the primary setting this distance is 1 3-4 inches.

An Intense Deoxidizing Process Is Carried On

The high heat in the vicinity of the arc induces an intense deoxidizing process which is so localized in the slag and spread out over the surface of the metal mass that the metal is not deteriorated. This process is brought to a complete state of perfection due to the fact that the bath is in constant and energetic circulation, which has the effect of bringing each particle of the metal into intimate relation with the high temperature for a sufficient length of time to complete the deoxidizing process.

The average temperature of the bath as a whole may not be any higher than the temperature as it obtains in other processes; it is the localized high temperature that seems to be efficacious. Deoxidizing is one of the beneficial processes; sulphur and phosphorus are both removed to whatever extent the manipulators desire, and carbon is regulated to a nicety.

Besides refining the steel, the electric furnace offers a most ready means of alloying; the distribution of the alloys is much more uniform and precise and the regulation of silicon, manganese, and carbon is brought down to a certain precision. Since there is no loss of metal to the slag after the same is transferred to the electric furnace, the process of alloying is relatively simple, it being only necessary to add the theoretically right quantity of the respective by-contents.

In the steel works of Richard Lindeberg, Limited, at Remschied-Hasten, Germany, the Héroult process is carried on as an every-day practical proposition, and the experience thus far gained would seem to support the contention that the excellence of the result is not at an undue cost.

Important Characteristics of Electric Furnace Steel

The specific gravity of the steel is higher than that of steel made by the other processes. For equal toughness the carbon content may be higher in this product; the effect of copper and arsenic is less pronounced. The ills attending the presence of sulphur and phosphorus are not so noticeable. Electrically refined steel behaves under the hammer and may be worked at a higher heat with less chance of deteriorating. Owing to the purity of the steel after it is subjected to the refining process it lends itself with great facility under specialized conditions as when it is desired to evolve a high silicon product; upwards of 5 per cent. silicon obtains in some of the brands of steel turned out. This process also works well in the production of aluminum steel; in some cases 2 per cent. aluminum is added.

It will be understood that this process is efficacious particularly in the production of chrome nickel steel and the other alloy products involving the use of vanadium, titanium, tungsten, and such other elements as are found to be efficacious for the purpose. The great purity of the product and the substantially complete elimination of sulphur and phosphorus have a marked bearing upon the procedure; moreover, super-oxidation may be resorted to if desired because deoxidation becomes the final corrective.

As an illustration of the efficacy of the process from the point of view of the removal of sulphur, references may be had to the following recount of the

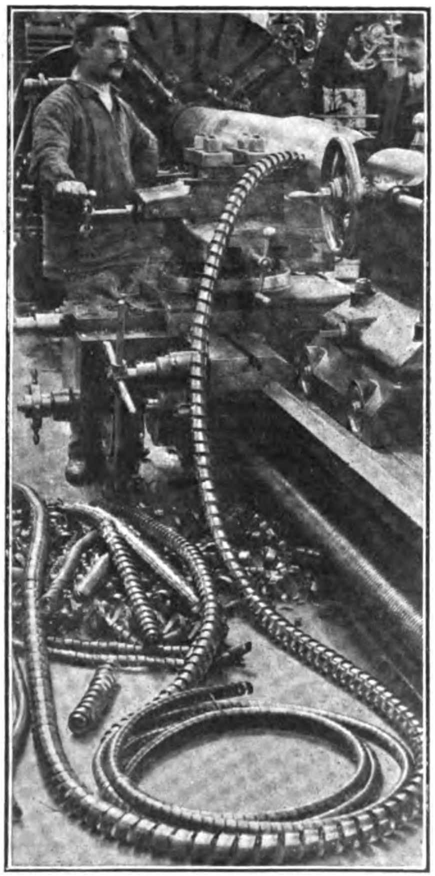

Fig. 3—Illustrating the cutting qualities of high-speed steel

final sulphur content as determined by analysis of 1,000 charges. Another table gives the analysis of electrically refined steel.

RECORD OF 1,000 CHARGES FROM AN ELECTRIC FURNACE

Per cent. of sulphur	No. of charges
.001	88
.002	5
.003	14
.004	29
.005	50
.006	82
.007	100
.008	168
.009	99
.010	108
.011	67
.012	64
.013	35
.014	29
.015	20
.016	11
.017	14
.018	6
.019	1
.020	2
.021	2
.022	2
.023	2
.025	1
.026	1
Charges	1000

743 charges with maximum .010 sulphur

958 charges with maximum .015 sulphur

No. of Charge	CARBON		MANGAN.		SILICON		Phosphorus	Sulphur	Tungsten	Chromium	Nickel
	Specified	Found	Specified	Found	Specified	Found					
30	1,10	0,99	0,30	0,34	0,20	0,25	0,003	0,007	.....	.....	.....
353	0,95	1,02	0,35	0,38	0,30	0,29	0,002	0,008	.....	.....	.....
359	0,70	0,77	0,30	0,32	0,15	0,16	0,010	.....	24,62	6,29	.....
360	1,40	1,38	0,30	0,35	0,25	0,25	0,009	0,010	.....	.....	.....
362	1 05	1,02	0,55	0,52	0,30	0,39	0,008	0,015	.....	.....	.....
829	1,00	1,08	0,30	0,34	0,30	0,33	0,009	0,003	.....	1,33	1,13
831	1,00	0,96	0,35	0,36	0,25	0,28	0,015	0,010	.....	.....	.....
839	0,70	0,68	0,30	0,29	0,15	0,16	0,012	0,012	21,41	4,64	.....
840	1,25	1,16	0,03	0,32	0,20	0,22	0,009	0,005	.....	.....	.....
842	1,00	1,00	0,53	0,54	0,30	0,30	0,010	0,009	.....	.....	.....
845	1,00	1,12	0,55	0,55	0,30	0,33	0,012	0,011	.....	.....	.....
850	0,75	0,81	0,45	0,45	0,30	0,35	0,010	0,005	.....	.....	.....
851	0,75	0,82	0,45	0,41	0,30	0,31	0,009	0,012	.....	.....	.....
854	0,90	0,87	0,33	0,30	0,25	0,24	0,009	0,007	.....	1,34	1,10
855	0,90	0,86	0,35	0,30	0,30	0,27	0,010	0,010	.....	.....	.....
856	0,70	0,67	0,30	0,29	0,15	0,15	0,010	0	23,86	5,54	.....
857	0,95	0,99	0,30	0,33	0,25	0,24	0,007	0,005	0,42	.....	.....
858	1,05	1,07	0,50	0,55	0,30	0,30	0,017	0,009	.....	.....	.....
861	0,95	0,97	0,30	0,31	0,25	0,24	0,007	0,005	.....	1,20	1,11

Don't

THIS ADDITION TO THE DON'T FAMILY DEALS MOSTLY WITH THE PURCHASE OF A SECOND-HAND AUTOMOBILE, LEAVING ROOM FOR A FEW INJUNCTIONS FOR EVERY-DAY USE AND A DASH OF HORSE SENSE FOR THE MAN THAT GETS IN WRONG FIRST AND THINKS AFTERWARDS

Don't forget that in polite society a second-hand automobile is called a "used automobile."

Don't overlook the fact that it may be a very much used car at that.

Don't think that a re-built demonstrating car, so-called, is a new automobile.

Don't become confused if it is said that the car is almost new and has not gone 1,000 miles—a precipice is not 1,000 miles down—but the going is such that the automobile that negotiates it will have a couple of broken ribs.

Don't look in the eye of the man that is telling you how good a second-hand car is; look in the eye of the car and see if it has a cast in it.

Don't try out your horse trading skill; what's the use of getting stuck?

Don't listen to the wiles of the man who says the car is almost new when the finish on the body shows that it has gone through the revolutionary war.

Don't forget that it takes time and service to make a log cabin look as if the resident has an ancestry—when an automobile looks that way it may have ancestral proclivities.

Don't add to your ancestors; an historical great-grandfather is a joy forever, but an automobile, if it belongs in that class, will be as sweet running as a threshing machine.

Don't let the demonstrator try out the second-hand car that you are to put your faith and your money in under an elevated railway; the elevator may make more noise than the car.

Don't persuade yourself that a car is making all the noise that it can when the demonstrator is nursing it along the boulevard at a low speed; try it out on high speed; give it a little cobble stone going; if it rattles like a saw mill purchase it as one if you have very little wood to saw.

Don't fail to test the car out on the several gears; it may not be silent on any of the gears excepting "direct."

Don't assume that the effect of noise is merely to be measured on a basis of its effect on your nerve; if you are a boiler-maker you can stand a lot of noise; the remaining fact is that noise is a sign of depreciation; remember that signs of depreciation would indicate to a Sherlock Holmes that there is a repair bill coming down the road.

Don't make haste in reaching the conclusion that silent performance is a sure sign of quality; the car may have been enjoined to be silent.

Don't forget that the rattling joints of a car, if they are filled up with paint, will cease to rattle.

Don't overlook the practice of putting bee's wax on the gears to silence them.

Don't go by the name plate; some wag may have replaced it by a more modern one.

Don't labor under the impression that a Worth sign on a costume makes it a Worth dress; the costume may have been made on the East Side. Likewise, an automobile may be disguised.

Don't think that a second-hand car is good just because it cost a lot of money in the first place.

Don't forget, the more the car cost in the first place, the greater will be the depreciation cost in the long run; if the depreciation is 10 per cent., for illustration, this percentage of $6,000 is $600, and a like percentage of $1,000 is but $100.

Don't overlook the fact that the depreciation of an automobile will be greater if the power plant is designed for high speed than will be true if the power available is barely sufficient to propel the car at an ordinary speed—the difference is very noticeable.

Don't allow yourself to get used to the idea that the compression of the motor is all right just because it cranks hard. A supply of heavy lubricating oil, put in on purpose, would produce this effect.

Don't be deceived; if there is a compression release on the car the demonstrator may be able to conceal the fact that the compression is far from good; he will point out that the compression should be slight when the release is used, as in cranking, but this will prevent you from finding out just how bad the compression is unless you try it when the release is not working.

Don't fail to remove all the lubricating oil, and after replacing it with a normal grade, determine what the true conditions of compression are; the power of a motor, as well as the fuel economy, increases with compression.

Don't purchase an automobile that is fitted with a clutch that will not take the automobile up a 20 per cent. grade; if the clutch will not hold, the power of the motor will be of no avail.

Don't fail to look twice at the clutch of the car if the same is "fierce." This may be a sign that the clutch is tightened up too much, just for the occasion—it might not hold in regular service.

Don't be satisfied with leaking valves; the leak may not be the sign of serious trouble; if the demonstrator says the valves can be ground in to make them tight, let him show you—the real point is, can they?

Don't invest in a car that has a cooling system that fails to maintain the normal working temperature of the cooling water. If the water boils when the car is standing at the curb, it is a sign that the cooling system is not what it should be.

Don't forget that the failure of the cooling system may be due to serious thermic derangement as well as a leaky pump.

Don't let the demonstrator convince you that cooling trouble is a slight derangement that can be remedied at the cost of a special delivery postage stamp—if he goes on that way, pay him the amount and let him do the work.

Don't permit the seller of the car to persuade you that ignition trouble is due to a set of depleted dry batteries—if he says that the ignition system will be all right as soon as the dry batteries are replaced by new ones, let him replace them and then show you how well the automobile will behave.

Don't fail to try out both ignition systems; this can be done in a very simple way: Run the car on one of the systems, and when it is performing well, throw in the other system and note the difference in performance.

Don't purchase an automobile that is not properly provided with brakes—it is your neck that is at stake.

Don't be induced to disregard the poor performance of the emergency brakes; the demonstrator may want to keep from you the information that they are faulty in design and cannot be made to work; if he says that 50 cents will re-line them and make them better than new, give him a dollar and turn him loose on the job.

Don't, just because the price sounds low, purchase an automobile that will not run; are you not aware that old iron is worth about one cent per pound?

Don't forget that an automobile is like a hound; if it cannot run it is scarcely worth feeding.

Don't fail to observe the condition of the springs; if they are in a state of "sag" it is easy to determine the fact; all that is necessary is to measure from the floor up to the underside of the chassis frame on both sides of the car; if there is a sag, one side will be down.

Don't fail to observe how much the front wheels wobble when the car is being driven along the road at a good pace; wobbling wheels are not to be tolerated; the trouble may be due to a fault in design as well as to lost motion.

Don't accept a car that has a worn-out steering gear; lost motion will tell the tale; if the demonstrator says it is but a trifle, and that it can be fixed, why beat him out of the pleasure of showing you just how clever he is?

Don't invest in a sagging live rear axle; if it can be fixed up let the seller do it. If it cannot be fixed, let the seller stew in his own juice.

Don't figure on the tires being of any value; they may be chalked up; it is possible that they were given hot water treatment before being put on; the inner tubes cannot be seen through the outer casings.

Don't fail to observe if the side-bars of the frame are in good order and free from a sag.

Don't fail to try the clutch lever when the emergency brakes are set; for all that you know, the brakes will interfere with the proper working of the clutch.

Don't reach the conclusion that all the possible troubles of the second-hand candidate are told here.

Don't be blinded by a lot of junk accessories—what you need is an automobile that will run, and in which some of the original sweet running qualities may still be discovered.

Don't be skeptical; there are good second-hand automobiles to be had—be diligent; scrutinize the entrails; if trouble is indicated, remember that you can scarcely be expected to see all of it; play safe in that event.

Don't conclude that a second-hand automobile is all right just because none of the troubles as here cited are not to be found; these are the troubles that belong in the automobile that you are not to put good money into.

Don't pay too much for a car that stands the light of a searching examination after it is found that it is free from impossible troubles—remember that it is still a second-hand car even if it does appear to be in an excellent state of preservation.

Don't monopolize the payment of tolls. Your friends may want to dig in their jeans once in a while.

Don't apply the brakes too suddenly on wet asphalt. The car is liable to go ahead anyhow if you do.

Don't try to show your car's paces on a tortuous downgrade. You may get your name in next morning's paper.

Don't try to "rush" a toll-gate. Suburban telephone companies are numerous.

Don't try to argue with a motor "cop." It only makes him worse.

Don't rely on your individual efforts in condemning bad automobile laws. Join some good club in your neighborhood and pay your dues regularly.

Don't wear your cap wrong-end foremost. It may give you a speedy appearance, but your eyes will suffer.

Don't start on a long trip without an extra pair of goggles in your kit. Eyes are too valuable to warrant taking chances with them.

Don't take both hands off the steering wheel to adjust your goggles. Telegraph poles and ditches are the automobile's affinities.

Don't pass another car at high speed. A slight miscalculation may prove costly.

Don't trail another car too closely, or you'll eat your bushel of dirt in too large portions for comfort.

Don't make up as a racing driver when you are on a pleasure tour.

Don't trust to luck to secure a rubber coat in case of rain. Take your own.

Don't delay too long in throwing in your low gear on a bad hill. You may stall your engine.

Don't try to get good results from an ignition system that is troubled with poor joints in the wiring; if the joints are soldered they will be barely good enough for their intended purpose.

Don't allow inertia of mind to stand in the way of inspecting the ignition system at frequent intervals; the wiring and connections need it.

Don't place $30 worth of tools in the tender keeping of a tonneau (under the seat) with the floor boards so loosely inserted that the tools will be scattered hither and yon along the roadside.

Don't forget that a file is the repairman's lathe, shaper, planer and milling machine. A good file is a very handy tool; all files are not good.

Don't be a pessimist when it is too late; if some gawk wants to hurrah money out of your pocket tell him to guess again.

Don't catch the enthusiasm of the fellow who has an eye on the yellow backs that persist in peeping over the gunwale of your vest pocket—why not have something to say about it; you are at least entitled to an opinion.

Don't grow weeds in your back yard and an account at a garage for car storage at the same time; put up a little garage of your own—the cost is but a trifle.

Letters

DISCUSSING MATTERS OF INTEREST TO USERS OF AUTOMOBILES; KNOCKS IN CYLINDERS; CORRECT PRACTICE IN DRIVING; DIFFERENCE BETWEEN HIGH-TENSION AND OTHER JUMP-SPARK SYSTEMS; HEATED MOTORS AND BOILING RADIATORS, ETC.

Loss of Power and Knocking on Grades

Editor THE AUTOMOBILE:

[2,361]—I have a new automobile and it seems to run very well indeed excepting when it is negotiating a long grade or when the road is soft and the pulling is unusually hard. It is a very annoying situation and I would consider myself much favored were you to give the matter a little attention. Last year when I wrote to you about other cases of trouble I had, the remedy that you gave me was to the point and it undoubtedly saved me many times the subscription price of THE AUTOMOBILE.

C. T. DEXTER.

Mobile, Ala.

There is not enough clearance between the pistons and the cylinder walls. Have the cylinders removed and rebored. The clearance should be on a basis as follows:

CLEARANCE REQUIRED BY PISTONS IN CYLINDERS

Bore of Cylinders In Inches	Clearance of Pistons At Top	Clearance of Pistons At Bottom
4	0.005	0.010
4 1-2	0.008	0.015
5	0.010	0.020
5 1-2	0.012	0.025
6	0.015	0.028

These allowances seem to be excessive and many autoists as well as some designers will generously disagree with the proposal. The fact remains that better results will follow if the pistons clear a little more than is to be expected when they are on the verge of sticking. It is not by having sticking pistons that compression is to be maintained. This quality follows when the rings are properly fitted.

A Few Special Situations Encountered in Driving

Editor THE AUTOMOBILE:

[2,362]—Like a good many other autoists of a relatively new vintage I know enough to keep to the right when going along the road; I also know that a road hog is not a good citizen; it is my intention to keep within the law, but I am not sure that I fully understand some of the more difficult situations that do occasionally arise. Will you please illustrate the correct practice under the conditions as follows:

1. When a car is approaching a cross street and it is desired to turn the same around.
2. When four cars come abreast; two going each way.
3. When one car is about to enter a cross street and meets another coming out.
4. When a car comes out of a street and approaches a circle, as at the Circle in New York City.

Brooklyn, N. Y.

The four specific situations are illustrated here and the captions under the illustrations will be sufficiently clear to eliminate the need of further elucidation.

High-Tension and Other Jump-Spark Systems

Editor THE AUTOMOBILE:

[2,363]—There seems to be a considerable amount of talk going the rounds about true high-tension ignition systems and other high-tension jump-spark schemes. Are they not, taking them as a whole, all high-tension jump-spark systems? If so, what are the distinctions that have to be made in properly describing them? It is believed that THE AUTOMOBILE is the one paper in the country that is capable of, and fearless enough to state the facts even though there may be some trade secrets involved. In any case why should there be any trade secrets? Is it not right that a man should know what he is getting when he pays good money for it?

GEO. W. PEABODY.

Plainfield, N. J.

Talk is cheap. When a company goes to the cost of building a device and exerts itself sufficiently to attract the notice of a clientèle, it stands to reason that it can scarcely hope to evade publicity, and knowing this, there is little chance that it will build any device that it thinks is below an acceptable standard.

Every ignition system that uses spark plugs in the cylinders, of the character that furnishes the spark by the jumping of the electrical charge across a fixed gap, is a true high-tension system.

All high-tension jump-spark systems of ignition are not made in the same way. There are two principal subdivisions, *i. e.*, (a) the system that uses high-tension magnetos as the source of electrical potential and (b) systems that employ step-up transformers in conjunction with low-tension magnetos.

The high-tension magneto system, as depicted in Fig. 5, differs from the step-up transformer system, structurally, due to the fact that the armature of the magneto has a double winding, the idea being to generate a low-tension current in the coarse wire winding, and step it up to a high potential in the fine wire winding of the armature. This plan eliminates the use of the separate step-up transformer for the reason that it is embodied into the construction of the magneto itself in this way.

In the second type of ignition equipment, the armature has a low-tension winding, and the terminals of this winding are connected up to a separate step-up transformer as shown in Fig. 6.

Both systems, according to this reasoning, have provision for generating a low-potential wave, and employ a transformer to multiply the voltage of the wave; that is to say, a secondary winding, on the principle of the transformer, is used to step the voltage up to some higher level.

The difference, in point of principle, is that in the magneto that is self-contained the coils are all on the armature, whereas the remaining type of magneto has a separate system of coils to perform the secondary function.

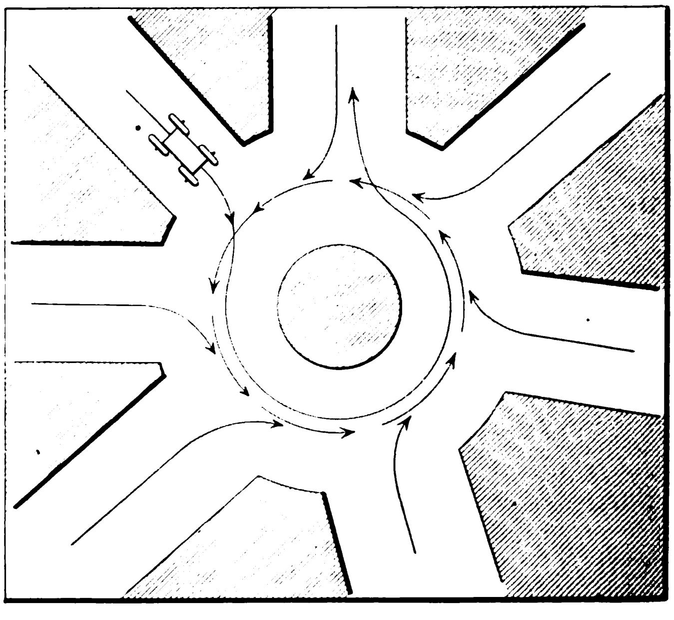

Fig. 1—Arrows point the way to an automobile that approaches a circle, coming in from any one of the converging streets or avenues

Which is the best system? Such a question is more or less foolish. The general principle is the same in both cases. One slight difference should be noted, *i.e.*, when the secondary winding is placed on the armature of the magneto, it cuts the magnetic flux and would generate the electromotive equivalent due to the number of inductors employed even were there no primary coil employed.

In the meantime it is within the realm of belief to take up with the idea that most of the troubles that are experienced with ignition systems are due to causes that are not due to any violation of magnetic principles, basically. The faults are of detail.

Motor Heats and Radiator Boils

Editor The Automobile:

[2,364]—I have a car that seemed to work very well when I purchased it and the demonstration, which was long, certainly did not disclose anything of the trouble that I am now experiencing. In a short time after I take the car out on the road the motor shows that it is heating up, and during the day I have to fill the radiator three or four times. Certainly this is not the performance that I had a right to expect from the car when I purchased it and I am much disappointed as you can readily appreciate. The agent who sold the car to me does not seem to be very sympathetic and he as much as said to me go and learn how to drive; the trouble is in you and not in the car. Do you think this is fair treatment after taking my money?

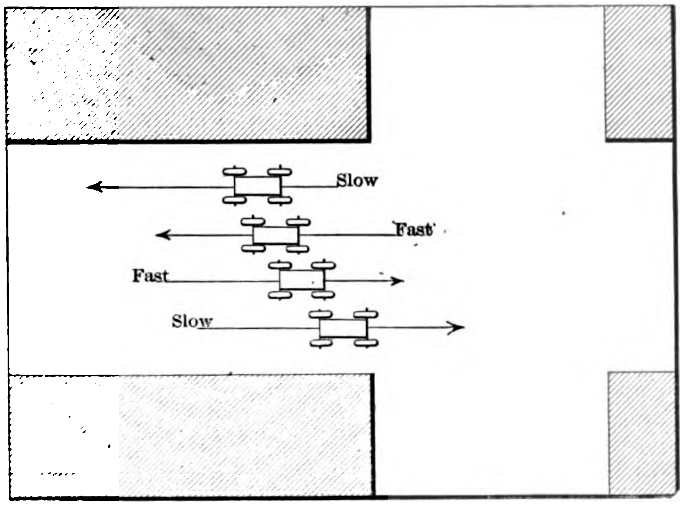

Fig. 2—Presenting four cars abreast, two traveling in each direction; indicating that the two outer cars should go slow to permit the two inner cars to get by and out of the way

New Subscriber.

New York City.

When the agent took your money you took his car; a fair exchange is no robbery. Sympathy, of the kind that you want, costs money. The agent's profit is probably not enough to encourage him to reduce it in the way that you would suggest. When he told you that the trouble was in you rather than in the car, strange as it may seem to you, he was telling the truth. The fact of the matter is that you persist in running the motor on a retarded spark. Advance the spark so that the motor will not heat up, and if the car does not then run slow enough to suit you, change to a lower gear. Throttle down on the mixture a little, and it will also be of advantage to you to reduce the flow of gasoline at low speed. Too much gasoline is likely to cause over-heating.

What Is a Good Practical Timing for a Motor?

Editor The Automobile:

[2,365]—Since I purchased my automobile two years ago I have gone over the timing of the opening and closing of the valves three times and I want to say that it has been a beneficial practice taking it on the whole. I did not wait until the motor showed distress; it is my belief that it is not good practice to get into trouble even without thinking of how to get out again. When I purchased my car and brought it home to my little garage, the first thing I did was to check over the timing of the valves, and I found that they were not all timed alike. I did not get vexed and go back to the agent for redress; what I did say to myself was, if the motor was not properly timed when the agent said it was in the pinkest of condition, why should I take the car back to him and risk having it put in worse shape than I found it. If the agent was that kind of a man it was enough to find it out and keep away from that grade of smallpox. Moreover, the automobile was a good one in spite of the shortcomings of the agent.

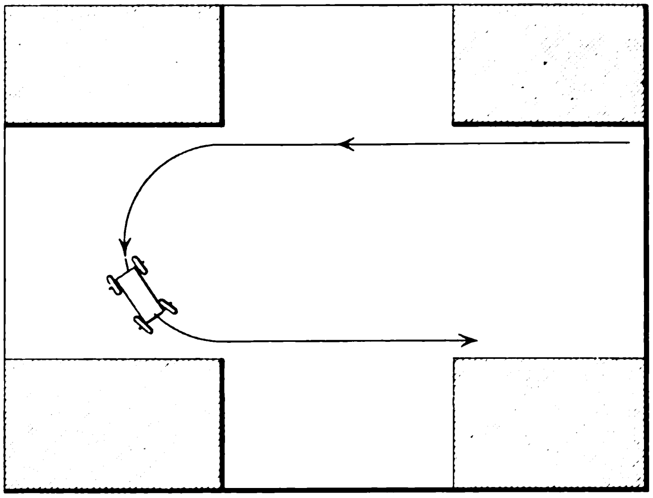
Fig. 3—When a car is going in one direction and it is to be turned around; the figure indicates that the car should go by the lateral before turning around

My first try at timing was not much of a success, but I made the car run better than when the agent handed it to me. What I then did was to find out how each valve was timed and I took a mean timing, that is to say, the average of the variations as I found them in the car. After that I went into the matter at some length and learned how to deftly manipulate the mechanism. With growing confidence I retimed the valves and the situation was improved quite noticeably. The motor "kicked along" for more than a year on this second timing, but the day finally came when I considered that the motor was getting short of breath, and I went at it again—the result was very good.

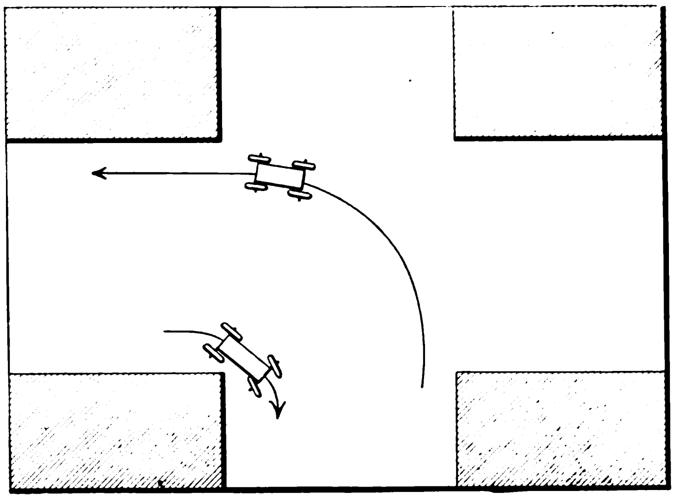
Fig. 4—A car coming out of a lateral and another going in; it is not only desirable to go slow, but it is also proper to keep well to the right of the street

It occurs to me now that I may have been over-confident after

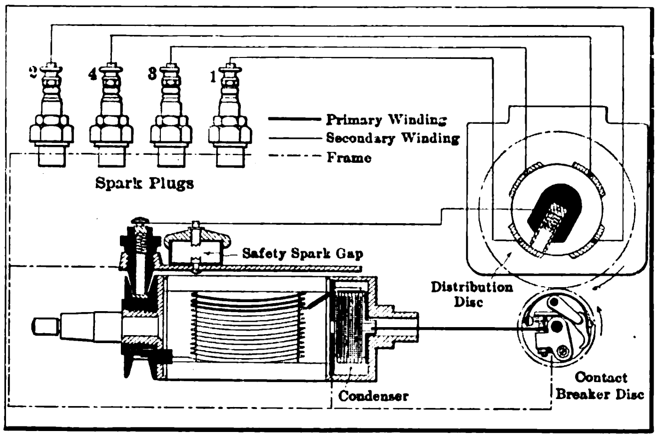

Fig. 5—High-tension jump-spark ignition system using high-tension magneto

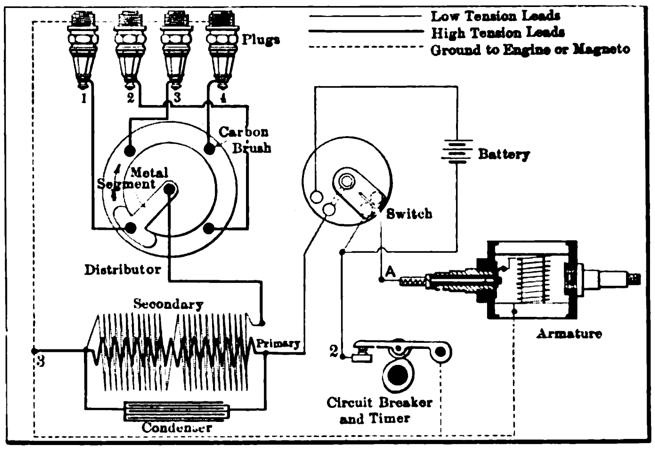

Fig. 6—High-tension jump-spark ignition system using low-tension magneto

all; perhaps there is a better timing than that which I use, at all events I will be glad to do the work if you will direct me.

Alex. D. Mansfield.

Buffalo, N. Y.

So brave a motorist is hardly in need of any help at all. The probabilities are that the timing is quite up to the best requirement. The following is considered a good setting of the valves of a motor that is to perform flexibly, running at a maximum speed of 1,300 revolutions per minute:

SATISFACTORY TIMING OF VALVES CONSIDERING FLEXIBLE WORK

Lead of Exhaust Opening	Lag of Inlet Closing	Lag of Exhaust Closing	Lag of Inlet Opening
44	33	10	17

It will be understood that the figures are in terms of degrees as marked off on the flywheel of the motor.

Some motors fail to work satisfactory when the inlet is opened close to the closing of the exhaust; if the design is such that it is feasible to open the inlet earlier it will be desirable to do so.

There is quite a little in the question of timing a motor in a way to conform to its characteristics, but this is a detail that must be taken care of alongside of the fact that the motor must be used in the service for which it may be designed. If a motor is designed for one purpose and used in some other work, it may be better to so time the same that it will lean toward the intended result—the value of the service will, of course, fall short of the maximum obtainable when best conditions are satisfied.

Clutch Spinning Interferes with Sliding of Gear

Editor The Automobile:

[2,366]—I have just purchased a new automobile and since it is my third car I have some idea of how the gears ought to slide. What I find is that the clutch has to be slowed down before I am able to change gears and a pause is necessary. The trouble is that the pause is too great and I would like to have you tell me of the reason. The clutch is of large diameter and looks quite substantial; it is of the leather-faced cone type.

Subscriber.

Hagerstown, Md.

The clutch is of such large diameter and so heavy that the energy stored in it is more than can be disposed of in a short time. It is impossible to slide the gears before they are reduced to nearly the same speed and the flywheel effect of the clutch interferes with this demand. There is only one way to apply a remedy and that is to attach a "drag" to the clutch. This can be done by finding a surface for a small brake-shoe and figuring out a motion for manipulating the same. The drag should come on just as the clutch is released. Cork inserts in the face of the drag will make it work better than it will if the contact is metal to metal.

Questions That Arise

CONCERNING THE PROPER SIZE OF A CARBURETER IN PROPORTION TO THE AMOUNT OF WORK IT WILL BE CALLED UPON TO PERFORM—TESTING OF GNOME MOTORS

[223]—What is that fixes the ultimate size of a carbureter?

The capacity of the same for delivering gasoline to the train of atmospheric air on a basis of 8,000 volumes of air at a pressure of one atmosphere to one volume of liquid gasoline at the same pressure, assuming the design of the carbureter is such that the liquid gasoline is vaporized and mingled with the air before the same reaches the combustion chamber of the motor.

The best test to make to ascertain whether or not the carbureter is large enough for a motor in a specific instance is to take the automobile to a road that has a 20 per cent. grade that is long. Start the car up the grade at its maximum speed and slide to low gear, keeping the motor going as fast as possible and the car climbing as fast as it will go. If the carbureter is too small for the motor, the latter will drink up all the gasoline that the carbureter will supply, and, as the demand will then exceed the supply, the motor will then stall.

This is a dangerous situation and it is one that should be examined into by every autoist in order that he will be able to judge of the mountain climbing ability of his automobile before he entertains the idea of making steep ascents.

There is a secondary reason for failure of the system of carburetion on long steep grades. If the gravity principle of feed is used and the "head" is restricted, it is just possible that this head will be reduced by gradient so much that the pressure back of the flow of gasoline will fall off to zero. This idea is illustrated in Fig. 1. Obviously, the shorter the distance L the less will be the trouble from this quarter, and if the gasoline tank is directly over the carbureter the difference in the head due to gradient will be almost nothing. As the illustration shows, if the grade is such that the line designated as level changes to the position designated as grade, the head will change from the original difference, as indicated in conjunction with the level line, to zero, as indicated in conjunction with the grade line; at this instant the gasoline will cease to flow to the carbureter unless the tank is more or less full, when the difference in head will be directly proportional to the height of gasoline in the tank.

But this is a bad state of affairs; the pressure on the gasoline will then change with the quantity of gasoline in the tank, and while it might flow fast enough to afford some result on a level, it might so limit the capacity of the carbureter just when it should be a maximum that the motor would be stalled. Now, it is not dangerous, as a rule, to have the motor stall when the road is level, but when a car is going up the side of a mountain it is far from pleasant to contemplate the idea that the power will cease and the motor will back down the steep declivity unless the brakes hold. Of course the brakes will hold if they are in good working order and properly designed. But are they always in good working order? Are they invariably properly designed? How many motorists can write in to the editor and say the brakes on my car, especially the emergency system, will not stop or hold my car?

[224]—What is the prospect from motors of the type known as the Gnome? Does it offer any attraction to the maker of automobiles? If it is light and powerful it should offer possibilities.

During the official tests held at the laboratory of the Automobile Club of France the new Gnome 14-cylinder, 100-horsepower motor failed to give the results claimed for and expected of it. The motor consists of two groups of 50 horsepower each connected up to a two-throw crankshaft, the explosions of the front and rear motor taking place at 180 degrees in relation one to the other. The cylinders measure 4 3-10 by 4 7-10 inches bore and stroke, and are cooled by revolving, together with the crankcase, around the fixed shaft.

The first test lasted 28 minutes 32 seconds, being stopped by the breakage of an intake valve spring. During the first 15 minutes the motor averaged 76.1 horsepower, at a speed of 1,128 revolutions; during the remainder of the time, at 783 revolutions a minute, the average power was 25.6 horsepower. During the 28 minutes 32 seconds the motor was under test its average speed was 1,004 revolutions a minute; average power 52.97; total consumption of gasoline 5 kilos 700 (12.7 pounds); total consumption of lubricant—castor oil—4 kilos, 400 (9.6 pounds); specific consumption of gasoline per horsepower-hour, o kilo, 226; specific consumption of lubricant per horsepower-hour, o kilo, 174; weight of the motor, 304.6 pounds.

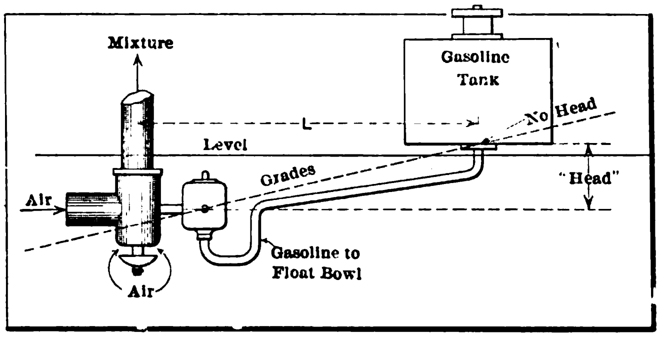

Fig. 1—Showing the influence of grades on the flow of gasoline from a tank under the influence of gravity

A second trial was stopped at the end of 59 minutes 3 seconds by reason of the breakage of two sparking plugs. On the third test the motor was stopped voluntarily and at the request of the owner at the end of one hour. The average speed and power for each 15 minutes were as follows: 1,135 revolutions, 74.40 horsepower; 1,112 revolutions, 69.90 horsepower; 1,100 revolutions, 67.78 horsepower; 1,098 revolutions, 67.58 horsepower. The average speed during the one hour's test was 1,111 revolutions a minute and the average power 69.89 horsepower. The consumption of gasoline for the hour was 22 kilos 700 (46.6 pounds); total consumption of lubricant, 11 kilos (24.2 pounds); specific consumption of gasoline per horsepower-hour, o. k. 324 (0.71 pound); specific consumption of lubricant per horsepower-hour, o. k. 157 (0.34 pound). The total weight of motor 304.6 pounds; weight per horsepower, 4.5 pounds. The tests were made on the first motor of this type produced at the factory. In their own works 95 horsepower had been obtained.

The only other competitor in the same category was a revolving 2-cylinder air-cooled Farcot motor which stopped dead at the end of a few minutes by reason of the seizing of an aluminum piston.

Digest

EXTRACTS ON TECHNICAL LINES FROM FIFTY BEST FOREIGN PAPERS—THE INFLUENCE OF A SECOND DIRECT DRIVE TO MAKE THE OPERATION OF A VEHICLE CONVENIENT AND ECONOMICAL IN HILLY DISTRICTS—AN EXPLANATION OF THE VAGARIES OF CARBURETERS

The transmission with two direct drives gives different results.* Let the gear speed ratios be supposed to be as before. Vehicle B can then scale the 5 per cent. hill on the third speed at about 36 kilometers per hour, which means a gain in speed of 8 kilometers and a smaller fuel consumption.

If instead of four gear speeds only three are available and their ratios are: first to second as 0.50 to 1 and second to third as 0.57 to 1, vehicle B is still more at a disadvantage; it can climb the 5 per cent. grade only on the low speed at 16 kil. per hour.

As has been seen, vehicle A could climb a 7 per cent. hill without changing gear, but rather slowly, at 28 kilometers per hour, but the 5 per cent. hill it climbs at 38 kilometers, the 6 per cent. at 42 kilometers. Evidently there is no advantage in changing gear for the 5 per cent. hill. In fact, if there is only one direct drive, the motor on reduced gear would develop only 14 horsepower at the rim, while, going at 58 kilometers per hour and direct drive, the power at the rim is 17 horsepower, so that there would be a loss in changing gear. The situation is similar for the 6 per cent. hill; it can not be scaled faster than 42 kilometers per hour, whatever we do, unless there is a second direct drive to save the efficiency of the transmission. The 7 per cent. hill can be climbed on the third at 35 kilometers, which is a gain of 7 kilometers per hour. With a second direct drive, the 5 per cent. hill could be scaled at 61 kilometers, which would be a small gain, hardly compensating for the manipulation of the lever, but the 6 per cent. hill may be taken on the third speed and direct drive at 56 kilometers, which is a gain of 14 kilometers over the third speed, by interposed reducing gear, and the 7 per cent. hill can be scaled at almost 50 kilometers by direct third-speed drive, which is a gain of over 20 kilometers compared with the direct high speed and of 15 kilometers compared with third speed by reducing gear.

While it is understood that, on level roads, the comfort of operating a car with few gear changes depends mainly upon the flexibility of the motor, the examples presented show that in traveling over a hilly territory the comfort in operation is nearly independent of the flexibility of the motor; that is, the motor may be highly flexible and the vehicle may, nevertheless, exact many manipulations of the speed lever, or the motor may be lacking in flexibility and the vehicle yet very comfortable to operate. The runabout or the torpedo type will always be more agreeable to conduct for this reason than a heavy limousine (of equal power) and, while the lighter and less bulky vehicles may get along even in moderately hilly districts, such as Normandy or Touraine, with three speeds and a single direct drive, the limousine placed on a chassis of equal power demands four speeds, and the two highest with direct drive, in order to make

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* Continued from last week.

the vehicle more rapid, easier to operate and less wasteful of fuel. The builders in the Lyon district, which is especially mountainous, have long ago come to the double direct drive. Cottin-Desgouttes, Pilain, La Buire and Berliet have two direct drives. Pipe also constructs his transmission box with two direct drives.—C. Faroux in *La Vie Automobile*, June 4.

All automobilists have observed that carbureters work differently according to the season, the condition of the atmosphere and, on the same day, according to the hour and the temperature. In passing through a forest, even those least alert discover that the vehicle becomes imbued with a responsiveness which it did not possess a moment before. The author has taken pains to seize these differences by accurate and prolonged observation in practice. For one year almost daily he passed through 15 kilometers of forest. Often, he says, during the heat of Summer, the vehicle would run sluggishly or even badly, over an overheated road, toward one o'clock in the afternoon, but as soon as the forest was reached the motor picked up and the gait was quickened, without the carbureter being touched. Also, morning, evening and night gave better motor results than the heated hours of the day on any road.

At the aviation meet at Vichy, last July, on an apparently perfect day, large masses of spectators waited in vain from ten o'clock in the morning to 7:30 at night, and became quite violent and abusive, seeing no reason why flights should not be made. But in reality the carbureters could not be made to work properly on any of the machines, as the day was tropically hot and the territory denuded of all trees. But after sundown the aviators took out their machines and made the evolutions expected of them. Two explanations have been offered for the peculiarities mentioned. One ascribes them to the chlorophyllian vapors of forests, but must be rejected, since it does not explain the morning and evening effects where no trees are present. The other explains them by the variations in humidity which follow variations in temperature, and seems plausible for the Summer, but conflicts with the facts noted in Winter. As soon as the coefficient of humidity becomes pronounced in Winter, as it easily does because very little water vapor is required to saturate cold air, the carburation becomes less good. And it seems unreasonable that water vapor should be beneficial in Summer and harmful in Winter.

Some of the facts of combustion in cylinders throws light on the subject. To burn gasoline completely there is required at least 15 times its weight in air. Tho quantity of air used greatly influences the heat of the combustion. According to Claudel, the theoretically best mixture gives 2,788° centigrade. With one and one-half times more air the heat drops to 1,951°; with twice as much air to 1,488,° and to 1,010° with three times as much air.. The thermic efficiency will then, other things equal, be more perfect the more nearly the air is supplied in the proportion of 15 to 1, weight units. Any variation in the proportion must be of importance. The carbureter is the instrument by which the proportion is regulated. In principle it maintains the fuel at a constant level by means of a float and delivers the gasoline at a jet whose mouth is slightly above the level of the liquid. With the customary means for regulating the auxiliary air admission, the carbureter should maintain a constant mixture, but all who have used carbureters whose auxiliary air intake is controlled by a special finger-lever know that it is often necessary to operate this lever without any cause for so doing being apparent. The physical condition of the surrounding atmosphere seems to influence carburation, and as the variations are particularly noticeable in the Summer between the hot and the cool hours there is reason for inquiring how the atmosphere behaves during these periods. First, the hygrometric state is variable. In general the air contains more water vapor in summer than in Winter and is nevertheless less humid because it will hold more before saturated. Humidity depends not on the quantity of vapor, but on its condition. In the Summer the cool mornings and evenings have less vapor, but more humidity than the hot hours, and this has given color to the hygrometric theory, which nevertheless must be rejected because humid air under other circumstances carburates poorly, and because a theory which fits better is available. In our climate the air is seldom saturated with water vapor except during fogs and thaw. It contains on an average one-half of the vapor necessary for saturation. On this basis the most favorable hygrometric condition, for a summer evening. should correspond to a temperature of 20° centigrade, with about 7 grammes of water vapor for each cubic meter of air, which is in the proportion of 1 to 170.

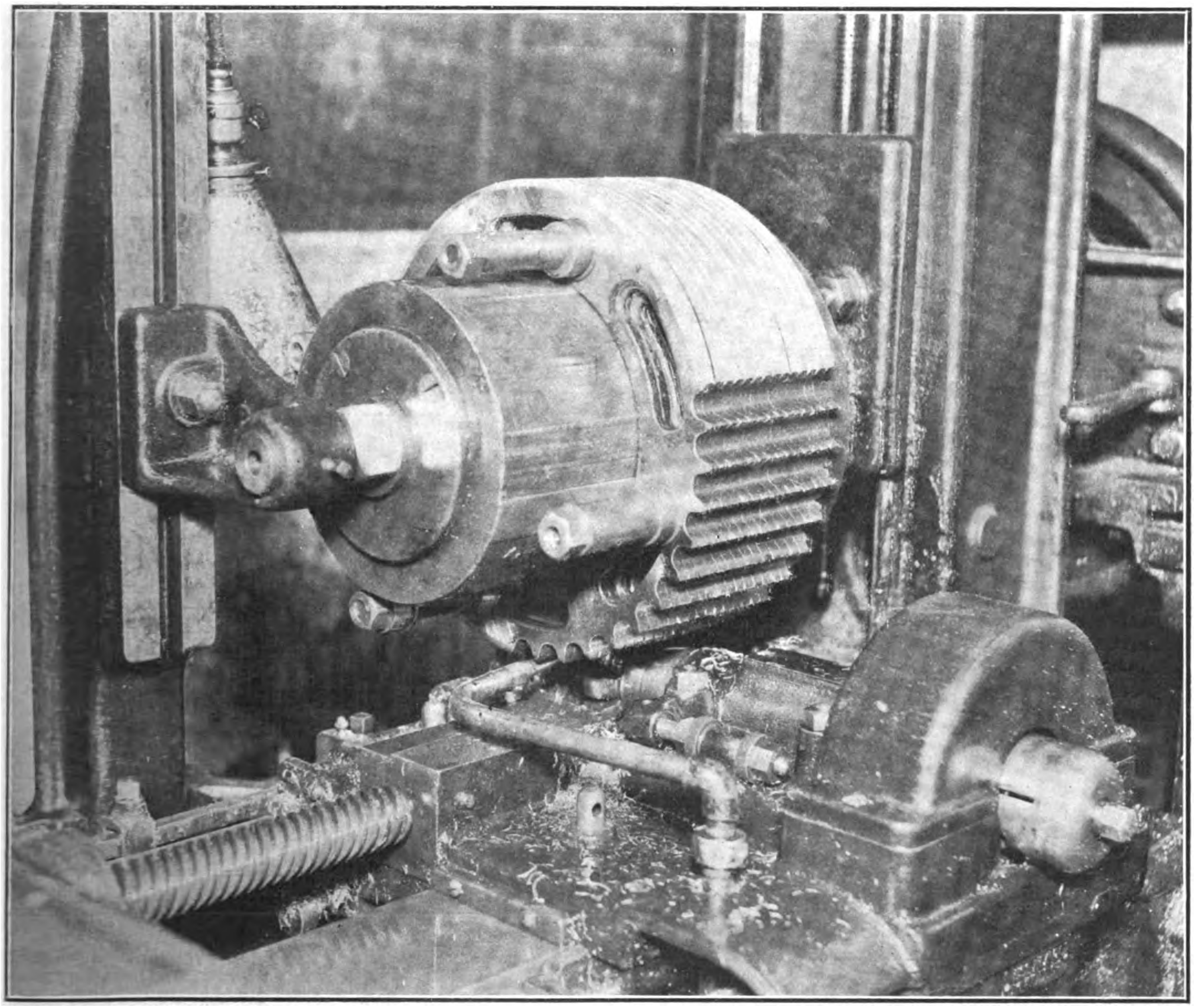
On the other hand the barometric pressure also varies, according to the hours and inversely with the temperature. The Summer air is less dense at noon than at night or in the evening, as a rule, by reason of the heat of the sun, which gives rise to expansions and thereafter to contractions, and consequently to changes in density. The influence of density must be real, because it has been verified in the case of gas motors. These industrial engines give 10 per cent. less power at an altitude of 1,000 meters than at the level of the sea. The daily variations of the barometer, being within much narrower limits, would not at this rate alone account for the variations in motor power, but in conjunction with certain other facts they form the basis of a provisional theory which the author has tried to verify by experience.

The volatile liquids used as carburants produce vapors whose tension grows in a geometric progression with the temperature. If the tension of the vapor is equal to a column of mercury 100 millimeters high, at the freezing point of water, it exceeds 3,000 millimeters at a temperature of 100°. Further, the volatility of gasoline is extremely sensitive and is affected by very slight disturbing factors. Evidently, the gravitation of the surrounding air must have a positive effect in deciding the depression of the gasoline in the jet of the carbureter, and, in turn, the smallest variation of the depression affects notably the quantity of liquid drawn out and vaporized. And, since the tension of the vapor is so much higher in warm weather. the effects are so much more noticeable in summer. Assuming a well-conceived carbureter functioning properly under any barometric pressure, when this pressure diminishes even slightly the gasoline will come out more abundantly, the best proportions of the mixture will be changed by an excess of gasoline and reduction of the air, and there will be a less efficient motor action. Finding no means for acting upon the emission of gasoline or upon the physical condition of the surrounding atmosphere, the author relates how he chose to act upon the nature of the fuel by reducing its sensitiveness and the tension of its vapors. In this he was guided by two laws: (1) when a liquid holds any foreign substance in solution the tension of its vapors is smaller than in a state of purity and so much smaller as the solution is more concentrated (nearer saturation); and, (2) when the dissolved substance is itself volatile the tension of the mixed vapors which are produced is less than the sum of their respective tensions. He relates the difficulties experienced in finding suitable substances for admixture, and cites the practical results obtained with various cars after finally deciding in favor of a substance which he calls Robur, but the composition of which he does not divulge, because it represents the commercial result of his research.—G. Patrouilleau in *La Technique Automobile et Aérienne*, August 15.

A varnish which keeps metals highly reflective and which applied to the parabolic surfaces of projectors at lighthouses or in automobile lamps saves both work and efficiency, has been produced and marketed under the name of "Camt." It is obtained by dissolving a gelatinous lacquer at high temperature in amylacetic ether with the addition of a siccative, and becomes very hard and quite impervious to water. It is applied cold without any preparation and dries in a few hours, forming an exceedingly thin and absolutely invisible film through which the metal shines with all the polish that has been imparted to it. While this new varnish may be washed with impunity it will not stand much rubbing, and is therefore of no great value for metallic automobile parts which are constantly subject to handling.—*Omnia*, July 30.

Among the Makers

CARS SHOULD BE MADE ON A DUPLICATING BASIS TO INSURE REASONABLE REPAIR COSTS—STODDARD-DAYTON LINE FOR 1911—THE HAZARD MOTOR



Depicting cutting of teeth of gang of sprocket wheels in Woods plant, using automatic gear cutter

EVERY experienced autoist realizes that it is of great advantage to have a car that is made on a duplicating basis in order that repairing may be done at a reasonable cost and on a basis that will maintain the car up to the original standard.

Quality, as it resides in an automobile, must be measured from two points of view: If the original automobile is thoroughly good, but repair parts cannot be had, the purchaser will be in a worse predicament than if a cheap and relatively poor automobile is purchased, due to the fact that the good automobile, assuming that it is high-priced also, will have an enormous cost per car mile in service. If repair parts are readily obtained and the purchase price of them is reasonable, the purchaser is then placed in a position to speculate to the extent that he will have to determine for himself whether or not a very high-priced car will be the best in the long run, or to what extent the purchase price can be shaded, remembering that repair parts can be procured when wanted, and at a price that is attractive.

The real problem is to be able to make automobiles, sewing machines, battleships, or any other character of a machine on a duplicating basis. Come to think of it, Nature did not set a good example in this regard. It is quite well understood that in Nature there are few duplicates; it might be said there is a marked and striking difference between blades of grass, babies, mountains, bandits, and even machinists—Nature goes in for variety.

The obstacle to duplication lies in the enormous cost of making preparation for duplicating parts. The cost of gigs for a single model of a car is not far from $50,000; under most exacting conditions, even double this sum.

It must be remembered that this cost would be the same no matter how many cars of the same model might be turned out; it would be $50,000 for one automobile and it would be the same amount for any greater number.

Some relief has been realized by ganging the work; in other words, special tools are made for the purpose of doing a single operation on a large number of parts instead of upon one part. In some instances the tools are so made that they perform several consecutive operations upon a considerable number of parts at a single setting.

Accuracy, as it is induced by the use of special tools, is foreshadowed in the tool room; the most skilled artisans are there employed and they are directed by the best talent that a diligent search can uncover.

Stoddard-Dayton for 1911

A FEW CHANGES AND MANY REFINEMENTS MARK THE LINE FOR THE COMING YEAR—26 MODELS OF PLEASURE CARS AND 3 OF COMMERCIALS

FEW American makers of automobiles offer their clientèle such a wide range of choice in models, styles and prices as does the Dayton Motor Car Company, of Dayton, Ohio, in announcing its 1911 line. No less than 26 separate and distinct body models of pleasure cars, of four different sizes of power plant mounted on six chassis, are listed, not to mention three commercial cars. The pleasure cars are divided into four classes, as follows: Stoddard-Dayton "50," ten models; Stoddard-Dayton "40," seven models; Stoddard "30," six models, and Stoddard "20," three models.

In the closed-car section the company's line is particularly strong, there being two styles of limousines in the "50" class (one with fore-doors) and a beautiful landaulet. In the "30's" there is a limousine, a landaulet and a coupé. All these closed models are, as usual, most excellent examples of the body-maker's art, finished within and without with an elegance and an attention to detail in the little niceties and conveniences of furnishing that stamp them as the best specimens extant of American workmanship along those lines. Auxiliary seats are part of the equipment of all closed-body cars, and when not needed they fold completely out of the way. Closed cars are furnished in any combination of colors desired and upholstered to suit the individual taste of the purchaser in broadcloth, leather or Bedford cord.

Among the changes noticed in the 1911 models is the increase of the length of the wheelbase of the "50" chassis from 128 to 130 inches; that of the "40" from 116 to 120 inches, and of the "30" from 108 to 114 inches.

The limousines, landaulet and touring car in the "S-D 50" class have seating accommodations for seven passengers each, as have the limousine and landaulet in the "S-30" division. The "50" Torpedo and 11-K, the "40" touring cars and 11-C, the "30" touring cars and the "20" touring car carry five passengers each.

SPECIFICATIONS FOR STODDA

MODELS	Price	H.P., A.L.A.M.	BODY		MOTOR				COOLING		IGNITION	
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery
"50" 11-F......	$4000	40	Limous.	7	4	5	5½	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"50" 11-F......	4200	40	F.d. Lm	7	4	5	5½	Pairs..	Tubular.	Cent'fl...	Barch D4	Storage
"50" 11-F......	4000	40	Land't..	7	4	5	5½	Pairs..	Tubular.	Cent'fl...	Borch D4	Storage
"50" 11-F......	3000	40	Tour'g*	5	4	5	5½	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"50" 11-K......	3000	40	Torp'o .	5	4	5	5½	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"50" 11-K......	2925	40	S. T'do.	2	4	5	5½	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"50" 11-K......	2900	40	Tg. R'tr	5	4	5	5½	Pairs..	Tubular.	Cent.fl...	Bosch D4	Storage
"50" 11-K......	2900	40	B. Ton.	4	4	5	5½	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"50" 11-K......	2850	40	R'ster...	3	4	5	5½	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"50" 11-S......	2800	40	Sp'str..	2	4	5	5½	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"40" 11-A......	2300	36.1	Tour'g .	5	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"40" 11-A......	2400	36.1	F.d.Tg..	5	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"40" 11-C......	2300	36.1	Tg. Rtr.	5	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"40" 11-C......	2300	36.1	B. Ton.	4	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"40" 11-C......	2350	36.1	Torp'o .	4	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"40" 11-C......	2275	36.1	S. Ton..	2	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"40" 11-C......	2200	36.1	R'ster...	2	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"30" 11-T......	2700	27.2	Limous.	7	4	4⅛	5¼	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"30" 11-T......	2700	27.2	Land't..	7	4	4⅛	5¼	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"30" 11-T......	2350	27.2	Coupe...	4	4	4⅛	5¼	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"30" 11-B......	1700	27.2	Tour'g .	5	4	4⅛	5¼	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"30" 11-B......	1750	27.2	F.d. Tg.	5	4	4⅛	5¼	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"30" 11-H......	1550	27.2	R'ster...	2	4	4⅛	5¼	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
"20" 11-R-1......	1175	25.6	R'ster...	2	4	4	4½	Block.	Tubular.	Cent'fl...	Bosch D4	Storage
"20" 11-L-4......	1250	25.6	Tg. R't.	4	4	4	4½	Block.	Tubular.	Cent'fl...	Bosch D4	Storage
"20" 11-M......	1275	25.6	Tour'g .	5	4	4	4½	Block.	Tubular.	Cent'fl...	Bosch D4	Storage
2 1-2 ton......	3000	27.2	Truck..	..	4	4⅛	5¼	Pairs..	Tubular.	Cent'fl...	Bosch D4	Storage
1 tcn......	1750	25.6	Truck..	..	4	4	4½	Block.	Tubular.	Cent'fl...	Bosch D4	Storage
Delivery......	1350	25.6	Wagon.	..	4	4	4½	Block.	Tubular.	Cent'fl...	Bosch D4	Storage

*Two or four d

The "50" 11-K, the "40" 11-C and Torpedo, the "30" Coupé and the "20" Touring-Roadster each has accommodations for four. All the remaining models carry two with the exception of the "50" Roadster, which has seats for three.

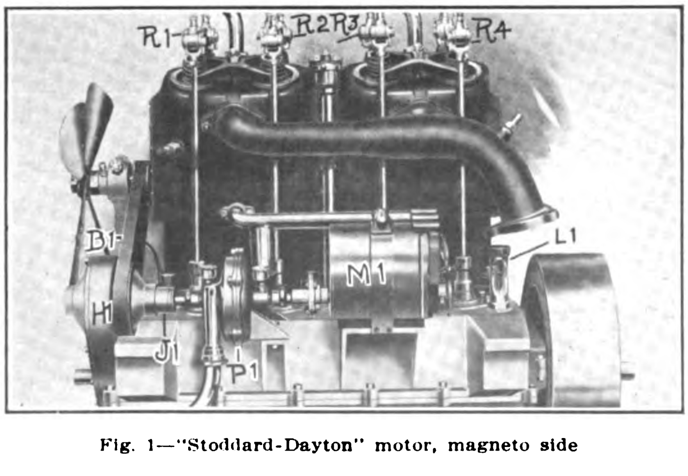


Fig. 1—"Stoddard-Dayton" motor, magneto side

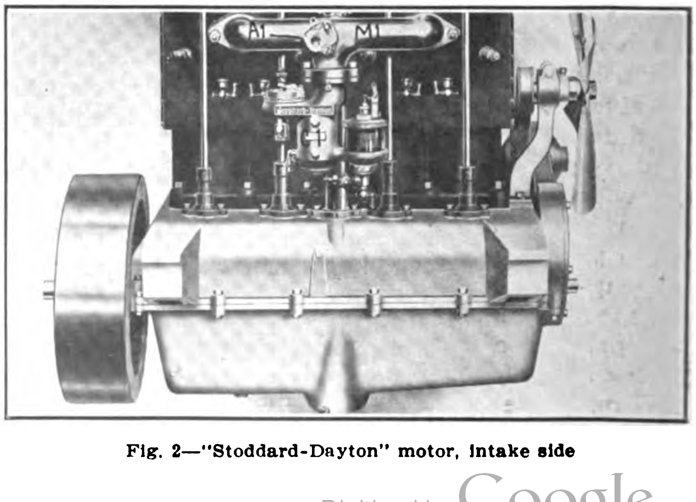


Fig. 2—"Stoddard-Dayton" motor, intake side

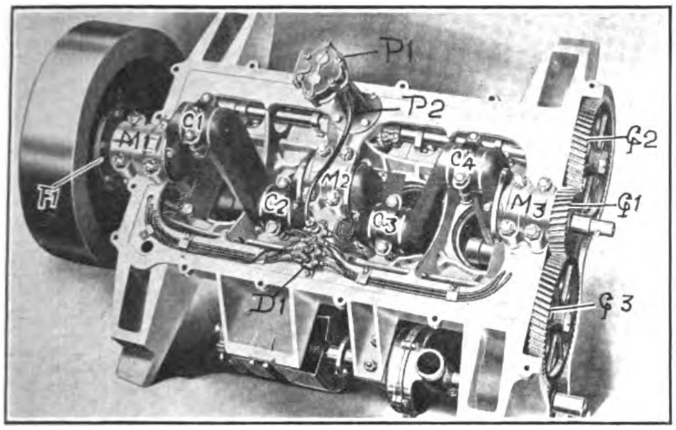


Fig. 3—"Stoddard-Dayton" 1911 construction, showing underside of the motor

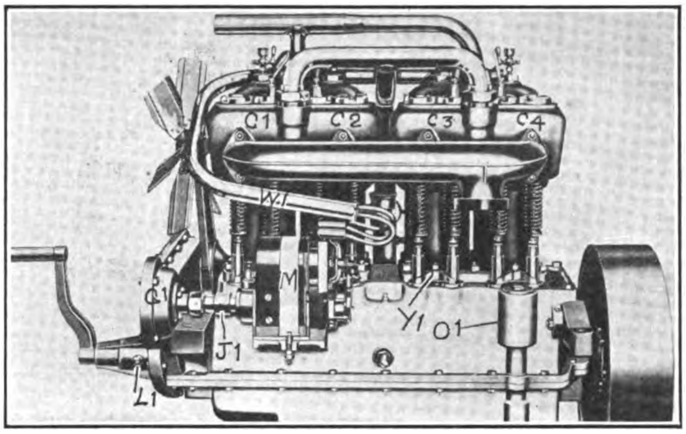


Fig. 4—Motor in the "Stoddard-30" models, showing magneto side of same

Reckoned by the A. L. A. M. formula, the motor of the Stoddard-Dayton "50" develops 40 horsepower; that of the "40," 36.1; the Stoddard "30," 27.2, and the "20," 25.6. The 2½-ton truck has a 27.2 horsepower motor and the 1-ton and the delivery wagon each 25.6. The three commercial models are chain-driven.

DAYTON CARS AS OFFERED FOR 1911

	TRANSMISSION							BEARINGS				TIRES	
Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Trans-mis'n	Axle	Weight	Front	Rear
	Selecti'e	3	Frame.	Shaft...	130	56	P. Steel.	3 Plain	Roller...	Roller...	....	36x5	36x5
	Selecti'e.	3	Frame.	Shaft...	130	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x5	36x5
	Selecti'e.	3	Frame.	Shaft...	130	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x5	36x5
	Selecti'e.	3	Frame.	Shaft...	130	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4½	36x4½
	Selecti'e.	3	Frame.	Shaft...	130	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4½	36x4½
	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4½	36x4½
	Selecti'e	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4½	36x4½
	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4½	36x4½
	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4½	36x4½
	Selecti'e.	3	Frame.	Shaft...	106	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4	36x4
	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4	36x4
	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4	36x4
	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4	36x4
	Selecti'e.	3	Frame	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4	36x4
	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4	36x4
	Selecti'e	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4	36x4
	Selecti'e.	3	Frame.	Shaft...	120	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4	36x4
	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4	36x4
	Selecti'e	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	....	36x4	36x4
	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	....	34x4	34x4
	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	....	34x4	34x4
	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	....	34x4	34x4
	Selecti'e.	3	Frame.	Shaft...	114	56	P. Steel..	3 Plain.	Roller...	Roller...	....	34x3½	34x3½
	Selecti'e.	3	Frame..	Shaft....	112	56	P. Steel..	3 Plain.	Roller...	Roller...	....	32x3½	32x3½
	Selecti'e.	3	Frame.	Shaft...	112	56	P. Steel..	3 Plain.	Roller...	Roller...	....	32x3½	32x3½
	Selecti'e	3	Frame.	Shaft...	112	56	P. Steel..	3 Plain.	Roller...	Roller...	....	32x3½	32x3½
	Selecti'e.	3	Frame.	Chain..	112	56	P. Steel..	3 Plain.	Roller...	Roller...	....	34x4†	34x4†
	Selecti'e.	3	Frame	Chain..	100	56	P. Steel..	3 Plain.	Roller...	Roller...	....	32x4	32x4
	Selecti'e	3	Frame	Chain..	112	56	P. Steel..	3 Plain.	Roller...	Roller	....	33x4	33x4

†Or dual 34x3½.

Thirty-six inch wheels are standard on all the "50" and "40" models, 34-inch on the "30's" and the 32-inch on the "20's." As to tires, 36 x 5 is listed for the "50" Limousines and Landaulet, 36 x 4½ for the remainder in that class with the exception of the Speedster, which is equipped with 36 x 4—the standard equipment also of the "40" models. All of the "30" class have 34 x 4 tires but the Roadster, which is fitted with 34 x 3½. The "20" equipment is 32 x 3½ throughout. The big truck has 34 x 4 front and dual 34 x 3½ rear. The 1-ton truck 32 x 4 and the delivery wagon 33 x 4.

With no less than 29 models listed for 1911 the Stoddard-Dayton output would seem to be one of the most comprehensive and all-embracing of any of the more prominent American factories. There are four separate chassis designs—Stoddard-Dayton "50" and "40," Stoddard "30" and "20"—besides the commercial models. The "50" class includes the Limousines (the usual style, besides one with four doors). Landaulet, Touring Car (two- or four-door) and Torpedo—all with 130-inch wheelbase; Semi-Torpedo, five-passenger, four-passenger and Roadster—all with 120-inch wheelbase; and the Speedster, with 106-inch wheelbase. Included among the "40's" are two Touring models (one with doors front and rear), five-passenger, four-passenger, Torpedo, Semi-Torpedo and Roadster—all with a wheelbase of 120 inches. The Stoddard "30" class is made up of Limousine, Landaulet, Coupé, two Touring Cars (one with doors front and rear) and a Roadster—all 120-inch wheelbase. The trio of "20's" is made up of Roadster, Touring-Roadster and Touring Car—all 112-inch wheelbase. In the commercial division the 2 1-2-ton truck and the delivery wagon are mounted upon 112-inch wheelbase chassis, while the 1-ton truck has a wheelbase of 100 inches. The tread of all the models is uniformly 56 inches.

The French type of rear wheels are used on the "50's" and "40's," both of which, with the "30" models, are equipped with Universal S. D. demountable rims, with an extra rim.

The spring equipment is semi-elliptic front and three-quarter elliptic rear, being much heavier than the 1910 practice, and with less arch in the design. Shock absorbers are standard on all "50" models. In the matter of equipment, robe rail, foot rest, five lamps, Prest-O-Lite tank, horn, jack, tools, etc., are standard, with dome lights, speaking tubes and similar conveniences on the limousines in the various models. Folding rear seats are fitted in some of the Roadster designs at a small extra price.

Some Details from a Mechanical Point of View

The four 1911 power plants range from the 4 x 4 1-2 inches bore and stroke, which is used in the "20's" and the delivery wagon, and is rated by the company at 25.6 horsepower, to the 50-horsepower motor, which is 5 x 5 1-2 inches bore and stroke. The small motor is of the *bloc* type and is especially designed to serve in freight automobile work, it being used in a 1-ton truck as well as in delivery work. The next size of motor is 4 1-8 x 5 1-4-inch bore and stroke, respectively, and is used in the 2 1-2-ton truck, as well as in passenger automobiles. This motor is rated 27.2 horsepower, and serves in the Model 30, representing a complete line of cars as limousine, landau, coupé, touring car, fore-door car, and roadster. The other motors are 4 3-4 x 5 inches and 5 x 5 1-2 inches bore and stroke—Models "40" and "50" respectively.

The scheme of design of two of the types of motors is shown in the illustrations Figs. 1, 2, 3, and 4, excepting the *bloc* type of motor, which is not illustrated. Remembering that past practice in the Stoddard-Dayton plant was along lines involving overhead valve construction, it remains to be seen that for 1911 the clientèle of the company may take its choice. The overhead construction is retained, as shown in Figs. 1 and 2, but the direct-lift construction is added, as shown in Fig. 4.

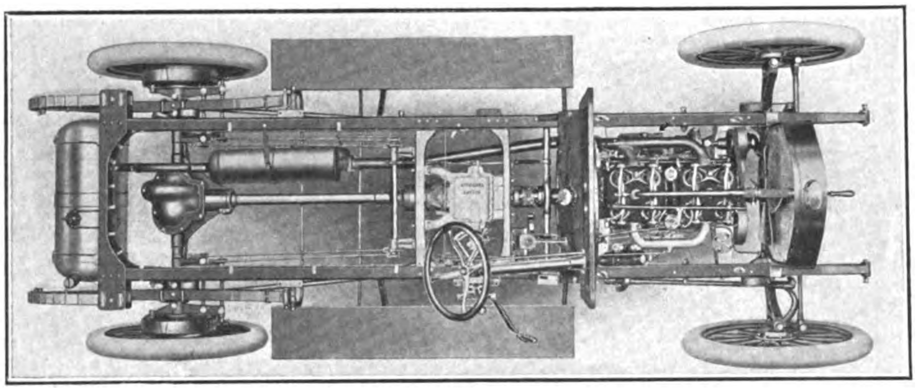


Fig. 5—Chassis of the 1911 "Stoddard-Dayton 40"

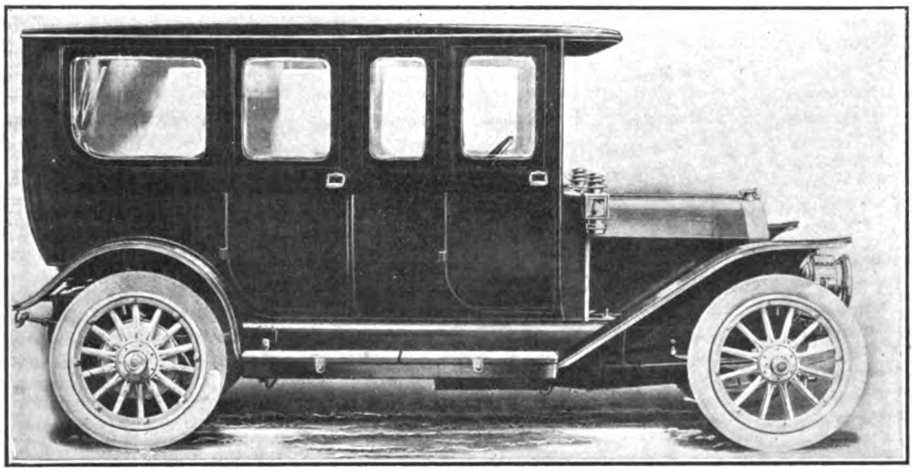


Fig. 6—"Stoddard-Dayton 50" 11-F limousine for seven passengers

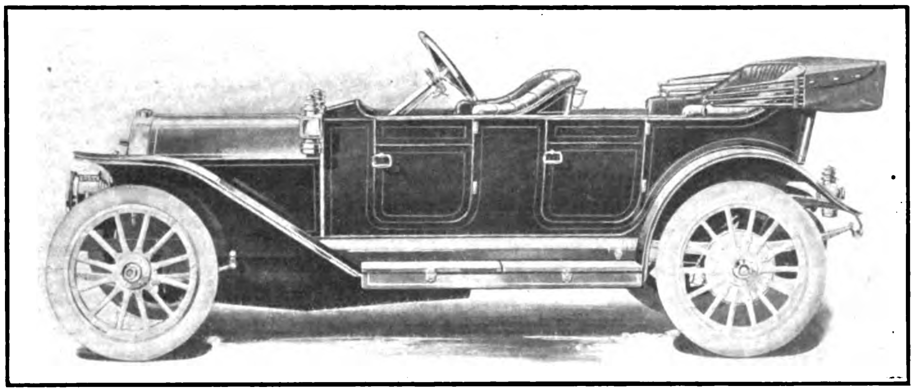


Fig. 7—"Stoddard-Dayton 40" 11-A fore-door touring car for five passengers

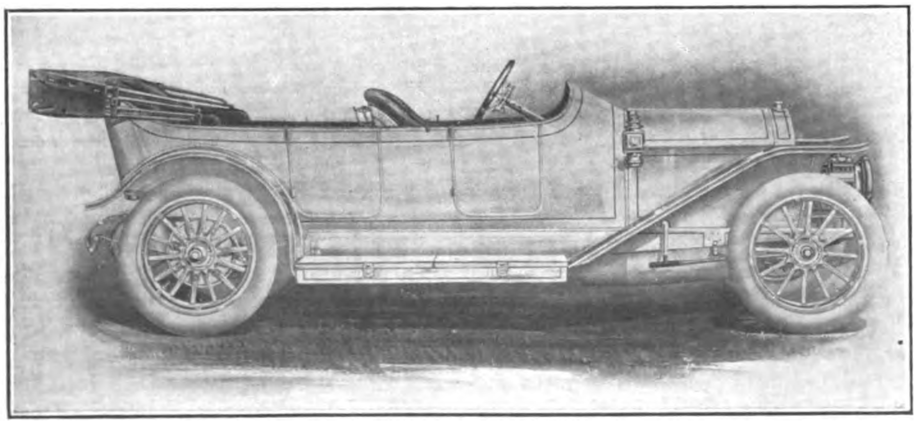


Fig. 8—"Stoddard-Dayton 50" 11-K torpedo for four passengers

As a further indication of a standardized practice, lubrication is worked out to the same completeness in each of the types of motors, using a pump for circulation. Likewise, the cone type of clutch is used in all the models, and the transmission gear is selective and three-speed in all the models, located on the frame in each case, and shaft-drive prevails throughout, excepting in the commercials, which have a side-chain drive. The tread is 56 inches in every case, and the side bars of the chassis frame are pressed steel of the channel section, excepting in the 2 1-2-ton truck. The wheelbase is long in all the models, being 112 inches in the delivery wagon, 100 inches in the 1-ton truck; the shortest wheelbase in the passenger automobile class is 112 inches in Model 20, 11-M, and the longest wheelbase is 130 inches, which obtains in five designs of the Model 50 cars.

The bearing situation is carried out along uniform lines with three plain bearings on the crankshaft in every case, and roller bearings in the transmissions and axles in all the models. It is a notable fact that the tires used on the wheels are selected with a discriminating eye, and with the understanding that but one extra casing will have to be provided in service, since but one size of tire is used in common for the front and rear wheels, and this perfectly uniform situation obtains in all the models.

The left-hand side of the motor is depicted in Fig. 1 with the magneto M1 located on a shelf that is cast integral with the upper half of the crankcase. The water pump P1 is driven from the same shaft, with a silent Oldham type of universal joint J1 between the pump and the gear on the end of the shaft, the latter meshing with the half-time gear in the housing H1. The fan in front is of good design and is driven by means of a belt B1, which is wide and is guided on the large pulley which is placed on the same shaft that furnishes rotation and power to the pump and magneto. The overhead valves show very clearly in this view, the rocker arms R1, R2, R3 and R4 being above and the push rods pass down clearing the cylinders by a proper margin and pass into the crankcase through proper guides to the point of engagement of the camshaft.

The right-hand side of the motor, as shown in Fig. 2, presents the contour of the motor case and the Stromberg carbureter C1, the same being of the multiple-jet type, with glass float bowl, and is flanged to a suitably designed manifold M1, to which is added a shutter A1 for use in adjusting the admixture of atmospheric air as the occasion demands; this shutter is adjusted once for all when the motor is being tuned up.

Fig. 3 shows the motor turned up and the lower half of the crankcase removed. The method of lubrication is clearly depicted here; the pump P1 is fastened to the upper half, and the main supply of lubricating oil passes from the pump through the pipe P2, thence to the distributor D1 and from there to the separate pipes that lead to the bearings to be lubricated. The main bearings M1, M2 and M3 are of large projected area, scraped in, and the nuts that are screwed up on the studs are castellated and a cotter pin is used in each one of them to prevent the nuts from backing off.

The connecting-rod bearings C1, C2, C3 and C4 are liberally proportioned, properly fastened, and the "brasses" are white metal. The half-time gears G1 (the pinion), G2 and G3 are of the herring-bone design, accurately cut and securely fastened to the shafts. The crankshaft is provided with a flange F1 for the flywheel; the workmanship at this point is most exacting.

Perhaps the most notable motor feature of this year from the point of view of this make of automobile lies in the design of the "30" type of motor as shown in Fig. 4. The cylinders C1 and C2 are one of the pairs, C3 and C4 are the remaining pair, they being cast in pairs. The valves instead of being in the head arranged for overhead actuation are in the conventional T-headed way. The magneto M1 is here shown on the left-hand side of the motor, taking its drive without the intervention of a pump by means of a shaft with a universal joint J1, thence to the half-time gear system in the housing G1. The wiring from the magneto is nicely arranged in tubing W1. The starting crank is contrived with a means for holding it in the up position when the automobile is on the road; no strap or other external means being necessary. The lock L1 shows at the side.

Considered from the price standpoint, the long line of the Dayton Motor Car Company offers a wide margin of choice. Beginning with the Stoddard-Dayton "50" model, the fore-door Limousine tops the list at $4,200; Limousine and Landaulet, $4,000 each; Touring Car and Torpedo, $3,000 each; Semi-Torpedo, $2,925; five-passenger and four-passenger cars $2,900 each; Roadster, $2,850, and Speedster, $2,800. The "40" models begin with the fore-door Touring Car at $2,400 and follow on with the Torpedo at $2,350; the regular touring car and five- and four-passenger cars at $2,300 each; the Semi-Torpedo at $2,275, and the Roadster at $2,200. The Limousine and Landaulet in the Stoddard "30" class are listed at $2,700 each; the Coupé at $2,350; fore-door Touring Car, $1,750; regular Touring Car, $1,700, and Roadster, $1,550. The "20" Touring Car is listed at $1,275; the Touring-Roadster at $1,250, and the Roadster at $1,175. In the commercial class the 2½-ton truck is catalogued at $3,000; the 1-ton truck at $1,750, and the delivery wagon at $1,350.

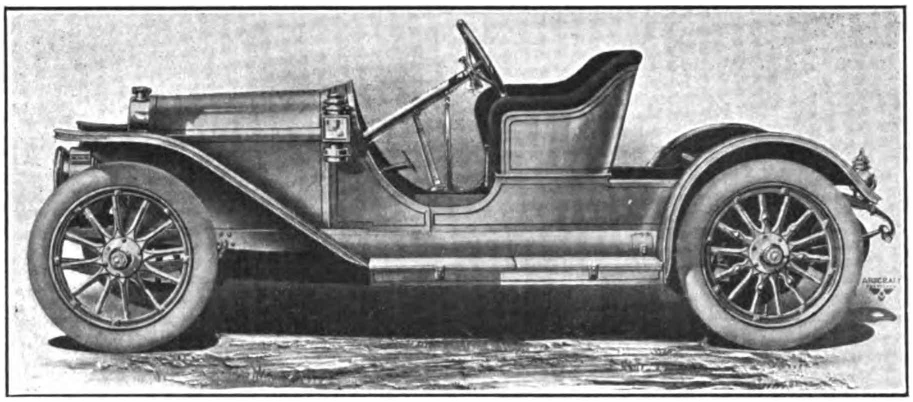


Fig. 9—"Stoddard-Dayton 40" 11-C roadster for two passengers

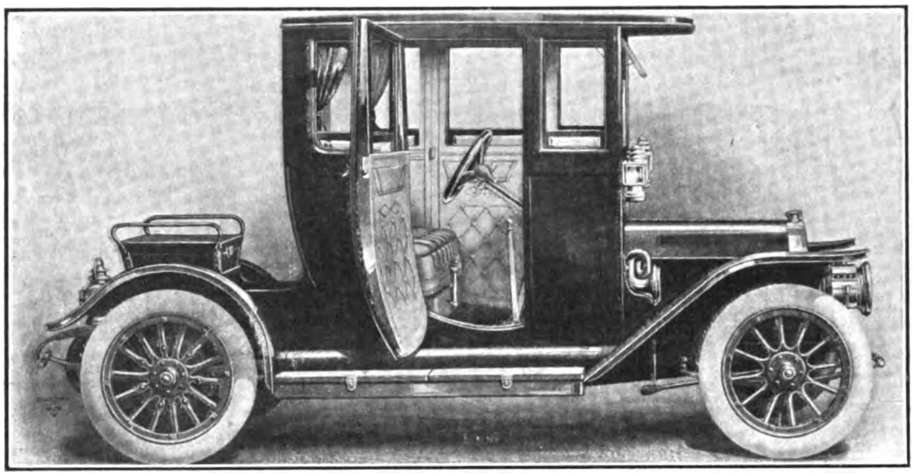


Fig. 10—"Stoddard 30" 11-T coupé for four passengers

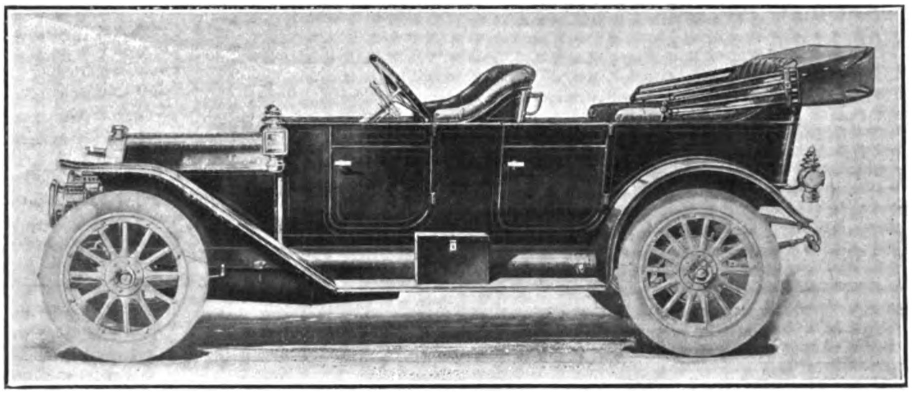


Fig. 11—"Stoddard 30" 11-B fore-door touring car for five passengers

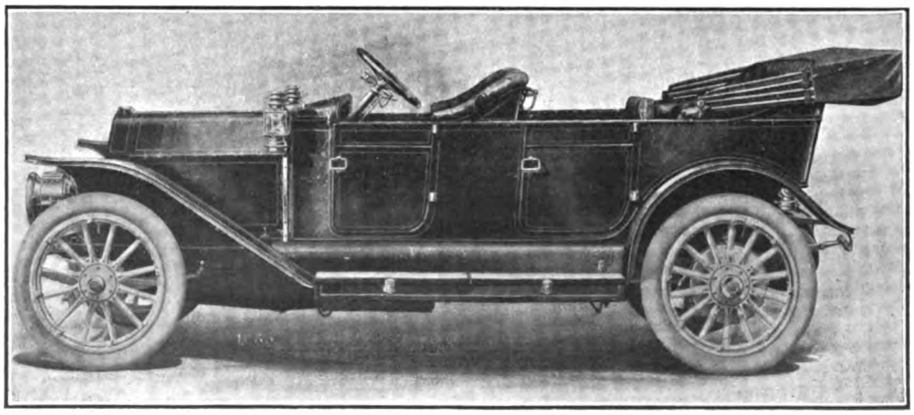


Fig. 12—"Stoddard-Dayton 50" 11-F touring car for seven passengers

The Hazard Motor

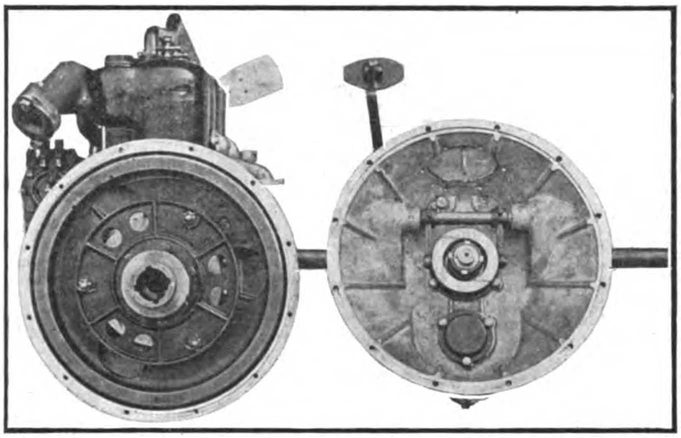


Fig. 1—Looking at the motor with the transmission gear removed, showing the housing in the flywheel

MAKERS of automobiles, especially those who confine their efforts to the relatively light but powerful cars at popular prices, are compelled to face a serious situation involving the question of quality, considering price, and they find that the solution of the problem lies in calling upon specialists for the units required, and it is this condition that serves as the underlying foundation for the success of the specialists who confine themselves to certain classes of work. The Hazard Motor Manufacturing Company at Rochester, N. Y., has taken for its specialty the manufacture of power plants, and experience has taught the company to limit its undertakings to the quantity production of a type of power plant that will be sufficiently good to carry its name and trade-mark out into the world and be a fair representative of that measure of quality that perpetuates an honest effort.

The illustrations as here presented are of the unit power plant as it has been refined and brought up to date, the principal dimensions of which are as follows:

DIMENSIONS AND SPECIFICATIONS OF 24-HORSEPOWER MOTOR

Number of cylinders, 4;
Bore of cylinders, 3 3-4 inches;
Stroke, 4 1-2 inches;
Piston pin bearings, 1 x 2 5-16 inches.

DIMENSIONS AND SPECIFICATIONS OF 30-HORSEPOWER MOTOR

Number of cylinders, 4;
Bore of cylinders, 4 inches;
Stroke, 4 1-2 inches;
Piston pin bearings, 1 x 2 1-2 inches;
Crankpin bearings, 1 1-2 x 2 1-4 inches;
Front crankshaft bearing, 1 1-2 x 2 3-4 inches:
Center crankshaft bearing, 1 1-2 x 2 1-2 inches;
Rear crankshaft bearing, 1 5-8 x 3 1-2 inches;
Camshaft diameter, 7-8 inches;
Flywheel diameter, 16 inches;
Diameter of front support, 2 1-2 inches;
Diameter of rear support, 1 1-2 inches;
Drop from center of rear support to crankshaft center, 3 inches;
Off-set of cylinders, 3-8 inch.
Outlet of water manifold, 1 1-4 inches (diameter of holes):
Outlet of exhaust manifold, 2 inches (diameter of steel tubing);
Weight of power plant unit, 450 pounds (without magneto).

Underlying Principle of the Design

The unit power plant with its three-point suspension has for its basis the fundamental idea that the spiraling of the chassis in response to road inequalities shall not be transmitted to the mechanism constituting the rotative members in the power plant. It is a principle in design that external disturbances cannot be transmitted through the shell of a power plant if the same is suspended at three points. It is a recognized fact in machinery designing that bearings must be in strict alignment, if bearing trouble is to be aborted. It is known that deflection is a property in every structural member that is subjected to strain, and the amount of the deflection is the only thing that can be limited by taking proper measures. Men frequently say a large beam, for illustration, when subjected to a light load does not deflect, but it does. When an elephant wants to cross a river he is not averse to using a bridge if he thinks the same is strong enough to carry his weight; how does the elephant determine to his satisfaction as to the strength of the bridge? Does he not strike a blow and observe if there is a quiver, in other words a deflection, or a series of deflections? Relative to the size of a bridge, an elephant is quite small; nevertheless, there is an appreciable deflection, and the elephant being accustomed to gauging such matters, uses his instruments of precision to the best advantage.

The most advanced designers being fully alive to the laws which govern deflections and distortions in members, instead of trying to avoid the inevitable, take advantage of "closed couples" and such other attending functions as will afford to them immunity from interference.

In the unit power plant design all the bearings are brought into correct alignment by the simple expedient of using a single boring bar of great rigidity with a plurality of cutters working simultaneously, resulting in the accurate centreing of all the bearings to a common axis. The crankshaft, as shown in Fig. 4. is first rough-machined and thereafter ground on centers so that it, too, is not only round but the main bearings rotate on a common axis. When the crankshaft is erected into place and is supported by a cylindrical structure, as in the Hazard motor case, it follows that there can be no outside interference because the spiraling of the chassis frame cannot be transmitted through the motor case, nor will there be disagreement within since the main bearings are bored to a common axis and the crankshaft is ground on common centers.

Among the remaining considerations that have to do with the maintenance of correct alignment is the rigidity of the crank-

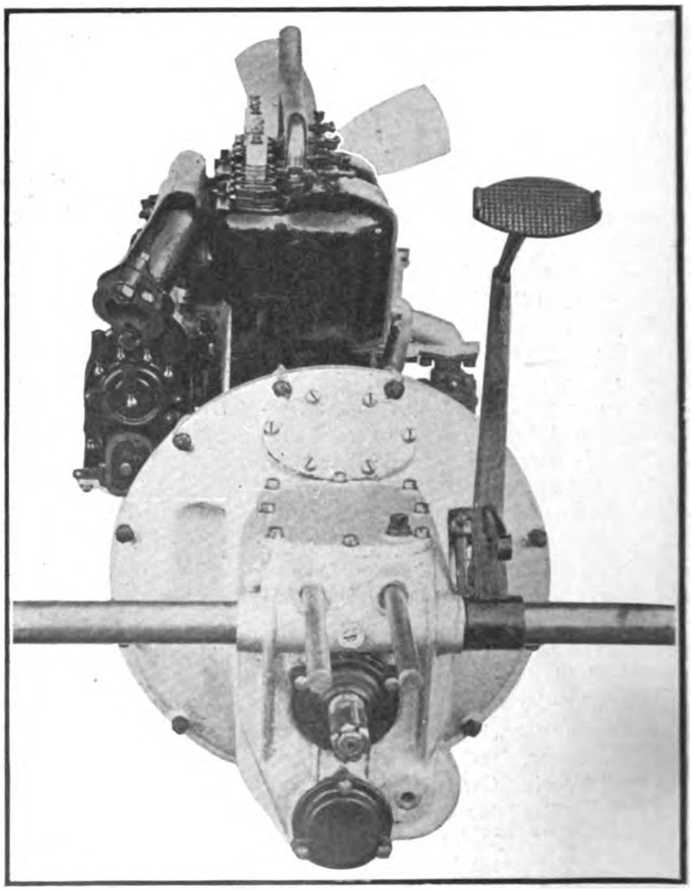


Fig. 2—Looking at the motor from the rear with the transmission gear in place and a brake pedal at the right

PRESENTING THE HAZARD POWER PLANT IN SUFFICIENT DETAIL TO BRING OUT THE FINE POINTS IN DESIGN AND CONSTRUCTION

shaft, for, as will be understood, if the crankshaft is lacking in its ability to interpret the torquing increments, it will be subjected to bending, torsional and shearing moments. The bending moments will have the effect of peening the main bearings, thus making them larger in diameter at the extremities than they will be at the intermediate position, resulting in disaster, however, since the bearing pressure will increase enormously toward the center, and in accordance with the performance with bearing metal, the lubricating oil will refuse to spread over the hot surfaces and the condition of so-called "freezing" will step in. The torsional moment if it is not sufficiently resisted will alter the axlewise length of the shaft just as the length of a rope is made long or short by putting twists into it. The shearing moment is not a matter of serious purport.

As the specifications indicate, the cylinders are offset, it being the aim of the company to make the amount of this offset just enough to compensate for inequalities of piston pressure as they obtain when the cylinders are not offset. This compensating factor affords the advantage of reducing the friction component, hence the total of the fixed losses in the motor, but there is another point that is rarely taken into account. Crankshafts deflect because they are subjected to pressure, and they give out when they are put in a position to resist rapidly varying loads. Offsetting the cylinders is of more advantage from the point of view of reducing the load variation than from the other angle.

Despite the excellent care with which the design has been consummated with a view to reducing the responsibilities of the various members, notably the crankshaft, it is the practice in the production of this motor to use the grades of steel that are known to hold kinetic properties, and the method of manufacture, including the process of heat-treating, is with the expectation that the desirable properties are accentuated to the greatest possible extent without reaching into other zones of danger. The shape of the crankshaft and the proportions of the throws are in line with the general endeavor, with the added advantage that quantity production does not lead to diminished quality. In the several other respects the plan of design lends facility to the employment of jigs, special tools and fixtures, all of which add to the rapidity with which the work can be done, to the exclusion of the personal equation, leaving to the artisans but a single choice.

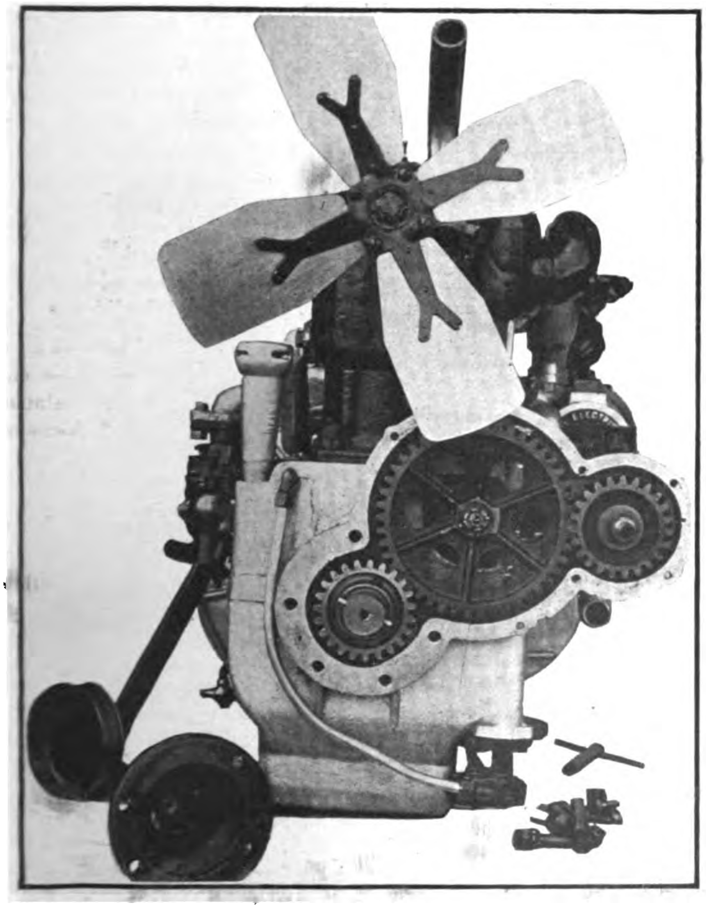


Fig. 3—Looking at the front of the motor, showing the half-time gear housing with the cover off, air propeller and other details

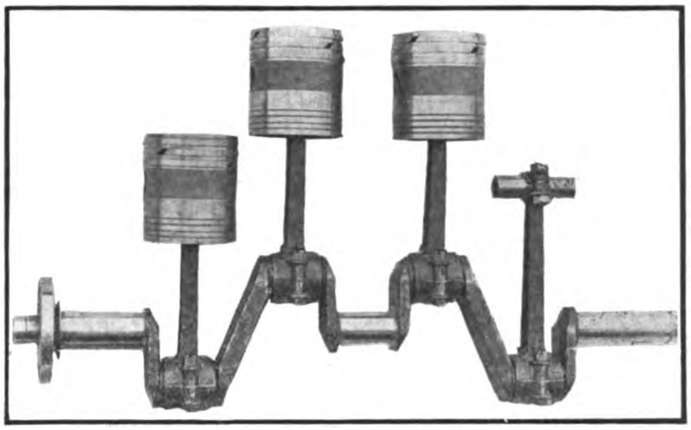


Fig. 4—The crankshaft with the connecting rods and pistons in place, showing a flanging for the flywheel and other refinements

The clutch end of the motor is shown in Fig. 1, it being unbolted at the flywheel housing, thus exposing the flywheel at the left and the clutch mechanism at the right, showing the telescoping shaft and the driving keys. Fig. 2 is a perspective of the motor from an elevated position presenting the same when the two halves of the case are bolted together, showing in the foreground the rear end of the crankcase. The clutch is of the multiple disc type, but instead of being run dry or under fixed conditions of lubrication, a provision is made for supplying a stream of lubricating oil, the same being filtered and used throughout a myriad of cycles.

The transmission gear in its compact housing as shown in Fig. 2 has three forward speeds and reverse, with a selective means of manipulation and a straight line control. The pedal for the clutch is presented in Fig. 2 at the right of the case and is of the extension type. Instead of casting arms integral with the case, and using them to suspend the power plant in the chassis frame, means are afforded for the utilization of drawn-steel tubing, the sizes of which are given in the specifications. The tubing is passed through finished holes, one of which is shown in Fig. 2, and it is found in practice that this method of suspension is both substantial and light.

Referring to Fig. 3 of the front end of the motor, the cover of the half-time gear housing is removed showing the pinion on the crankshaft meshing with the half-time gear on the camshaft, and at the right-hand side the pinion that drives the magneto is also in mesh in the train. When the cover is fastened into place the half-time gear housing is grease-tight, and accuracy of the gears together with the proper centering of the shafts, including adequate means of lubrication, results in noiseless performance. The magneto is placed on the right side of the motor as shown in Fig. 3, but the carbureter is on the opposite side, it being the idea of the designer that the greatest measure for safety lies in separating the fuel system from the ignition system in this way.

One of the main points, and the particular one that cannot be illustrated, lies in the use of selected materials in the construction of the motors, and by means of a well-contrived set of special tools the power plants are turned out in quantity, at a reasonable price, but with such accuracy that they come up to an exacting demand.

Aeroplane Traffic

BY MARIUS C. KRARUP. A REASONED COMPARISON BETWEEN AEROPLANES, MOTOR BOATS, BICYCLES, MOTOR BICYCLES AND AUTOMOBILES, WITH REGARD TO THE CHANCES FOR THE IMMEDIATE GROWTH OF AN AEROPLANE INDUSTRY

AEROPLANE traffic shall be, though Mother Shipton forgot to say so. All are interested in forming and coloring a mental picture of what it will be in five years. Few doubt that it will profoundly affect human life and civilization, sooner or later. The terrors of war will be so abhorrent, many believe, that wars will cease. The cost of collecting import duties on light and valuable merchandise, already exorbitant, will rise to an impossible height, compelling free trade between nations. The values of residence property will undergo a transformation in which aeroplane traffic will be a factor scarcely less important than the railway and the automobile. About these things all may dream. But civilization in general is a complicated structure, and none may be very sure how things will turn out. Otherwise with regard to those features in aeroplane evolution which depend on physical laws and those fundamental human instincts which never change—self-preservation, love of new sights and sensations, desire for control of natural forces, desire for a sense of power with relation to other humans.

The mechanical laws governing aeroplane flight have already been revealed sufficiently to permit a glimpse of the immediate future, a reasoned glimpse. At the present moment suitable design already accounts for ninety per cent., more or less, of the flying qualities of any aeroplane machine, and what may be added to these qualities by putting more money in materials and workmanship counts for correspondingly little. With a very good propeller a ten horsepower motor weighing 150 pounds or more and obtainable in the open market for $150 is likely to do better work in an aeroplane for one or two than that which any of the special aviation motors of higher power and smaller weight can do with a propeller of only ordinary efficiency. The Wright brothers have practically shown this to be true. Louis Bréguet, only the other day, proved still more. Santos-Dumont, by placing his Demoiselle type in the market at a price of $250, without the motor, has shown that good workmanship and materials are not necessarily very costly, and improvement of his design would not change this fact, so long as the question is only of producing aeroplanes with fixed wings and rudder control of the types so far used in practice. These will continue to be very attractive and may undoubtedly be improved in many little ways without increase of their intrinsic cost. As soon as it is generally realized that a little ten horse-power aeroplane which will fly quite well in fair weather may be produced for the price of a little motor boat (whose usefulness and pleasures are also limited to fair weather), the popular demand for such aeroplanes will of course assume enormous proportions. Unless the monopoly of patent rights interferes seriously, motor and propeller equipments will be sold over the counter and farmer boys will make their own structures after patterns obtained from correspondence schools or from enterprising firms exploiting the situation. Of course there will be accidents, many of them, but there will also be a development of a keen sense for weather and weather indications in wide circles, and there will be thousands of brains working overtime to devise improvements in the machines and in the means for ascertaining the meteorological conditions near the earth and in the higher altitudes. As only small size renders cheap construction compatible with strength, all the emphasis is on the small dimensions of these machines and, when the general design is otherwise suitable, on those features which specially contribute to render small dimensions sufficient for support. Aside from a reliable motor, these are mainly safe and efficient planes, a really efficient propeller and reduced air resistances. Since Bréguet publicly demonstrated the superior qualities of resilient propellers—a superiority dependent upon correctness in details and a certain correspondence between the propeller action and the speed and torque of the motor—nearly all that is required to give birth to a popular sport which will take possession of the young male population in a degree never witnessed since the halcyon days of the bicycle, is the crystallization into one design of the best features now found in many. The value of flexible elements in the planes has already been demonstrated in two important flights, and planes curved "in series" seem to constitute the only required feature which has not yet been publicly exhibited. There will then appear a monoplane with a 14 to 16-foot span, for one person; a biplane with a 16 to 20-foot span, for two or three persons. Having fixed wings and rudder control, these machines will not be safe in puffy weather, but they will be very attractive and safe enough for a good combination of sporting blood and prudence.

The first glimpse into the future seems to reveal a few hundred thousands of these little flight machines used by the young and hardy for sport and pleasure, for interurban visits, for excursions to sea and mountain, for the exploring of hunting grounds and natural fastnesses not too far removed from the arteries of civilization and the depots of supplies. Low cost as an incentive in the heat of a spectacular aviation movement, world-wide and intense, must find this practical interpretation. And the motor to be used is likely to be one in which the flexibility of the automobile motor will be sacrificed in favor of high reliability at a constant power development, combined with lower price. In other words, the popular motor for little aeroplanes may be a lightweight of the same pattern as that to which the owner of small commercial trucks is looking forward or like the small high-speed motor for boats not yet quite realized rather than that of the automobile racing car. A clutch will permit a start without assistance and a landing without necessarily shutting off the power, while the gliding qualities will be substantially improved by a propeller whose blades are on edge when not in use.

To estimate the probability of an immense popularity for small aeroplanes of the kind referred to, it is only necessary to compare the factors for and against them with the value of the same factors for and against the motor boat, for and against the bicycle, for and against the motor bicycle, and finally for and against the automobile. The favorable factors may be multiplied above the division line, the unfavorable factors below, when an estimated numerical value is given to each, and the quotient obtained in each case will show, after a fashion, the relative claims upon popularity of each of the five modes of locomotion.

The factors considered above the line may be:

A, representing the population of the territory where each form of locomotion may be practicable and from which it may therefore draw its support.

N, representing novelty.

S, representing speed.

R, representing carrying capacity.

E, representing esthetic satisfaction and sport and

F, representing freedom of movement in getting from one place to any other, in which factor weather and actual road conditions are included.

The factors below the line may be

C, representing cost of purchase or production.

D, representing danger.

L, representing chances of delay, principally those due to troubles with the mechanism and perhaps caused by salt water or bad roads.

I, representing bother and incumbrance in stabling or disposing of the machine when it is not in use.

U, representing dirt, dust and caretaking and

X, representing manufacturing difficulties in producing or delivering a machine of the design and qualities required for realizing the numerical values assumed for the properties denoted by the other letters of reference.

The maximum numerical value used is 10, but for the aeroplane machine this has been doubled for I in consideration of the extraordinary difficulties which, at least for the present, the inhabitants of cities will experience in stabling aeroplane machines. On the other hand, in the case of the automobile, it seems that it might be proper to multiply the final figure by 5 in recognition of the fact that the automobile to a very large extent takes the place of a recognized and long-established utility.

While the figures used are necessarily not above criticism and others may be substituted by readers whose estimate varies from that of the writer, and while it may be subject to dispute whether multiplication and division truly represent the relations which exist between these figures and the effect of the various properties upon "commercial popularity," or the number of machines of each kind to be demanded by the population of this country, the table given herewith should nevertheless supply a foundation upon which any person may build up a rational guess, modified by his own estimate of details, with regard to the probabilities of the immediate future for aeroplanes of the type referred to:

Upper Lower	$\frac{A}{C}$ ×	$\frac{N}{D}$ ×	$\frac{S}{L}$ ×	$\frac{R}{I}$ ×	$\frac{E}{U}$ ×	$\frac{F}{X}$ =	Co-efficient of Public Demand
Aeroplane.......	10 ×	10 ×	10 ×	2 ×	10 ×	5	166
	3 ×	5 ×	2 ×	20 ×	1 ×	x	X
Motor Boat.....	1 ×	2 ×	1 ×	10 ×	5 ×	1	100
	3 ×	2 ×	3 ×	5 ×	2 ×	5	900
Bicycle..........	10 ×	1 ×	3 ×	1 ×	3 ×	5	180
	¼ ×	2 ×	1 ×	1 ×	5 ×	1	
Motor Bicycle...	5 ×	2 ×	5 ×	1 ×	3 ×	1	150
	1 ×	10 ×	5 ×	2 ×	10 ×	2	2000
Automobile......	7 ×	2 ×	5 ×	6 ×	2 ×	3 × 5	126
	10 ×	5 ×	1 ×	6 ×	8 ×	2	48

It may now be inferred from this table that the popularity of the simple aeroplane machine will under all circumstances greatly exceed that of the motor boat and the motor bicycle; that it would rival that of the bicycle, if the chance of getting a satisfactory type of aeroplane manufactured and delivered (expressed in divisor X) were the same as in the case of the bicycle; that it will exceed the popularity of the automobile, if those difficulties in design and manufacture which are expressed by giving X the value of 2 for the automobile, do not run up to more than 62 for the aeroplane; in other words, if the chances for producing an aeroplane whose traveling qualities are somewhat as expressed in the numerical values assigned to it are not absolutely remote or infinitesimal. And if these chances are expressed by the figure 20, which seems a high estimate and one destined to be reduced very rapidly in proportion as the understanding of design requirements becomes public property through the performances of the various types at aviation meets and in long-distance contests, the inference from the table should be in favor of seeing a number of small aeroplanes in use before long considerably exceeding the number of automobiles and beginning to rival that of bicycles. In similar estimates made in other fields, it has been thought that the true numerical relations were much exaggerated by multiplication and division of the factors respectively for and against the estimated result, and that the square roots of the figures representing the "coefficient of public demand" would more nearly represent reasonable expectations. On this basis, and with the value of 20 for X in the case of aeroplanes, the intrinsic public demand for small aeroplanes, bicycles and automobiles would then be represented in the square roots of 8.6, 180 and 2.63, which are 2.8, 13.4 and 1.6, and an expansion of aeroplane manufacture aiming for a production of aeroplanes on this scale should be justifiable. But in all of this one rather important fact has been left out of consideration. It relates to the much smaller than average purchasing capacity which is characteristic of that class in the population who would buy aeroplane machines in which the safety has not been worked out more fully in the very construction of the machine than is here supposed to be the case. The small and cheap aeroplanes are still subject to mortal dangers from wrong estimates of the weather and from occasional motor troubles. Some allowance greater than that involved in the figures given under C for cost and under D for danger, should probably be made for the immediate present, say for two years out of the five next years which constitute the period for which this estimate is worked out, but in practice, and for the period as a whole, it would seem reasonable to hold this consideration to be offset by two others which are favorable, one being the unavoidable progress in design on lines which may not now be foreseen and the other demand for larger and costlier but also almost perfectly safe aeroplanes—as safety in traffic is rated in other forms of locomotion—by which diversity and volume will be added to the aeroplane industry, giving another outlet for manufacturing facilities. Whether the popular demand will swing a little more to the cheap, individual aeroplane or a little more to the aeroplane omnibus and excursion vehicle seems to be a subordinate question which need not be answered till it answers itself, while the fact that a public demand for aeroplanes in general may be reasonably estimated as likely to outgrow in five years—giving the necessary time for development—the present demand for automobiles in the proportion of 2.8 to 1.6 and to approach the demand for bicycles in the proportion of 2.8 to 13.4, in conjunction with the supplementary fact that this estimate can be based almost solely upon what has already been accomplished in aeroplane design and manufacture, seems to be sufficiently remarkable to stimulate investigation of the manufacturing opportunities which have been opened to the world mainly through the practical work of the Wright brothers, though the name of Blériot should not be left unmentioned, and which seem at present to be mainly appreciated, in an industrial sense, in France.

There remains to be indicated the probable development of the complete individual aeroplane built on industrial lines and of substantial materials, costly as an automobile in varying degrees according to its equipment, capable of carrying considerable loads at moderate speed and light loads at enormous speed, safe in almost any weather and second in security against failure of the motor power only to the third type which may be foreseen; namely, the multiple aeroplane, much longer than broad, equipped with a series of motors working by releasable clutches on one or two propeller shafts carrying a series of propellers, controlled mainly through its rows of adjustable wings and intended as a public conveyance or an instrument of war.

(*To be continued.*)

Mountain Work Hard on Brakes and Motors

The advantage of kinetic brakes, so called, rather than to depend upon the friction of the members of the brakes proper is not given the attention that the plan deserves. The average autoist is skeptical, that is to say, he is inclined to the belief that it will damage the motor to use it as a retarding machine. Certainly, if the motor is capable of propelling an automobile up hill it should be able to retard the same weight down hill. If a car goes up hill at the rate of 20 miles per hour the motor must do a certain amount of work and in going down the same hill at the same speed, if it is to serve in the capacity of a kinetic braking system, it will be required to do exactly the same amount of work as is represented by the propelling of the car up the hill.

When the brakes (proper) are used, owing to the friction of the members, they wear out. But when the motor is used instead the work comes upon well-lubricated bearings, which last just as long under the work imposed upon them when the car is going down hill, as under other road conditions.

Worcester Automobile Club

Library and Billiard Rooms

Ladies Reception Room

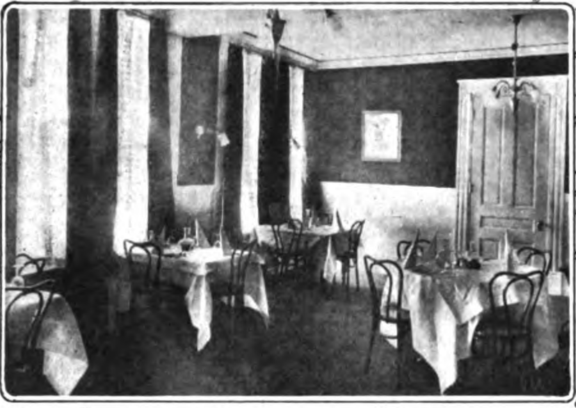
C. E. Greene
V. Pres.

M. C. Snyder
Treas.

D. F. Gay
Pres.

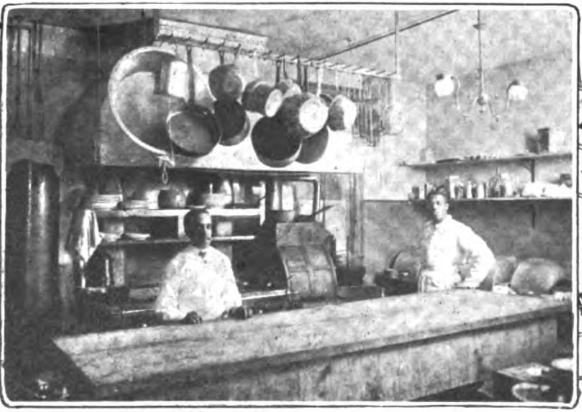
H. F. Blanchard
Sec.

R. W. S. Negus



Ladies Dining Room

Dutch Room



The Well Equiped Kitchen

In sharp contrast to many automobile organizations, the Worcester (Mass.) Automobile Club "gets action" on everything it undertakes. It is the progressive spirit behind the club that marks it as something out of the ordinary. It is the same spirit that has pushed the club forward and made its name mean something to motordom.

Formed over ten years ago for the sole purpose of increasing and fostering interest in automobiles and motor car sports, the club after a typical winning struggle stands out to-day as one of the foremost organizations of its kind in the United States.

To the outsider the fame of the club rests to a large extent upon its success in conducting a series of five hill-climbing contests which were amply noticed all over the automobile world. But in a larger sense the club has been of even more potent force in popularizing the automobile in its territory.

When it was born in 1900 there were 15 owners of automobiles in Worcester, and J. M. Bigelow and William J. H. Mourse, two of the pioneer motorists of that city, had considerable difficulty in getting them to affiliate in a club. Mr. Bigelow was chosen first president, when the motorists finally decided to get together and the meetings of the organization were held at his home during the early days. In 1904 Asa Goddard and B. A. Robinson took hold of the organization, raised the membership fee to $5 and secured headquarters at the Bay State House. Mr. Goddard was elected president.

At first the club had a single room in the basement of the hotel, but after two years more adequate quarters were taken on one of the upper floors. As soon as the club issued forth from its chrysalis form it assumed a commanding position in the automobile life of Worcester. In 1905 John P. Coghlin was selected to head the club, which by that time had 40 members and an income of sufficient size to finance its activities in an economical way.

With the advent of Mr. Coghlin the club began to grow rapidly and after he had been in office a year a suite of seven rooms were leased in the Chase building and the club spent $8,000 in fitting them up in comfortable style. The dues were doubled and despite the raise the membership continued to swell until now its rolls contain the names of nearly 1,000 of the prominent and influential men of Worcester and vicinity. The list includes leaders in society, business and professional life, and naturally enough the club has a distinct influence on about everything of importance that is to-day presented to Worcester's consideration.

The work of Mr. Coghlin was of a high order and the club endeavored to persuade him to accept a sixth term as president. He declined, however, and at the last election Daniel F. Gay was chosen to succeed him. Mr. Gay is also an aggressive official and much progress has been made under his administration.

For five years the club has conducted a hill climb on Dead Horse Hill, a straight but very stiff grade. The entry lists have always been typical and some remarkable achievements have been attained in the various events. During the past summer the club promoted a track meet which was thoroughly successful.

And yet with that record to look back upon the club is not a sporting organization in any sense. Neither is it a social or political organization. It has a decalogue which outlines its main objects as follows:

First—In scrutinizing legislation for a square deal for motorists.

Second—In boosting interest in automobile and motor car sports.

Third—In securing good roads both in the city and its suburbs.

Fourth—In the erection of signs indicating directions and speed limits.

Fifth—In controlling speeders and autoist lawbreakers.

Sixth—In promoting sociability among its members.

Seventh—In giving its members and friends the best regardless of cost in the line of clubrooms and comfort.

Eighth—In promoting the club by increasing its membership among autoists.

Ninth—In the registration of chauffeurs and owners, and lastly

In conducting functions, such as club runs, entertainments and the annual outings for the orphans and poor children of the city.

The present quarters of the club include ten rooms and the furnishings and fittings are attractive and comfortable. The cuisine of the club is gaining a wide reputation and its patronage is growing by leaps and bounds.

Frequently high personages in the business and political world have tasted the hospitality of the club and the members never yet have had cause to feel ashamed.

To-day the club is free from debt of all sorts and is in commendable conditions in every way.

The officers are as follows: Daniel F. Gay, president; Chester E. Greene, vice-president; Henry F. Blanchard, secretary, and Milton C. Snyder, treasurer. The board of governors includes the four officers named and Alfred Thomas, M. A. Macker, John W. Harrington, Charles Case, William F. Whipple and R. W. S. Negus.

Plans are already afoot for the sixth annual hill climb, which is scheduled to be held in June, 1911.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL CLIMBS, ETC.

Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4,'11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11,'11	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Mch. 4-11, 1911	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.

Races, Hill-Climbs, Etc.

Sept. 16	Algonquin, Ill., Annual Hill Climb of Chicago Motor Club.
Sept. 17	Syracuse, N.Y., Track Meet of Automobile Club of Syracuse, Syracuse Automobile Dealers' Association and the New York State Fair Association.
Sept. 20-22	Louisville, Ky., Reliability Run, Auto Club, Louisville.
Sept. 24	Belmont Track, Narbeth Race Meet, Norristown Automobile Club.
Sept. 28-30	St. Louis, Mo., Third Annual National Good Roads Convention.
Oct. 1	Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 3	Louisville, Ky., Reliability Run, Louisville Automobile Club.
Oct. 6-8	Santa Anna, Cal., Track Meet.
Oct. 7-8	Los Angeles, Cal., Speedway Meet.
Oct. 8	Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 14-18	Washington, D. C., Start of Washington Post Reliability Run to Richmond, Va.
Oct. 15	Long Island Motor Parkway, Grand Prize, Automobile Club of America.
Oct. 15-18	Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.
Oct. 27-29	Dallas, Tex., Track Meet.
Nov. 3-5	Atlanta, Ga., Speedway Meet, Atlanta A. A.
Nov. 5-6	New Orleans, La., Track Meet.
Nov. 6-9-13	San Antonio, Tex., Track Meet.
Nov. 24	Redlands, Cal., Hill Climb.
Nov. 24	Savannah, Ga., Road Race, Savannah Automobile Club.

Foreign Shows and Races

May 1-Oct. 1	Vienna, Austria-Hungary Automobile and Aviation Exposition.
Aug. 1-Sept. 15	French Industrial Vehicle Trials.
Oct. 15-Nov. 2	Paris, France, Aeronautical Society Show.

THE AUTOMOBILE

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REFINEMENTS are made from season to season as the finger of necessity points the way, but it cannot be said that necessity is the servant of the user of the automobile in every case.

* * *

NECESSITY may be the servant of the maker, rather than of the user, in which event it stands to reason that direct benefit will accrue to the maker rather than to the user.

* * *

BUT this situation, while it has its misfortunes, is not good ground for contending that the advances that are indicated by real experience should not be indulged in.

* * *

WHEN a maker puts forth his initial effort and he finds by after experience that some of the details of design and construction are lacking in stamina, what remains but to make the necessary corrections at the earliest possible moment?

* * *

WHAT are necessary corrections? Is it necessary to correct all the automobiles that were previously placed in the hands of the users, as well as to eliminate the faults thus discovered, this being the reason for making changes?

LEGALLY, no. Morally, perhaps. Wisdomly, yes. Why, for a round dozen of reasons. What are some of the reasons for claiming that faults should be corrected in the cars that are sold and paid for?

* * *

PRIMARILY, if the money paid in for a car is not counterfeit, the car should not be counterfeit. The law of fair dealing demands that an equivalent shall be extended to the purchaser.

* * *

EXPEDIENCY, business acumen, and the precedents that accompany ultimate success, all point the way to the correction of error by the one who errs.

* * *

WHAT is the reward of merit? Success, lasting success. What is the price of infamy? Degradation, downfall, oblivion. Merit is best defined in the process of making good. If a device is not what it should be, what a splendid advertising medium will the purchaser become if he is treated like a white man!

* * *

ADVERTISING—what is advertising? Is it horn-tooting? Would it avail a burglar anything to toot his horn? Imagine a two-color insert with 72-point bold-face type proclaiming: "I am a burglar; my skill is known to even the Bank of England"!

* * *

BUT a satisfied client; a man who, in good faith, pays down good, honest money; takes title to an automobile, and, after running it a week, finds that (a) the rear wheels will not stay on, (b) the clutch will not hold, (c) that the motor is so defective that it is worthless for the purpose; supposing the maker should say to this man: "Come, let us treat you fairly; here is a good automobile to replace the bad one that we delivered to you for your good money." The result?

* * *

FIRST, the maker, feeling absolutely honest, becomes strong. Then, the bank, realizing that the maker is strong, leaves the "latch-string" out. Again, the men who work for the maker, knowing that he is a fair man, do twice as much work, and better work, every working day. But the user, what of him?

* * *

JUST think of it: The user, the man who was treated fairly; the customer who, after getting a defective car, was advised that it would be exchanged for a car that would measure up to the promise of the maker—remember, just up to the promise of the maker; no more.

* * *

IS it too good to be true? In some instances, perhaps; in other cases, no. One of the now most successful makers of automobiles on the American market replaced every automobile it made during one year. Did the company go broke, so to speak? No. It made just so many four-page, two-color inserts in a paper that has a circulation of 90,000,000, that goes to press every day in the year—the company advertised and it won out.

Premier Injunction Denied

SUPREME COURT JUSTICE PUTNAM DISSOLVES TEMPORARY ORDER RESTRAINING DELIVERY OF GLIDDEN TROPHY TO CHALMERS COMPANY

ON the ground that the Court would not assume jurisdiction to overset the ruling of a duly constituted sport-governing body in the absence of fraud alleged and shown, Justice Putnam, of the Supreme Court of New York, has dissolved the temporary injunction applied for by H. O. Smith, president of the Premier Motor Manufacturing Company, to prevent the Contest Board from turning over the Glidden Trophy to the Chalmers Motor Company.

The opinion of the Court is as follows:

This is a motion to continue the temporary order of July 23d, restraining the delivery of the 1910 Glidden Trophy. The referee. Mr. A. H. Whiting, decided in favor of plaintiff's car. The Contest Board, however, sustained an appeal and awarded the trophy to the Chalmers Motor Company. Plaintiff charges that this action of the Contest Board was unwarranted, being against the Association rules, contrary to the terms and conditions under which the contest took place, and a breach of the trust created by the donor's deed of gift. This suit seeks to set aside the decision of the Contest Board and to reinstate plaintiff as winner.

In 1905, Mr. Charles J. Glidden offered this trophy for yearly competition under the terms of a deed of gift to the American Automobile Association, providing for the adoption of rules to govern such contests. This was to be a reliability run, since called the "Glidden Tour." The deed of gift (as later modified) declared that this trophy should be competed for annually by members of the Association. and that the winner should hold the trophy until won by another. The A. A. A. had adopted various rules through its Contest Board, to which has been delegated the regulation of such competitions. In March, 1910, the Contest Board issued advance copies of a set of rules, called the 1910 Contest Rules, intended to govern the various competitions to be conducted under sanctions issued by that Board on behalf of the Association. These were subdivided to apply to many different contests, including reliability tests.

The purpose of the Glidden Tour is to try out and test the endurance of what manufacturers call a "stock car," that is, a car such as is regularly sold to purchasers, and not one specially equipped for a contest. In the rules for 1910, the entrant was required to file a stock car certificate of description, in which the details of the car were fully set forth. A technical committee was to make a preliminary inspection of the stock car to determine if it corresponded with the stock car certificate. Various provisions were made as to the examination and report by this technical committee, as well as regulating the penalties in the contest after the cars should have entered upon the tour.

Plaintiff was the entrant in the 1910 contest of a Premier car. In the certificate of description was mentioned a hand oil pump and oil tank. This car was duly examined by the technical committee and declared to be eligible. During the tour a protest was made, upon the claim that this hand-pump to inject oil into the crankcase of the engine of the Premier car was not a part of the regular stock equipment. At the conclusion of the tour, in which plaintiff's car showed the best score, this protest was considered by the referee, who deferred action until he had received a special report from one of the technical committee who had visited the factory of the Premier Motor Manufacturing Company. Subsequently, the referee overruled the protest and declared plaintiff's car the winner. The Chalmers Motor Company, who had entered a car in the name of the defendant, George W. Dunham, appealed from this decision to the Contest Board. which. after notification to the plaintiff, took up the appeal on July 21st, and after receiving proofs by affidavit and hearing arguments, on July 22d, sustained the appeal of the Chalmers Motor Company, on the ground that there was no sufficient evidence to prove that the auxiliary oil tank and pump equipment was stock equipment. so that the Premier Company had failed to furnish evidence sufficient to establish the stock status of its cars entered in respect to this lubricating equipment, and for that reason the Premier cars were disqualified.

It is a primary principle of all sporting contests that rules must be made by the bodies conducting them, and that those regularly appointed must decide who wins. The entrants in such competition, as a matter of fairness, agree to abide by the decisions of the umpires, referees. or boards having jurisdiction, as the rules may provide. Especially is this true in a contest where the points of eligibility are highly technical, and the Association is composed of experts who themselves are well fitted to judge. Before a dissatisfied entrant can ask the courts to interfere and set aside the rulings of a sport-governing body there must ordinarily be evidence of fraud, either by a competitor, or by the official making the decision. The track judges, umpires, referees, executive committees. and governing boards of such associations are supreme within themselves when acting under their recognized authority. If they give the parties concerned a fair opportunity to be heard, and there is evidence on which their findings can be based, their decisions, in the absence of fraud. are not subject to judicial review. Thus, Judge Gildersleeve, delivering an opinion reversing a special term order which granted an injunction in favor of a disqualified contestant at a race track, said:

> "When the original contract was entered into, * * * , the owner of the said colt, in effect, subscribed to the defendant's rules, and they are binding upon his successor. Those rules named the tribunal to which any dispute. that might arise out of the contract, should be submitted. That tribunal was the executive committee of the defendant corporation. They had jurisdiction of the cause of action alleged in the complaint herein. and it was the duty of the plaintiff to submit to their decision." (Corrigan v. Coney Island Jockey Club, 48 N. Y. St. Rep. 582, 586.)

These principles have been generally recognized. The fact that this trophy is of large value and that, although in the form of a sporting contest, the tour really affords a test of the endurance of a car, from which important financial consequences ensue, does not change the rule. Such consequences flow from many modern sporting contests, but these results do not give the court jurisdiction.

The rule that courts of equity will interfere to secure the possession of valued objects having a sentimental interest to the owner comes under a different head of the jurisdiction. Plaintiff's proceeding, while nominally to gain possession of the trophy, is in reality to obtain a reversal of the present award, with a reinstatement of the Premier entry as the winner. Were jurisdiction entertained proof would be naturally taken with respect to the equipment of the 1910 Premier cars from nearly all the large cities of the United States. On this motion, 73 affidavits from 26 cities have been submitted. Upon a hearing on the merits, even with the utmost diligence, such a mass of testimony from widely dispersed points might require several months for its completion. After decision rendered thereon, appeals would naturally follow, so that the final judicial ascertainment of the result of the 1910 Glidden Tour might not be reached until other Glidden tours had in the meantime taken place. Heretofore, the law has declined this jurisdiction not based on those property rights usually cognizable by courts. To change now and hear the loser in court would also imperil the spirit and interest in all such contests.

In the present case, the objections to the form of the appeal and to the proceedings before the Contest Board are largely technical. While in some respects informal, such proceedings do not appear to lack any substantial protection to all concerned. The high standing of the parties forbids the suggestion of fraud; in fact, upon the argument it was acknowledged that there was no fraud as to anyone involved. In the absence of fraud, the question for the court is not whether passing primarily upon the evidence, it would have reached the same conclusion as that of the Contest Board, or whether their conclusion was reasonable or unreasonable, but simply and wholly whether the case before them was so bare of evidence to sustain the decision that no honest mind could reach the same result (People ex rel. Jackson v. New York Produce Exchange, 149 N. Y. 401, 414).

No winner of this trophy has a right to hold it for more than one year, and its ownership remains in the American Automobile Association. There is, therefore, no necessity to impose the terms of a bond conditioned to conform to any future order of this court, as the Association is a responsible defendant able to comply with any final decree.

The temporary injunction is vacated and dissolved, with costs.

September 8, 1910.

Plaintiff Says Fight Will Go On

Harold O. Smith, president of the Premier Motor Mfg. Co. of Indianapolis, entrant of the Premier cars in the recent Glidden tour, telegraphed the following message to THE AUTOMOBILE:

CHICAGO, Sept. 13.—The action of Mr. Justice Putnam in refusing to continue in force the temporary injunction issued in the suit brought by me against the American Automobile Association, Chalmers Motor Company and others, to set aside the decision of the Contest Board and to restrain the delivery of the Glidden Trophy to the Chalmers Motor Company, will have no effect upon the vigorous prosecution of this action.

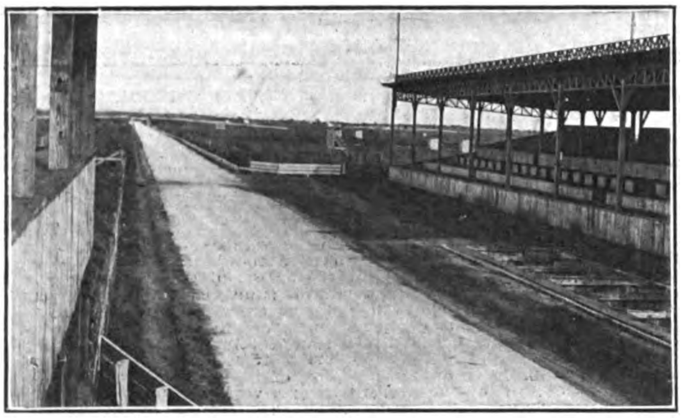
The statement purporting to have been made by the Chalmers company to the effect that the Supreme Court of New York has awarded the Glidden trophy to the Chalmers Motor Company and has fully sustained the action of the Contest Board, is wholly without foundation in fact.

The decision of the court in no way determines the propriety of the action of the Contest Board or settles the merits of the controversy, nor does it attempt to do so, and the preliminary injunction was refused, apparently upon the theory that the issues cannot be finally determined during the year within which the winner of the 1910 contest will be entitled to the custody of the trophy, and that the A. A. A. is a responsible body, subject to the jurisdiction of the court and can be compelled to comply with the terms of any decree entered.

I have instructed my attorneys to set the case down at the earliest possible date for a hearing on the merits and to proceed without delay to a final determination of the issues involved. Much as I deplore the necessity for this course, I am determined, not alone in my own interest, but in the interests of clean, wholesome sport, to obtain a decision from an impartial tribunal, and if necessary a court of last resort, as to whether or not the Premier cars driven in the 1910 Glidden tour, after having established so conclusively their superiority over all other cars driven in the contest, can be disqualified in the manner attempted and the trophy awarded to a manufacturing corporation not an entrant, in utter disregard, as it seems to me, of the plain provisions of the rules. The fight has just begun. (Signed) H. O. SMITH.

French Rights to Twombly Patents Sold

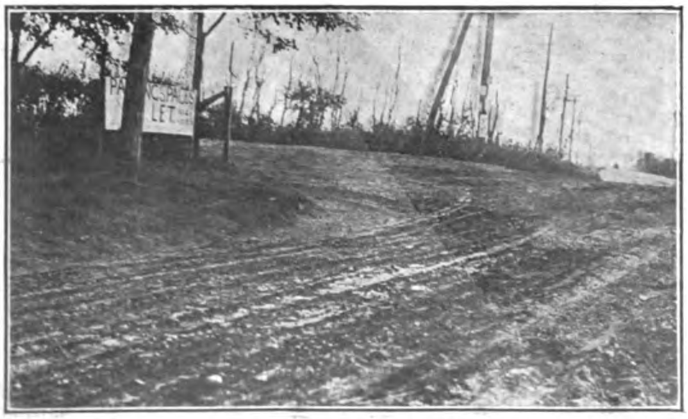
W. Irving Twombly, of the Twombly Motors Company, has received a cable from Paris announcing the sale of the French patent rights of the Twombly Power Company to Bernard Maimon, the proprietor of *Le Matin* of Paris, France.



Looking down the course from grand and judges' stand

Hicksville turn into the long straightaway back-stretch

The S-Curve just beyond Meadow Brook Lodge, near Garden City



Westbury turn—sharpest and most dangerous on the course

Vanderbilt Cup of 1910

THE premier sporting event of American motordom, the Vanderbilt Cup race, will be decided October 1 on the Long Island course of the Motor Cups Holding Company. A magnificent list of entries has been made to date and as the entry box will not be declared closed until September 24, considerable additions are expected.

The course for this year's race is identical in length and territory with that of 1909, but material improvements have been made in the surfaces of certain portions of the route so that higher speed and less tire trouble than ever before are looked for. The course is situated in Nassau County and is 12.64 miles long. Of this distance, 5.15 miles are over one of the fine stretches of the Long Island Motor Parkway and 7.49 miles are county roads. The race requires 22 circuits of the course or 278.08 miles. The start will be at dawn and the finish probably about four hours later.

The history of the event has been glorious. William K. Vanderbilt Jr., a pioneer in American motoring, instituted the cup race that bears his name in 1904 when he offered a trophy to be contested for in a race of from 250 to 300 miles on a road course. Under the conditions the trophy was to be contested for by teams of cars from clubs that were recognized by automobile authorities, and consequently the entrants did not compete as individuals. The same conditions prevailed in the following year.

The first contest took place October 8, 1904, with sixteen starters, representing four teams, those of France, Germany, Italy and the United States. The race was won by a Panhard 90-horsepower car driven by George Heath, a member of the French team, despite the fact that he was an American amateur. The race was 284 miles long and the winner averaged 52 miles an hour and had only a slight margin at the end.

In 1905 a Darracq driven by Hemery was the winner with an average of 61 1-2 miles an hour. In this race Lancia in a Fiat was eliminated as a winning factor while far in the lead, through a collision with a freak car that he thought he could avoid. In 1906 France scored again with a Darracq driven by Wagner with an average speed of 63 miles an hour.

Changing conditions resulted in some radical alterations in the deed of gift covering the Vanderbilt trophy and no race was held in 1907. In the following year, the custody of the cup having been vested in the Motor Cups Holding Company, the race was renewed and on October 24, 1908, a 90-horsepower Locomobile, driven by Robertson, was returned the winner. The average time made by the winning car was 64.3 miles an hour, the fastest time ever made in a cup race under like conditions. In this race, under the amended terms of the deed of gift, the cars competed as individuals.

Last year saw the cup won by a six-cylinder Alco, driven by Harry F. Grant, with an average speed of 62.8 miles an hour for the 278.08 miles of the race. A Fiat, driven by E. H. Parker, was second.

In connection with the big race last year, two shorter sweepstake events were run coincidentally, the Massapequa trophy at 126.40 miles for $1,000 and a cup and the Wheatly Hills trophy at 189.60 miles.

It may be predicted with certainty that there will not be an uninteresting second from the moment the first car is sent away until the last one finishes. Given a pleasant day the attendance undoubtedly will break some records. In the past, the chief item about which there may have been criticism of the management of the contest has been the fact that after the first and second cars finished the race, the spectators swarmed upon the

SIXTH ANNUAL RACE FOR TROPHY, CASH AND HONOR TO BE HELD OCTOBER 1 WITH A STRIKING FIELD OF CARS AND DRIVERS

course and the resulting congestion in the vicinity of the grand stand forced the officials to declare the race off before the rest of the contestants were able to finish.

This crowding resulted in jeopardy for hundreds and was an injustice to the unplaced cars. Take for example the case of a car that is lower in power and price than the winner and second. If that car has an opportunity to be checked in in third or fourth place, and ahead of many other automobiles, the honor of making a creditable run and finishing close to the winner and placed cars is a distinct consideration.

This year a determined effort will be made to give the contesting cars a chance to finish without interference. The conditions of the Vanderbilt Cup Race are as follows:

Open to Class C; divisions 4C and 5C. Division 4C includes gasoline cars or chassis made by a factory which has during the last twelve months prior to the date of the contest produced at least 50 motor cars (not necessarily of the same model). Eligible for entry under piston displacement limitations of Class B, but without minimum weight restrictions. The limits for piston displacement in this class are from 301 to 450 cubic inches.

Division 5C is the same as above, except that the piston displacement limits are from 451 to 600 cubic inches.

Under the terms of the award, if one of the 4C cars wins the cup and cash, the most prominent of the 5C cars will be awarded a special "Donor's Trophy" for permanent ownership.

If the present prospect of twenty-five starters is realized in the cup race and if the starters in the Massapequa and Wheatly Hills trophy races total fifteen, which is said to be a conservative estimate, there will be forty cars in simultaneous action during the early hours of October 1. On as short a circuit as is afforded by the Vanderbilt Cup course this would place the cars about fifteen seconds apart, if they should be separated by regular intervals during any part of the running. The scene at any point along the route is thus bound to be full of action.

The Massapequa trophy race is open to cars of from 161 to 230 cubic inches displacement of Class B, division 2B; minimum weight 1,400 pounds and is ten times around the circuit.

The Wheatly Hills trophy race is for Class B, division 3B, open to cars of from 231 to 300 cubic inches piston displacement.

The entry lists of both sweepstakes events will close September 24. From September 20 to the day of the races practice will be allowed over the course from 5 until 8 A. M., the roads being closed to traffic during those hours.

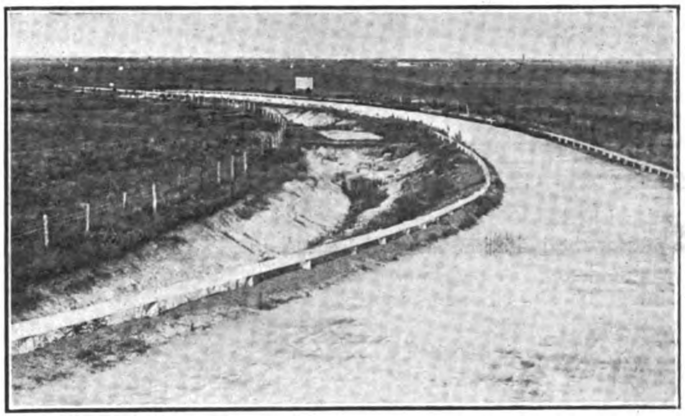
With a full dozen days more to go before the entry boxes close, the entries for the three races are as follows:

For the William K. Vanderbilt, Jr., Cup—

Practice Number	Car	Driver
1	Benz	Robertson
2	Benz	Hearne
3	Benz	Bruce-Brown
4	Alco	Grant
5	Pope-Hartford	Fleming
6	Pope-Hartford	Dingley
7	National	Aitken
8	National	Livingston
9	Lozier	Mulford
10	Simplex	Mitchell
11	Simplex	Beardsley
12	Marquette-Buick	L. Chevrolet
14	Marquette-Buick	Burman
15	Marqette-Buick	A. Chevrolet
16	Apperson	Hanshue
17	Marmon	Dawson
18	Marmon	Harroun
For the Massapequa Trophy—		
	Cole	Endicott
	Mercer	Sherwood
	Cole	Edmunds
For the Wheatly Hills Trophy—		
	Marion	Basle
	Marmon	

The road a mile east of Parkway—bridge over Jericho turnpike

New road which leads from Westbury to Meadowbrook Lodge



Going toward grand stand, which is about 1½ miles away

Banked turn at Massapequa Lodge, where Parkway section ends

Recent Events Among Aviators

PRIZES DISTRIBUTED AT HARVARD-BOSTON MEET—AERONAUTIC MILITARY RESERVE—WIRELESS WITH DIRIGIBLES

THOUGH the proportion between spectators inside the pay gates and those outside at the Harvard-Boston aviation meet has generally been as one to two, the first week totaled about a quarter million of paid admissions, it is stated, and it was decided to prolong the event from Sept. 13 to Sept. 15. The city of Boston and the international mining engineer John Hays Hammond have offered money prizes for successful bomb-throwing at a dummy battleship target from altitudes of 1800 feet or higher, the competition to take place on the two additional days of the meet.

Only the Wright machines have competed in the important slow-flight contests scheduled. On Sept. 8 Walter Brookins flew a lap or 5 1-4 miles in 13 minutes 48 seconds. Two days later Johnstone flew 63 miles in 2 hours 3 minutes 5 2-5 seconds and on Sept. 12 he stayed up for 3 hours, 5 minutes, 40 seconds, covering 101 miles, which was record for duration of a single flight. The slowest flight was thus at the rate of 22 3-4 miles per hour. Previously a short flight at the rate of 19 miles per hour had been reported. The record for the shortest getaway on wheels, in which machines with skids cannot compete, was made on Sept. 9 by Graham-White in the Blériot monoplane. A first attempt gave a start in 52 feet 6 inches, the second cut this to 39 feet 10 inches, and finally it was reduced to 26 feet 11 inches. In this contest the power of propulsion and the force of the wind play an important part, while in the slow-flight trials the wind may be eliminated as a factor by prescribing a circular course and the power is unimportant, the whole emphasis being on general efficiency of design and construction. On Sept. 12 Graham-White flew in his Blériot machine from the field at Squantum twice to Boston Light and back, a distance of 33 miles in 34 minutes, 1 1-5 seconds, bettering his speed record of the previous week about 6 minutes, and winning the $10,000 speed prize of the meet without competition. On the same day Lieutenant J. E. Fickel flew with Willard in a small Curtiss biplane and fired with an army rifle at targets on the ground while circling the field at more than 30 miles per hour. Wilbur Wright flew with Brookins and practiced throwing plaster of paris bombs at the imitation battleship, succeeding in scoring 77 points with 37 balls, beating Graham-White's previous record of 75 points. In all, Graham-White won $22,100 in prizes at this meet and the Wright team $9,250. Clifford B. Harmon captured all the amateur first prizes.

Nearly all the prominent aviators at the Boston meet enrolled themselves as members of the United States Aeronautical Reserve, an organization which was founded during the progress of the event by J. H. Ryan, a son of Thomas F. Ryan of New York for the purpose of training many aviators in the art of throwing bombs. A trophy valued at $10,000 and a valuable cup are to be competed for by the members. The organization is to be international in scope and membership, military in purpose.

James H. Moore, an owner of theaters in Rochester, N. Y., and Detroit, Mich., has offered a prize of $10,000 for the first flight between the two cities, the conditions to be decided by a committee of aviators.

Charles K. Hamilton, the aviator who flew from New York to Philadelphia and back this summer, flew at Sacramento, Cal., on Sept. 9 and sustained severe injuries at a fall due, he said, to the jamming of a rudder.

Hawthorne race track at Chicago near the Indiana boundary, has been leased for the meet to be held in Chicago, Oct. 1 to 8 and also for the following week, as a starting ground for contestants in a race from Chicago to New York organized by two newspapers offering a prize of $25,000 for the winner, if any.

At the Harvard-Boston meet on Sept. 10 Glenn H. Curtiss introduced the "Flying Fish," a new biplane of Curtiss-Burgess manufacture, equipped with "Indian" motor and Burgess propeller.

Robert Loraine, an actor, flew on Sept. 11 from Holyhead, Wales, aiming for Dublin, and dropped into the Irish Channel 400 yards from Bailey Lighthouse at the coast of Ireland.

Paris as a municipality offers a prize of $20,000 to any French-born aviator who flies from Paris to Brussels and back on Sept. 26.

The Bayard-Clément, a French military dirigible balloon, has been equipped with a specially light wireless telegraph apparatus and has sent and received messages over a radius of 56 miles.

"America," the dirigble with which Walter Wellman, with a crew of five proposes to cross the Atlantic ocean, is 228 feet long, has a maximum diameter of 52 feet and a volume of 345,000 cubic feet. It has been equipped with a wireless telegraph apparatus for sending and receiving designed by A. F. Collins of New York City. This involves the use of a cable dragging in the sea to act as a grounding wire. The date of departure from Atlantic City, it is stated, will be announced 24 hours in advance, if the weather permits.

Previous altitude records by Brookins. Drexel and Leon Morane were broken by the latter on Sept. 3 near Paris, Morane this time reaching a height of 8,151 feet in a Blériot monoplane.

Prof. A. Lawrence Rotch of Harvard and Blue Hill Observatory is preparing to furnish charts of the normal air currents in different altitudes based on observations made for the past 15 years by means of kites and small balloons. As the work covers a large part of the Atlantic ocean, it is believed that it will greatly assist in crossing this water by dirigible or aeroplane, favorable currents being available as a rule by selection of place and altitude.

According to a press dispatch, Duralumin is a new alloy of aluminum discovered by H. B. Weeks, head chemist at Vicker's Sons and Maxim's Works, Barrow. It is described as a little heavier than aluminum but as strong as steel, and the firm is building new works at Birmingham, Eng., for its production. The discoverer of the alloy declares that it may be rolled, drawn, stamped, pressed and forged and is one-third the weight of brass. Commercial manufacture is to begin in October.

S. A. E. Striding Forward Rapidly

The following were elected, this week, members, associates, and juniors of the Society of Automobile Engineers:

James C. Angelino, Carlson Motor & Truck Co., Philadelphia, Pa.
Edwin E. Arnold, Metal Products Company, Detroit, Mich.
C. P. Brockway, Inter-State Automobile Co., Muncie, Ind.
Wm. G. Bee, Edison Storage Battery Co., Orange, N. J.
Wilton Bentley, Universal Electric Storage Battery Co., Chicago, Ill.
John R. Bensley, Randolph Motor Car Co., Chicago, Ill.
Claire Barnes, Billings & Spencer, Hartford, Conn.
Harold A. Baxter, H. H. Franklin Mfg. Co., Syracuse, N. Y.
Fred C. Burkhardt, The Crosby Co., Buffalo, N. Y.
Everett J. Cook, Faulkner-Blanchard Motor Car Co., Detroit, Mich.
Wm. E. Carpenter, Hibbard Engineering Co., Detroit, Mich.
A. L. Dyke, 3975 Washington St., St. Louis, Mo.
C. A. Erickson, Lozier Motor Co., Plattsburg, Pa.
Radclyffe Furness, Midvale Steel Co., Philadelphia, Pa.
Max H. Grabowsky, Grabowsky Power Wagon Co., Detroit, Mich.
Arthur A. Greenick, McCord Mfg. Co., Detroit, Mich.
Geo. E. Hazard, Hazard Motor Mfg. Co., Rochester, N. Y.
Wm. E. Taupt, L. A. Bergdoll Motor Co., Philadelphia, Pa.
Verne R. Lane, Milan, Mo.
Arthur C. Leverton, Brush Runabout Co., Detroit, Mich.
John McGeorge, Cleveland Motor Truck Co., Cleveland, O.
James A. McMichael, Carpenter Steel Co., Toledo, O.
Cyrus E. Mead, Reibold Building. Dayton, O.
Thos. H. Miller, Grabowsky Power Wagon Co., Detroit, Mich.
Burnett Outten, Packard Motor Car Co., Detroit, Mich.
Clive W. Richardson, Brush Runabout Co., Detroit, Mich.
Elmer R. Ritter, The Lunkenheimer Co., Cincinnati, O.

Preparing for Garden Show

EXHIBITORS DRAW FOR SPACES—MAIN HALL TO BE MUCH ENLARGED—TO CONTINUE FOR TWO WEEKS, THE FIRST FOR PLEASURE CARS ONLY

PREPARATIONS for the coming eleventh national automobile show at Madison Square Garden next January were discussed and in large measure perfected at a meeting of the board of managers of the A. L. A. M. last week. The meeting was well attended and its proceedings harmonious.

The business transacted included drawing for space on the main floor and in exhibition hall and the balconies. The floor space will be materially increased through rebuilding to a large extent the interior of the main hall.

The show will be divided into two parts, one devoted to passenger or pleasure vehicles and the other to freight or commercial cars. The first section will hold forth from January 7 to January 14 and the second will occupy the following week.

The first to draw for space was the Buick, followed by the Overland, E-M-F, Cadillac, Packard, Maxwell, Chalmers, Reo and Pierce-Arrow. The other cars which will occupy space on the main floor are as follows: Stearns, Thomas, Olds, Franklin, Dayton, Oakland, Lozier, Elmore, Winton, Locomobile, Hudson, Mitchell, Stevens-Duryea and Peerless.

Cars in the exhibition hall and balconies will include the following makes: Amplex, Moon, Mercer, Corbin, Bartholomew, Nordyke & Marmon, Knox, American, Matheson, National, Selden, Buckeye, Moline, Premier, Autocar, Columbia, Alco, Studebaker, Waltham, Inter-State, Ohio, Palmer & Singer, KisselKar, Hol-Tan, Chadwick, Speedwell, Regal, McIntyre, Marquette, Acme, Pierce-Racine, Flandrau, Hupmobile, Midland, Brewster, Courier, Simplex, Atlas, Dorris and Cartercar.

The show committee, which consists of Col. George Pope, chairman; Charles Clifton, Alfred Reeves and M. L. Downs, has devised an elaborate plan of decoration.

It was announced that a meeting will be called in the near future to allot space to accessory dealers and exhibitors of commercial or freight carrying cars, electric vehicles and motorcycles which will comprise section two of the show.

The Kissel Motor Car Company, of Hartford, Wis., was granted a license under the Selden patent at this session.

Charles Clifton, of the Pierce-Arrow Motor Car Company, head of the association, presided at the meeting, and in attendance were: James Joyce, American Locomotive Company; G. H. Strout, Apperson Brothers Automobile Company; J. S. Clarke and D. S. Ludlum, Autocar Company; O. Y. Bartholomew and R. A. Whitney, The Bartholomew Company; J. W. Lambert, Buckeye Manufacturing Company; W. C. Leland, Cadillac Motor Car Company; Hugh Chalmers and C. C. Hildebrand, Chalmers Motor Company; H. W. Nuckols, Columbua Motor Car Company; M. S. Hart, Corbin Motor Vehicle Corporation; W. R. Innis, E-M-F Company; G. H. Stillwell, H. H. Franklin Manufacturing Company; Elwood Haynes, Haynes Automobile Company; Howard E. Coffin, Hudson Motor Company; I. H. Page, Stevens-Duryea Company; G. A. Matthews, Jackson Automobile Company; A. N. Mayo, Knox Automobile Company; S. T. Davis, Jr., Locomobile Company of America; H. A. Lozier, Lozier Motor Company; F. F. Matheson, Matheson Motor Car Company; Benjamin Briscoe, Maxwell-Briscoe Motor Company; W. T. White, Mercer Automobile Company; W. E. Metzger, Metzger Motor Car Company; J. W. Gilson, Mitchell-Lewis Motor Company; W. H. Van Dervoort, Moline Automobile Company; M. J. Budlong, Packard Motor Car Company; L. H. Kittridge, Peerless Motor Car Company; Charles Clifton, Pierce-Arrow Motor Car Company; George Pope, Pope Manufacturing Company; H. O. Smith, Premier Motor Manufacturing Company; T. C. O'Connor, Pullman Motor Car Company; R. E. Ingersoll, Reo Motor Car Company; George J. Durham, Royal Tourist Car Company; G. E. Mitchell, Alden-Sampson Manufacturing Company; R. H. Salmons, Selden Motor Vehicle Company; F. B. Stearns, F. B. Stearns Company; W. R. Innis, Studebaker Automobile Company; Windsor T. White, Waltham Manufacturing Company; John N. Willys, Willys-Overland Company; Thomas Henderson, Winton Motor Carriage Company; Alfred Reeves, general manager.

Maxwell Wins First Buffalo Reliability

BUFFALO, Sept. 12—Maxwell car No. 12, Charles F. Munroe, driver, won the Laurens Enos trophy in the first annual reliability contest of the Automobile Club of Buffalo.

The winner was in the class selling for from $1,201 to $1,601, and showed a record of a perfect road score and only 5 points penalization in the final technical examination by the representative of the three A's.

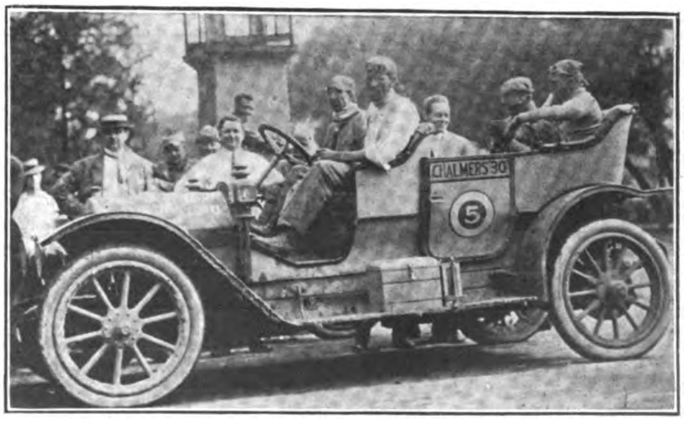
The Hudson car, Tate driver, was second, having a technical penalization of 5 points, but losing by road penalty of 4 points. Oakland No. 7 was third, with a total penalization of 32 points, and the two Pullmans were tied for fourth honors with 36 points.

The first day's run knocked out five of the entries from the clean score class. These were Regal No. 2, three points; Maxwell No. 11, 22 points; Regal No. 14, 2 points; Reo No. 15, 21 points, and Oakland No. 18, 28 points.

The second day's run to Salamanca, took Parry No. 1 from the clean score class, and added 6 points to the Regal, three to the Maxwell and 30 to the Oakland, all three of which were penalized on the first day's run. The third day's run to Geneseo and return took the other Oakland and Hudson from the clean score class and added 7 points to the Parry No. 1, 47 to Maxwell No. 11, 42 to Regal No. 14, and placed 3 and 2 points respectively against the Hudson and Oakland.

The total road score was as follows:

No.		Wednesday	Thursday	Friday	Saturday	Total
1	Parry	0	3	7	4	14
2	Regal	3	6	0	0	9
4	Pullman	0	0	0	0	0
5	Pullman	0	0	0	0	0
7	Cartercar	0	0	0	0	0
11	Maxwell	22	3	47	14	86
12	Maxwell	0	0	0	0	0
14	Regal	2	0	42	0	44
15	Reo	21	0	0	0	21
17	Oakland	0	0	3	0	3
18	Oakland	28	30	0	0	58
20	Hudson	0	0	2	1	3



Chalmers No. 5 as it entered Chicago from the Glidden Tour—now declared winner

Motordom's Supreme Court

MANUFACTURERS' CONTEST ASSOCIATION SUGGESTS SUCH A BODY AND DISCUSSES CHANGES IN COMPETITION RULES FOR COMING YEAR

A SUPREME COURT of motordom was foreshadowed Friday at the meeting of the General Rules Committee of the Manufacturers' Contest Association, which was held at A. L. A. M. headquarters, when a Board of Appeals the function of which will be to review the findings of the Contest Board on appeal was suggested, discussed and referred to the directors for action.

One of the factors that worked to bring the matter to a focus was the dissolution of the temporary injunction given to the Premier company against the Contest Board, to prevent the latter body from turning over the Glidden 1910 Trophy to the Chalmers Motor Car Company. The decision followed the general line always taken by the Courts in ruling upon matters of sport—that is, it refused to upset the action of a duly constituted and authorized sport-governing body.

The contemplated Board of Appeals would serve to supply an ultimate tribunal such as was sought by the appellants in the various cases taken into the equity courts this year.

About twenty-five were in attendance at the meeting, which was presided over by Howard E. Coffin, president of the Hudson Motor Car Company. Alfred Reeves, S. M. Butler and A. L. McMurtry were present in an advisory capacity.

One of the matters that came up for consideration was a modification of the weight rule so that Ford cars and others of similar weight and power shall be rendered eligible.

The announcement was made that at the end of the current racing and contest season Alden L. McMurtry, chairman of the Technical Committee of the Contest Board, would retire permanently from that position, which he has filled acceptably.

Among the matters taken up by the committee were the following: That the decision of the Technical Committee shall be final with regard to the eligibility of any car to enter contests under the rules of the Contest Board; that importers shall be considered upon an even basis with domestic manufacturers in stock car and stock chassis events; that amateur drivers shall lose their standing as such by competing with professionals on track or road; that promoters shall charge certain amounts for entry; that entrants shall report to the starter or his assistant at least thirty minutes before the scheduled time of the first event of any race meeting; that an effort shall be made to interest the United States Signal or Engineer Corps as observers in national reliability tours; that a paid Technical Committee be placed at the disposal of the Contest Board next year; as to the use of demountable wheels; the length of time during which race drivers may continue at the wheel during long-distance events, such as 24-hour races, and several other matters.

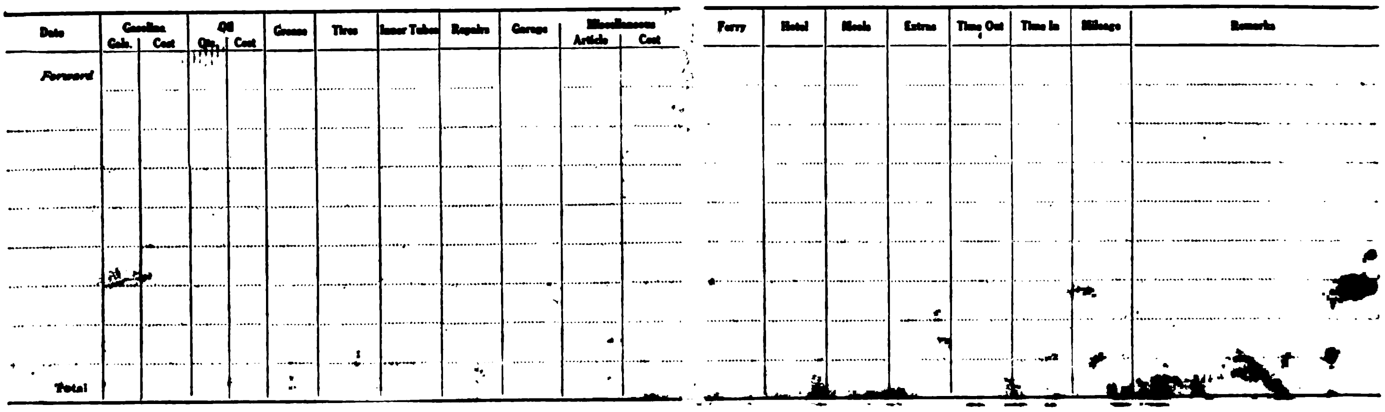
Those who attended the session were as follows: Howard E. Coffin, A. N. Jervis, George H. Strout, G. W. Brown, Jesse Froelich, George Dunham, Herman G. Farr, A. L. Riker, C. A. Emise, F. F. Matheson, C. W. Matheson, M. C. Reeves, William G. Metzger, George M. Dickson, Homer George, H. O. Smith, W. B. Hurlburt, W. H. Vandervoort and Russell A. Field.

While the action taken by the committee is not formally final, the subsequent proceedings upon matters recommended and formulated is considered largely perfunctory on the part of the Contest Board.

Automobile Expense and Record Book

One of the latest innovations for the autoist who wants to know just what it costs to maintain his car is offered by H. C. Smith & Company, 61 Cliff Street, New York City. A pair of pages from the book are here reproduced and they will tell the story better than words. The book is 3 1-4 x 5 inches; opens endwise, and has enough pages to last for a whole year. The title page provides space for the name and number of the automobile, owner's name, also his address, the name and address of the chauffeur is provided for, and a space is given for the registration number of the car.

The idea incorporated into the Automobile Expense and Record Book as here referred to, has a utility foundation. A record such as this will be of value in determining the ratio of lubricating oil to gasoline, for instance. In the course of time it would be possible to decide as to whether or not it is an economy measure to repair tires to the greatest possible extent, or to avoid the cost of repairs and transfer the account to the purchasing fund with the idea of buying new tires more frequently. In the garage there are little problems to solve and this method of accounting will permit of reaching a decision as to the amount of money the garage keeper becomes the possessor of, some of which is for rental, to be sure, and the balance for articles purchased, and repair work done. Some garage keepers have a happy way of coaxing money out of the pocket of the automobile owner, and this little book would help to tell the tale should they succeed. Many owners in figuring on the cost of maintaining a car make the mistake of assuming that $30 per month, for instance, will be the total of the garage increment. With an efficient "coaxer" in charge of the garage it is possible to see $30 in the position of the small end of the horn.



Date	Gasoline		Oil		Grease	Tires	Inner Tubes	Repairs	Garage	Miscellaneous		Ferry	Hotel	Meals	Extras	Time Out	Time In	Mileage	Remarks
	Gals.	Cost	Qts.	Cost						Article	Cost								
Forward																			
Total																			

Specimen pages of the Smith Automobile Expense and Record Book—useful in keeping track of maintenance expenses

Motor Day at State Fair

MINNESOTA GRANGERS ADD INTEREST TO THEIR EXHIBITION BY PUTTING ON A PROGRAM OF AUTOMOBILE RACES

MINNEAPOLIS, MINN., Sept. 12—Motor day at the State Fair, Saturday last, was of greater importance than such affairs usually are. The feature was the track meet and because of the prizes offered by the State Fair people many racing stars were attracted. The Benz captured the mile track record, beating the Fiat's previous best of 50 4-5. The big Benz did 49:25; the Fiat, 49:35; the Darracq, 49:78, and the Buick Special, 50:61.

In addition to the record trials there were seven events contested, two of which were won by the Buick and one each by the Marquette, Fiat, Ford, Velie and Falcar. The feature of this section was the 5-mile free-for-all in class D in which the Fiat, Buick and Darracq met. This battle resulted in a victory for the first-named by a scant 2 seconds over the Buick, with the Darracq the same margin behind the place winner. Another free-for-all brought together some smaller cars and resulted in a victory for the Velie. Oldfield in his Knox started in this event and figured among the also-rans. The summaries:

One mile time trials—

No. Car	Driver	Time
5—Benz	Oldfield	:49.25
2—Fiat	De Palma	:49.35
6—Darracq	Kerscher	:49.78
19—Buick	Burman	:50.61

Class B, Division 2—161-230 Class, 5 miles—

9—Buick	Burman	5:11.36
7—Firestone-Columbus	L. A. Frayer	5:19.82
20—Cole 30	B. Endicott	5:20.12
21—Cole 30	G. Edmunds	5:22.25
8—Buick	Chrevolet	5:35.20
15—Staver-Chicago	Monckmeier	5:35.30
14—Staver-Chicago	Crane	5:50.10
10—Hudson	Gullic	5:56.30

5 miles—Free-for-all, Class D—

2—Fiat	De Palma	4:29
19—Buick	Burman	4:31.39
6—Darracq	Kerscher	4:33.12

5 miles—Handicap, Class E—

12—Ford	Hanson	:15	6:10.14
10—Hudson	Nyman	:25	6:26.54
25—Pullman	Hegland	...	6:47.45
24—Velie	Harford	:35	6:56.53

5 miles—Free-for-all, Class D—

24—Velie	Harford	5:57.93
15—Staver-Chicago	Monckmeier	6:10.68
20—Cole	Endicott	6:17.43
21—Cole	Edmunds	6:17.88
25—Pullman	Hegland	6:25.74
14—Staver-Chicago	Crane	....
1—Knox	Oldfield	6:29.25
22—Cutting	Clark	6:45
7—Firestone-Columbus	Frayer	6:48.73
28—Falcar	Gelnaw	....

5 miles—231-300 class, Class B, Division 3—

28—Falcar	Gelnaw	5:19.80
22—Cutting	Clark	5:29.05
27—Falcar	Pearce	5:40.38
25—Pullman	Hegland	6:21.10

10 miles, Class C, Division 4—301-450 Class—

No. Car	Driver	Time
3—Marquette	Chrevolet	9:28.66
23—Cutting	Clark	10:24.42
28—Falcar	Gelnaw	10:42.06
27—Falcar	Pearce	10:59.89
4—Marquette	Burman	....

Class E—Australian Pursuit Race, 9½ miles—

9—Buick	Burman	9:22.90
20—Cole	Endicott	9:27.38

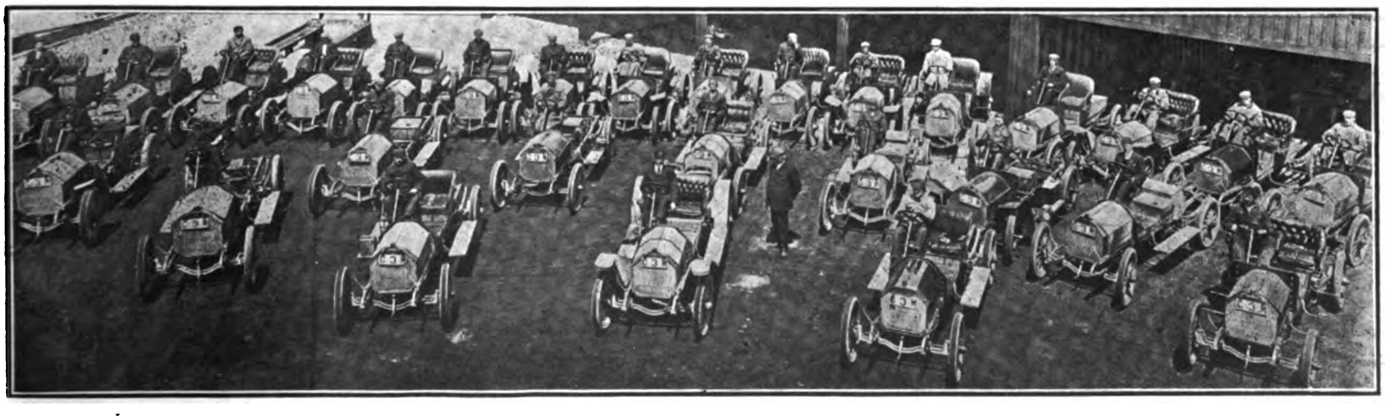
Third Annual Good Roads Convention at St. Louis

Delegates to the third annual Good Roads Convention, to be held at St. Louis, September 28, 29 and 30, will, besides listening to the opening address by Lewis R. Speare, have the opportunity of hearing read many excellent papers germane to the subject. Among them will be: "High Altitude Roads," F. L. Bartlett, Denver, Colo.; "Roads for Modern Traffic in the South," J. T. Bullen, Montgomery, Ala.; "Paved Roads," A. N. Johnson, State Engineer, Springfield, Ill.; "Modern Road Construction in the United States," Walter Wilson Crosby, Chief Engineer, Maryland Geological Survey; "Continuous and Systematic Road Maintenance," S. Percy Hooker, Chairman N. Y. State Highway Comm., Albany, N. Y.; "Farmers' Interest in Improved Highways," Hon. N. J. Batchelder, Master of National Grange, Patrons of Husbandry; "City Streets and Boulevards," Hon. James C. Travilla, Street Commissioner of St. Louis, Mo.; "Modern Surface Treatment of Various Roads," Charles W. Ross, City Street Commissioner, Newton, Mass.; "Town and Lateral Roads," Frank D. Lyon, Department Highway Commissioner of N. Y. State; "State Roads to Meet Modern Traffic Conditions," Harold Parker, Chairman Mass. Highway Commission; "Dustless Roads of Europe," Arthur Blanchard, of the Department of Civil Engineering, Brown University, Providence, R. I.; "Park Roads," John R. Rablin, Engineer, Metropolitan Park Comm., Boston, Mass. and several others.

The plans for the entertainment of the delegates are in the hands of the local committee, and include boat and trolley rides and the inspection of many of the industries of the city of St. Louis.

Studebaker Automobile Company Will Move

When a representative of THE AUTOMOBILE conferred with the Studebaker Company in relation to the question of moving, while the main fact was not denied, it was said that the New York building now occupied by the Studebaker Company is to be turned into a hotel, and it was learned through other sources that the company will probably move to a new building in the vicinity of Fifty-second street and Seventh avenue.



At the Locomobile Plant—Starting out the testing crews in the morning

Doings in the East

BOSTON TAXICAB COMPANIES TO INCREASE RATES—JERSEY MOTORISTS' INTERESTS INJURED BY SEVERE LEGISLATION—GOOD WORK OF SYRACUSE CLUB—TRADE NOTES

—The Lozier sales company of Boston has added T. A. Earl, formerly a Maxwell-Briscoe salesman, to its sales force.

—The Boston *American's* commercial vehicle contest will be held Oct. 20-21 instead of Oct. 14-15 as first announced.

—W. J. Jameson, who handles the Selden car in Boston, has just taken the Moline on, having secured a large territory for its sale.

—The Ingram-Richardson Enamel Company, of College Hill, Beaver, Pa., has orders on its books now for automobile tags for 1911 to total more than 500,000.

—The Reo Company has enlarged the territory of J. M. Linscott of Boston, who had all Massachusetts, giving him in addition Vermont and New Hampshire.

—The New Jersey Automobile and Motor Club has formulated a demand for the strengthening of the law which requires lights upon all horse-drawn vehicles after dark.

—The Keystone Sheet Metal Company of Ambridge, Pa., has completed its first lot of gasoline tanks for the Franklin Commercial Truck Company of Franklin, Pa.

—Fifty entries are already in for the *Herald* Sociability run, at Syracuse, N. Y., which is to be held Sept. 24. It is expected that there will be over 100 entries for it.

—Jack Wade, formerly automobile editor of the Boston *Journal*, has accepted the position of sales and advertising manager of the Grout Automobile Company, Orange, Mass.

—Manager J. E. Savelle, of the New England Motor Vehicle Company, agents in Boston for the Parry and Rainier cars, has resigned to take charge of a big garage to be built soon in the Hub.

—J. F. Dunlop, of the Dunlop Motor Co., Kilmarnock, Scotland, has contracted with the Motor & Mfg. Works Co., Geneva, N. Y., to manufacture on a royalty all Ejector mufflers used in Great Britain.

—C. J. Conolly, 443 Central Park West, New York City, is the local representative of the Randall-Faichney Company, of Boston, makers of the Jericho Horn "B"-Line Oil Gun and "Webster" Gasoline Gauge.

—Finishing touches are now being given to the first car manufactured at the Poughkeepsie plant of the F. I. A. T. Co. It is expected that machines will be turned out by the plant from now on, at the rate of one a day.

—A new company, headed by L. H. Wetherell, has been organized in Boston to handle the entire wholesale and retail business of the Croxton-Keeton car in New England. It is known as the Croxton Motor Car Company of Boston.

—The Cunningham Piano Company, of Philadelphia, has just put into operation a Hewitt motor truck, the capacity of which is 4,000 pounds. The truck hauls seven large pianos at one time and is expected to greatly facilitate rural and suburban delivery.

—G. D. Woodworth, formerly in charge of the Electric Pleasure Vehicle Department of the Philadelphia Studebaker branch, has been placed at the head of the Studebaker's E-M-F and Flanders "20" department on 18th below Spring Garden street.

—The race meeting scheduled for Sept. 9 and 10 at Providence, R. I., was declared off by its promoters. The projected meet was to have been a local affair if it had been conducted, as no application for sanction was made by the promoters to the Contest Board.

—The Central City Motor Car Company has been incorporated to handle the Haines car in Syracuse and Central New York. The president is A. G. Williams, of Syracuse; Arthur Hughes, of Elbridge, is treasurer and manager, and W. Curtis, also of Elbridge, is secretary. Temporary quarters are at 376 W. Fayette street.

—Richard G. Spavin, whose plant is located on Centre avenue, Pittsburg, has secured Arthur McClure from the Inter-State Sales Agency and Edward Gilmore from the Franklin automobile factory, of Syracuse, making a strong addition to its business force.

—A new firm has just been organized in Boston known as the McConnell & McCone Company to handle the Overland, formerly sold by the J. M. Linscott Company. Frank F. Wentworth, at one time New Hampshire agent for the Overland, is to be general distributer.

—All the motor clubs of New Jersey, representing as they do 25,000 automobile owners, are determined to elect to the Legislature this Fall only such men as will favor reciprocal laws, entitling tourists of other States to use the roads, without expense, for a limited period.

—The majority of the Worcester, Mass., dealers have received their 1911 models and had them on display for the first time at the Worcester Licensed Automobile Dealers' Association outdoor auto show, held in connection with the New England fair in that city.

—A change has been made in handling the Jackson car in Boston, E. P. Blake, who has had it for several years, turning it over to W. H. Bates, of Brockton. Mr. Bates had the Brockton agency for a long time. Mr. Blake is to devote his time to the commercial field with the McIntyre truck.

—The Automobile Club of Indian county, Pa., through Judge John P. Elkin, has offered $300 in cash in five prizes to those supervisors who would, during the remainder of this season, put the roads in their charge into the best possible condition. The prizes are $100, $80, $60, $40 and $20 respectively.

—The Worcester (Mass.) Automobile Club, acting with the other auto clubs of the State of Massachusetts, has started a campaign to get men from Worcester county in the Massachusetts Legislature who are favorable to the light bill which will compel vehicles as well as autos to carry lights at night.

—H. W. Brown, proprietor of the Binghamton Motor Car Company at Binghamton, N. Y., has begun work on a large garage. The size of the building is 66 by 130 feet, three stories in height. The building will be practically fireproof and fitted with modern appliances. The total cost will be about $26,000.

—Dr. H. L. B. Ryder of Poughkeepsie, N. Y., has let contracts for the construction of the first airship dock between New York City and Albany. G. Leslie Ryder is designing the garage and airship wharf. The work is to be rushed to completion; and the airship landing is to be large enough for either aeroplanes or two liners of the huge Zeppelin type.

—All is in readiness for the automobile races, in connection with the New York State Fair, which will be held at Syracuse, Sept. 17. Theodore Roosevelt will be a fair visitor that day and will act as honorary referee. There are three National entries and the Herreshoff and Maxwell teams are entered. There are a number of local entries, too.

—The legislation to be striven for by the New Jersey automobilists at Trenton next winter includes the elimination of the present fee of $1 from tourists, the proper enforcement of the light law, compelling all vehicles to carry lights at night, the grading of cars by the A. L. A. M. rating and not upon the manufacturer's rating, and the erection of sign posts.

—Earl J. Moon, sales manager of Moon Motor Car Company, will continue to make his headquarters in New York City, looking after the wholesale selling end of the Moon business in the

East. His latest big deal was in closing with the Linscott Motor Car Company, of Boston, for 250 cars. This concern has been allotted the New England States as its territory for 1911.

—Hartford Solid Motor Tires have been selected by the Wanamaker firm, of New York and Philadelphia, as regular equipment on its complete line of delivery wagons. The excellent service which the Hartford tires have given in the past, the splendid wearing qualities and the economy in actual use brought about the selection of this tire for the Wanamaker trucks.

—The Collins Gear & Motor Company has purchased the plant of the Simpson Stove & Mfg. Co. at Canonsburg, Pa., and will convert it into a factory for the manufacture of automobile axles, gears and motors. The company will also erect a building 60 x 300 feet. The officers are: J. J. Flannery, president; D. P. Collins, vice-president and manager; J. M. Flannery, secretary, and H. A. Neeb, treasurer, all of Pittsburg.

—The Automobile Club of Syracuse has put up this season nearly 200 steel-enameled route and danger signs in the adjacent territory and many special signs have been secured to warn tourists of dangerous places and to give information. The club employs a man and team constantly to post the notices. The territory covered stretches to Richfield Springs, 63 miles from Syracuse, and north to Henderson Harbor, about 60 miles away.

—The New Jersey Automobile and Motor Club contends that the business interests of the State are being greatly injured by the severe motor vehicle laws now upon the statutes. At a recent mass-meeting, called for the purpose of outlining a course of action that would procure remedial motor legislation from the next Legislature, it was pointed out that the automobile has resulted in the increase of the output of a great many New Jersey products.

—The Buick car is now represented in Hartford and Tolland Counties, Conn., by the Buick Garage Company, which for the present is located in the old Rambler quarters at No. 18 Elm street, Hartford, Conn. The Buick was formerly handled by the Miner Garage Company and later by an offshoot of that outfit, the Hartford Garage Company. Edwin Graham, representing the Buick interests, has been in Hartford for the past few days closing up the new deal.

—Harry M. Bronner, widely known in motordom, has assumed his duties as General Eastern Sales Manager of the Dayton Motor Company at the New York offices on West Fifty-seventh street. He will handle the Stoddard-Dayton line not only in New York but through branch houses in Brooklyn, Newark and other points. R. T. Newton will have charge at Newark and E. C. J. McShane at Brooklyn as soon as the new building in that borough is completed.

—At a meeting of the stockholders of the Chase Motor Truck Company the following were elected for the ensuing year: A. M. Chase, Syracuse, N. Y.; A. C. Chase, Syracuse, N. Y.; L. O. Bucklin, Little Falls, N. Y.; Geo. A. Brockway, Homer, N. Y.; H. P. Bellinger, Syracuse, N. Y. At a meeting of the directors immediately following the stockholders' meeting, the following officers were elected: A. M. Chase, president; H. P. Bellinger, vice-president; E. A. Kingsbury, secretary.

—The Boston taxicab companies have been granted an increase in rates, but not as fully as they petitioned police commissioners for two weeks ago. Beginning Sept. 20 the companies may charge 40 instead of 30 cents for the first half mile. The 10-cent limit for each quarter thereafter remains the same. A rate of 50 cents for the first half mile was asked for. For each person in excess of one they may charge 20 cents each. The waiting time for which 10 cents was charged, six minutes, remains the same, the companies asking to have it reduced to four minutes.

—Control of the R. L. M. Morgan Company, motor truck builders, of Worcester, Mass., has passed into a group of New York capitalists headed by Clair Foster, water registrar of New York City, and former managing director of the Standard Plunger Elevator Company. Ralph L. Morgan, founder of the business, will be vice-president of the concern and will have charge of the designing and engineering departments, while Henry E. Whitcomb, the present treasurer of the Morgan company, will continue in the same capacity, with Henry Mason Smith, of New York, as assistant. Henry Bennett Leary, of New York, will be the new secretary, and the board of management will include the following: Frederick A. Philips, Thomas H. Greenwood and Conrad N. Pitcher, all of New York, and John E. Bradley, R. L. Morgan and H. E. Whitcomb, of Worcester.

Middle West News

MINNEAPOLIS SELECTED AS NORTHWESTERN HEADQUARTERS FOR THE FRANKLIN—LOZIER MOVES TO DETROIT NOVEMBER 1—MANY NEW COMPANIES FORMED—INTERESTING ITEMS OF TRADE NEWS

—The Behen-Faught Motor Car Company has secured the St. Louis agency for Michelin tires.

—The St. Louis Automobile Company, 2714 Lafayette avenue, has become the agent for the Clark cars.

—The Phœnix Auto Supply Company has taken the agency for Missouri for Stromberg carbureters.

—The New Way Motor Company, of Lansing, has increased its capital stock from $100,000 to $350,000.

—James F. Gould, 200 Main street, Oshkosh, Wis., has been appointed representative of the Hupmobile.

—P. H. Boalen has been made manager of the Stein Double Cushion Tire Company at 5901 Euclid avenue, Cleveland.

—The name of the Bailey Motor Truck Co. has been changed to the Federal Motor Truck Co. M. L. Pulcher continues as general manager.

—The Rex Automobile Company has taken the agency for the St. Louis territory for the Atterbury Motor Car Co.'s trucks and commercial cars.

—The Fisk Rubber Co. of Cleveland has removed to its new building at 2931 Euclid avenue. R. J. Youngblood has been made assistant manager.

—F. E. McClure will open a branch house shortly in Cleveland for the Brush runabout. He will locate on Euclid avenue in "automobile row."

—The Illmo Motor Merchandise Company, accessory dealers of St. Louis, moved from 2230 Olive street to larger quarters at 1309 King's highway.

—Omaha and Des Moines automobilists have arranged for a sociability run between the two cities starting September 19, over the river-to-river road.

—Don C. McCord has taken the position of sales manager for the Marion cars, with office in factory No. 3 of the Willys-Overland Company at Indianapolis.

—H. Penner, a well-known Milwaukee business man, has succeeded J. D. Waite as general manager of The Petrel Motor Car Company, Milwaukee, Wis.

—Announcement has been made that Burton Parker will assume the duties of advertising manager of the Willys-Overland Company with headquarters in Toledo.

—The Detroit Garage Company, capitalized at $750,000, has filed articles of incorporation. Tryon W. Gorman and Edmund J. Baxter are the principal stockholders.

—L. L. Blood has accepted a position in the selling department of the Toledo Auto & Garage Company. For some time he has been selling the McFarland "Six."

—The Hoard Motor Car Company of Galion, Ohio, is taking bids on an automobile factory to cost $60,000, from plans by Architect Vernon Redding of Mansfield, O.

—E. W. Arbogast has severed his connection with the Badger Motor Car Co., and has become associated with the DeTamble Motors Co., as designer and general manager.

—The United Motor Detroit Company, formerly the Maxwell-Briscoe-McLeod Company, will have a branch store in Saginaw, where it will handle Maxwell and Columbia cars.

—Ralph Owen, general manager of the Owen Motor Car Company, and Mrs. Owen, are back from a 2,500-mile tour through the East, covering a period of two weeks.

—W. H. Lalley, European representative of the E-M-F Company, left recently for a trip which will include a swing around the circuit of both the British Isles and the Continent.

—An outgrowth of the Twin City Taxicab Company, the Alco Motor Car Company, of Minneapolis, has been organized to handle the Hudson, Baker and Alco in that territory.

—The Auto Shop Company, of Cleveland, in addition to its handsome new Euclid avenue salesrooms, has taken a long lease on the Fishel building, next door to its Vincent avenue garage.

—The National Gas & Gasoline Trades Association will meet in annual convention at Racine, Wis., one of the centers of the motor car industry in the West, on Dec. 12, 13, 14 and 15, 1910.

—The Haynes Automobile Company of 219 South Sixth street, Minneapolis, has been appointed territory distributor for the Cole "30." They will cover Minnesota and North and South Dakota.

—Morgan & Wright have decided to open a branch store in Denver located in the Majestic Building, 217 Sixteenth street. James Maginnis and Henry Althens have been put in charge of the new branch.

—The Chicago office and headquarters of the Bosch Magneto Company has been removed to 119-121 East Twenty-fourth street. The building is a two-story structure between Michigan and Indiana avenues.

—Interest in Detroit is for the time being focused on the automobile show which will be one of the big features of the State fair, opening September 19. The exhibit will be located in the handsome new building.

—The Regal Motor Car Company, of Detroit, has recently placed at the head of the sales department George D. Wilcox. Mr. Wilcox goes to Detroit from Syracuse, where he has been handling the Regal cars.

—Detroit may be chosen as the location of a plant for the manufacture of a new style transmission perfected by Clark W. Parker, of Springfield, Mass. Officials of the company are in the city looking for a factory site.

—The Rogers Unika Wheel Company, of Boston, is another prospective addition to the Detroit automobile colony. An option has been taken on a large tract of land, and it is the intention of the company to build a large plant.

—The Weber Implement Company has opened downtown salesrooms in St. Louis at Nineteenth and Locust streets, where the Mitchell, Lozier, and Rapid lines are displayed. The main offices will remain at 415 North Main street.

—Louis Geyler has been appointed agent of the Hudson car in the Chicago territory for the coming year. The agency is located at 1532 Michigan avenue until the new building between Twenty-fifth and Twenty-sixth streets is completed.

—Ralph W. Keeler has resigned as general manager of the Keeler-Hupp Company, Detroit, State distributors of Hupmobiles, and will engage in another line of business, retaining his present connections until a successor has been selected.

—The promoters of the Lisbon Auto Truck Company, of Lisbon, Ohio, which was all but ready to start work on a new plant there, are now negotiating for terms in East Liverpool, Ohio, where it is possible the new plant may be located.

—The Missouri Taxicab Company has been incorporated in St. Louis, with Walter Isaacs, 131 shares; Herman Rindskop, 116 shares; Clara Isaacs, 1 1-2 shares, and Addie Rindskop, 1 1-2 shares, incorporators. The paid-up capital stock is $25,000.

—The Studebaker Automobile Company this week shipped the last train load of electric delivery wagons to Gimbel Brothers, New York. This is the last of an order for 66 machines placed by the Gimbels with the Studebaker concern a few months ago.

—The Scioto Auto Company, organized recently with an authorized capital of $150,000, of which $85,000 has been subscribed, will take over the plant of the Arbenz Furniture Company at Chillicothe and will remodel it into an up-to-date automobile plant.

—Racine (Wis.) stockholders in the Thomas Brass & Iron Company and allied companies failed to win their fight to have the plants locate at Racine. The factories at Waukegan, Ill., were destroyed by fire recently. They will be rebuilt at Chicago Heights.

—The Bower Roller Bearing Company is erecting a new plant at Goethe and Hart avenues, Detroit, which will be ready for occupancy this fall. It is to be of concrete construction, 220 feet long, 90 feet in width at the widest point and 60 at the narrowest.

—The Regal line of automobiles, which has been handled up to the present in St. Louis by the General Motor Car Company, will in the future be taken care of by the Grand Motor Car Company, an organization that has just been completed by R. W. Anslem.

—The third annual meeting of the stockholders of the Royal Tourist Car Company for the election of directors and the transaction of business generally will be held on Wednesday, September 21, at 533, Society for Savings, Cleveland, Ohio, at 11 o'clock a. m.

—The crowning feature of last week's convention of Ford Motor Company branch managers from all over the United States and Canada, and from abroad, was the dinner given Wednesday evening in the new convention hall of the Hotel Pontchartrain, Detroit.

—Minneapolis will collect taxes next year on $1,425,300, representing the assessment on automobiles. There are 2,630 machines on the tax lists this year, compared with 1,325 last year. The average of valuations also has jumped. Last year it was $513; this year it is $542.

—The Cummings Auto Sales Company, organized recently with an authorized capital of $20,000, has taken the salesrooms at 153 North Fourth street, Columbus, Ohio, formerly occupied by the Burdell Auto Sales Company. The company will have the Central Ohio agency for the Elmore.

—The Lisbon Auto Truck Company has been formed with a capital of $50,000 and will build a plant at Lisbon, Ohio, for the manufacture of small motor trucks for the use of grocers, hucksters, etc. Among those most largely interested are A. H. Wyatt and W. A. Kitto of Cleveland, O.

—The new officers of the Ideal Electric Company are as follows: Bruce Borland, president; Edwin W. Ryerson, vice-president; Uri B. Grannis, treasurer; Cyrus H. Adams, Jr., secretary, and C. J. Holdrege, general manager. The capital stock of the company has been raised to $50,000.

—The Pierce-Racine car, manufactured by the Pierce Motor Company of Racine, Wis., will hereafter be known as the Case and will be distributed exclusively by the J. I. Case Threshing Machine Co. of Racine, the oldest builder of traction and threshing machinery in the United States.

—The Enger Motor Car Company, of Cincinnati, manufacturer of the Enger automobile, has closed contracts with the Federal Motor Car Company, of Chicago, for 200 cars for 1911. The representative of the Federal company, after visiting the Enger plant, decided to handle the Enger in the Chicago territory.

—The Rubber Products Company of Barberton, O., has increased its capital stock from $150,000 to $300,000. Part of the stock will be given to the stockholders as a stock dividend, and the remainder sold at par pro rata. The increased capital will be devoted to increasing the size and equipment of the plant.

—At the annual meeting of the Firestone Tire & Rubber Company, of Akron, held recently, the old board of directors was re-elected and officers were selected as follows: H. S. Firestone, president and general manager; Will Christy, vice-president; S. G. Carkhuff, secretary, and J. G. Robertson, treasurer.

—The American Tire and Rubber Company of Akron, Ohio, was incorporated with an authorized capital of $200,000 to manufacture and sell all kinds of rubber articles, including automobile and motorcycle tires. The incorporators are: Frank L. Kryder, Adam Duncan, Gilbert C. Waltz, Harvey Musser and J. R. Huffman.

—Minneapolis has been selected by the H. H. Franklin Company of Syracuse, N. Y., as headquarters for their northwestern traveling representative, George S. Rule. His territory includes Minnesota, North and South Dakota, Wisconsin and Northern Michigan, and he has established headquarters at Robertson Motor Company's office at 111 Tenth street, South.

—The Scioto Auto Car Company of Chillicothe, recently incorporated, has been organized by the election of the following directors: Fred G. Stroehmann, Henry J. Arbenz, C. A. Fromm, H. C. Ogden, Wheeling R. Enderlin, Robert W. Manly and F. C. Arbenz. Fred G. Stroehmann was elected president; W. R. Enderlin, vice-president and F. C. Arbenz, secretary and treasurer.

—In accordance with a State requirement the United States Motor Company, Jersey City and Detroit, capital $30,000,000, has filed articles of incorporation with the Secretary of State at Lansing. Other concerns to follow suit are the Alden Sampson Manufacturing Company, Pittsfield, Mass., and Detroit, $300,000, and the G. & J. Tire Company, New York and Detroit, $10,000.

—The McLeary Engineering Company has been incorporated at Toledo by Edward McLeary, Oliver P. Barnhart, Reuben Y. Barnhart, Samuel J. Logan and John F. Kumler, Jr. It has an authorized capital stock of $25,000 and will take over and expand the business of Ed. McLeary, who for years has conducted a machine shop. Both air and auto motors will be added to the output of the concern.

—Studebaker Bros. Manufacturing Company has opened a temporary automobile branch in St. Louis at Tenth and Locust streets in the building formerly occupied by the Midland Automobile Company. Until recently the branch in St. Louis was conducted under the name of the E-M-F Automobile Company, but by present arrangements the Everitt-Metzger-Flanders Company merges its interests in this territory. T. L. Hausmann is manager of the Studebaker company.

—The removal of the general offices of the Lozier Motor Company to Detroit, Michigan, will occur Oct. 1, on the completion of the new factory at Detroit. F. C. Chandler, formerly manager of the Western Sales Agencies and foreign department, has been elected to the vice-presidency of the company, and will be in charge of the sales department; C. A. Emise assumes charge of a new department of publicity and advertising and W. S. M. Mead, who succeeds Mr. Emise as manager of the New York and Metropolitan Agencies, will also have charge of the foreign department, with headquarters at 1751 Broadway, New York City.

—At the annual meeting of the stockholders of the K-R-I-T Motor Car Co. at Detroit, it was decided to add two more stories to the plant at the foot of Lieb street, increasing the capacity to 5,000 cars per year. Directors were elected as follows: W. L. Piggins, B. C. Laughlin, Kenneth Crittenden, William Van Sickle, L. C. Sherwood, J. W. Kanter and George G. Harris. The new officers are: President, W. L. Piggins; vice-president, Kenneth Crittenden; secretary and treasurer, B. C. Laughlin; manager of sales, J. E. Winney. The company will add to its line this year a surrey model for four passengers. The K-R-I-T Motor Sales Co. has been organized to handle cars of this make and will be located at No. 461 Woodward avenue, with Thomas C. Harris in charge.

The South and the Coast

PREPARING FOR ATLANTA'S FALL SPEEDWAY RACES —IMPROVING THE LOUISVILLE-NASHVILLE TURNPIKE—LOS ANGELES DEALERS ABANDON RACING—OREGON STATE A. A. MEETS TO-DAY

—The city of Harrisonburg, Va., has installed two motor cars in the headquarters of its water department.

—Walter E. Smith, Louisville agent for the Matheson car, has joined the salesforce of the Olds Motor Works.

—The Murray Motor Car Company has entered the Seattle field and is located at 1716-18 Broadway. This company has taken on the Hudson car and the Gabrowsky power wagon.

—Charles E. Miller & Bro. have secured the agency for the Owen in Washington, D. C., and vicinity and will be located on Fourteenth street, in the heart of the capital city's motor row.

—F. A. Mitchell, one of the veteran automobile men of Seattle, who has been away from that city for the past two years, has purchased the garage of the White Motor Company on Broadway.

—Edward E. Gerlinger has taken the agency in Portland, Ore., for the Stoddard-Dayton. The agency will cover the State of Oregon and will be known as the Stoddard-Dayton Automobile Company.

—Among the agencies for the Owen closed during the past ten days are: J. P. Burrus, McKinney, Tex.; John Ackard & Sons, Colby, Kan.; O. J. Merrill, Edgar, Nebr.; Bert Gilhousen, Los Angeles, Cal.

—The Standard Auto Equipment Corporation, of Richmond, Va., has been granted a charter by the Virginia Corporation Commission. The incorporators of the company are: B. C. Patte, president; C. Ridgeway Moore, vice-president, and George A. Perry, secretary and treasurer.

—Richmond, Va., is considering motorizing her fire department. A representative of the city has been away inspecting machines at various points and has returned much pleased with the demonstrations.

—After a stormy session, the Licensed Motor Car Dealers' Association of Los Angeles voted to take no further part in racing events of any kind, but will permit members of the association to enter races at their will.

—The Kentucky Automobile Company has secured a building adjoining its present location on Third avenue, south of Breckenridge street, and is moving its offices to that structure. The company is the agent for the Cadillac cars.

—Two Louisville automobile houses have exhibits at the Applachian Exposition at Knoxville, Tenn., September 12 to October 12. The Olds Motor Works and the Studebaker Automobile Company will show machines.

—One of the latest cars to enter the Baltimore field is the Everitt, the agency for which has been taken on by the Pullman Automobile Company, Inc., with office at 1117 Cathedral street and garage and repair shop at 1803 Lovegrove alley.

—Kentucky and Tennessee motorists and citizens living along the line of the old Louisville and Nashville turnpike are agitating the question of improvements for that important and historic highway. A meeting is to be held at or near Smith's Grove in the near future to discuss ways and means of procedure. The road in question received a good deal of undesirable advertising following the 1910 Glidden tour.

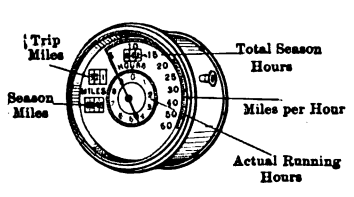
Seen in the Show Window

IN these days of stringent speed laws it is sometimes convenient for the autoist to know exactly how fast he is driving, how long he has been upon the road and how far he has traveled. In the Cleveland Speed Indicator (AQ), made by the company of the same name at 1806 Euclid avenue, Cleveland, O., he is provided with a device which tells not only the miles per hour, the trip hours and trip miles, but the season hours and the season miles. The running time record will be excellent evidence for every law-abiding motorist in the event of police interference, as the indicator shows at all times the number of miles and the running time. The instrument is kept in motion by a flexible shaft connection to the automobile wheel. The fastest moving part of the indicator revolves only 30 times for each mile.

A MAKER who regularly equips his cars with the Veeder Odometer (AR), made by the Veeder Mfg. Co., 22 Sargeant street, Hartford, Conn., gives evidence of a confidence in the reliability of his wares that should go far to convince a prospective customer of the honesty of his claims, for this little instrument will act as a tell-tale should he overrate the battery mileage, gasoline and oil consumption, tire mileage or the longevity of the various parts. The dashboard type of odometer has two registers—a total and a trip. The trip can be set back to zero at will; the total cannot be set back. The type of odometer which is designed for attachment to the front wheel is also shown; it is regularly supplied for use on the left wheel, but can, when so ordered, be supplied for the right front wheel.

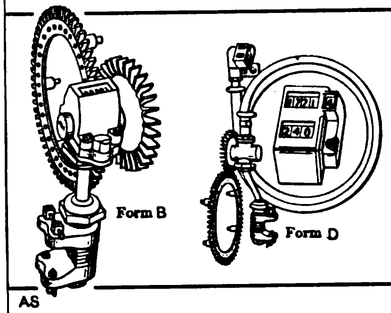
ROUGH roads deliver hammer blows to the wheels, tires and mechanism of an automobile that would materially shorten their life were it not for the springs. But to successfully cope with such conditions the springs must be necessarily so stiff-acting that riding in a car thus equipped is tiresome in the extreme. The Koehler Cantilever Spring (AS), made by the Universal Auto Spring Company, 8500 Florissant avenue, St. Louis, Mo., is designed to withstand heavy shocks and yet be sufficiently "soft" in action to insure comfortable riding. The company claims that with these springs the use of solid tires on pleasure cars is rendered quite possible; shocks on the engine and the road wheels are minimized, and the life of pneumatic tires lengthened.

AQ



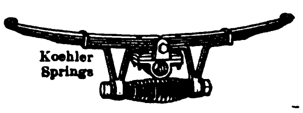
AQ—The Cleveland Speed Indicator

AR



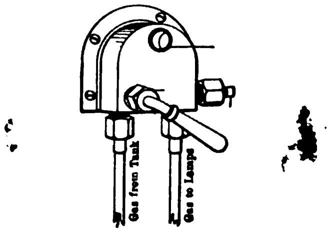
AR—Veeder Odometers—for wheel and dash

AS



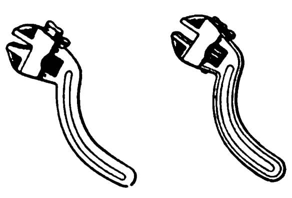
AS—The Koehler Cantilever Spring

AT



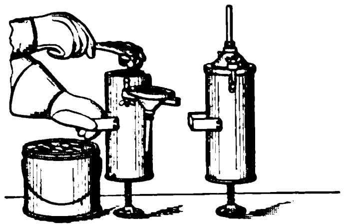
AT—Inst Lighter saves the autoist money

AU



AU—B. & S. Wrenches for tight places

AV



AV—The Little Giant Grease and Oil Gun

WASTEFULNESS in the use of acetylene gas on automobiles costs considerable money in the aggregate. The trouble of lighting and relighting lamps with each succeeding stop when traveling at night usually induces the autoist to allow his lights to remain burning, regardless of the length of the stay. It is to remedy this very situation that the Inst Lighter (AT) has been perfected by the company of the same name at 53 East Main street, Columbus, O. By a turn of a handle and the push of a button the driver of a car, without leaving his seat, has instant control of the lighting and extinguishing of his head lamps. The lighter is installed on the dash and takes up but little room.

THE location of some of the nuts and pipes in the mechanism of an automobile makes them so difficult of access that in the event of their needing tightening the ordinary form of wrenches is found practically useless for the purpose. The Billings & Spencer Co., of Hartford, Conn., realizing the necessity of a new form of wrench to enable the motorist to reach the otherwise un-get-at-able nuts and pipes, has designed the B. & S. adjustable wrenches (AU) here shown. The curved handle enables one to get the jaws of the wrench onto a pipe or a nut that could not be reached with a straight-handled tool. These wrenches are made of drop forged steel and are fitted with a patent nut lock to prevent slipping.

LUBRICATING gear cases and differentials is a nasty job under ordinary conditions. Greasy hands and gloves, soiled clothing and smudged features are the usual accompaniments of the process. In an effort to ameliorate these conditions the Neiman Machine Works, of Freeport, Ill., have designed and are marketing the Little Giant Grease and Oil Gun (AV). The device consists of a metal cylinder holding a quart of oil or 2 1-2 pounds of grease; a removable cover and spout, and a screw piston to quickly propel the lubricant to the point where it is needed. A side handle makes the gun easy to carry.

MAKERS of lubricants, cleaning compounds and other materials that must be sealed in cans will find something to interest them in the announcement that L. & J. A. Steward, of Rutland, Vt., have perfected a machine for sealing open top cans after being filled. The filled cans, with covers laid on top, are placed on a feed belt, which carries them to a header where the covers are forced on and fastened. From there the cans are taken to the dial plate, where each can, remaining stationary while the head revolves, is automatically sealed.

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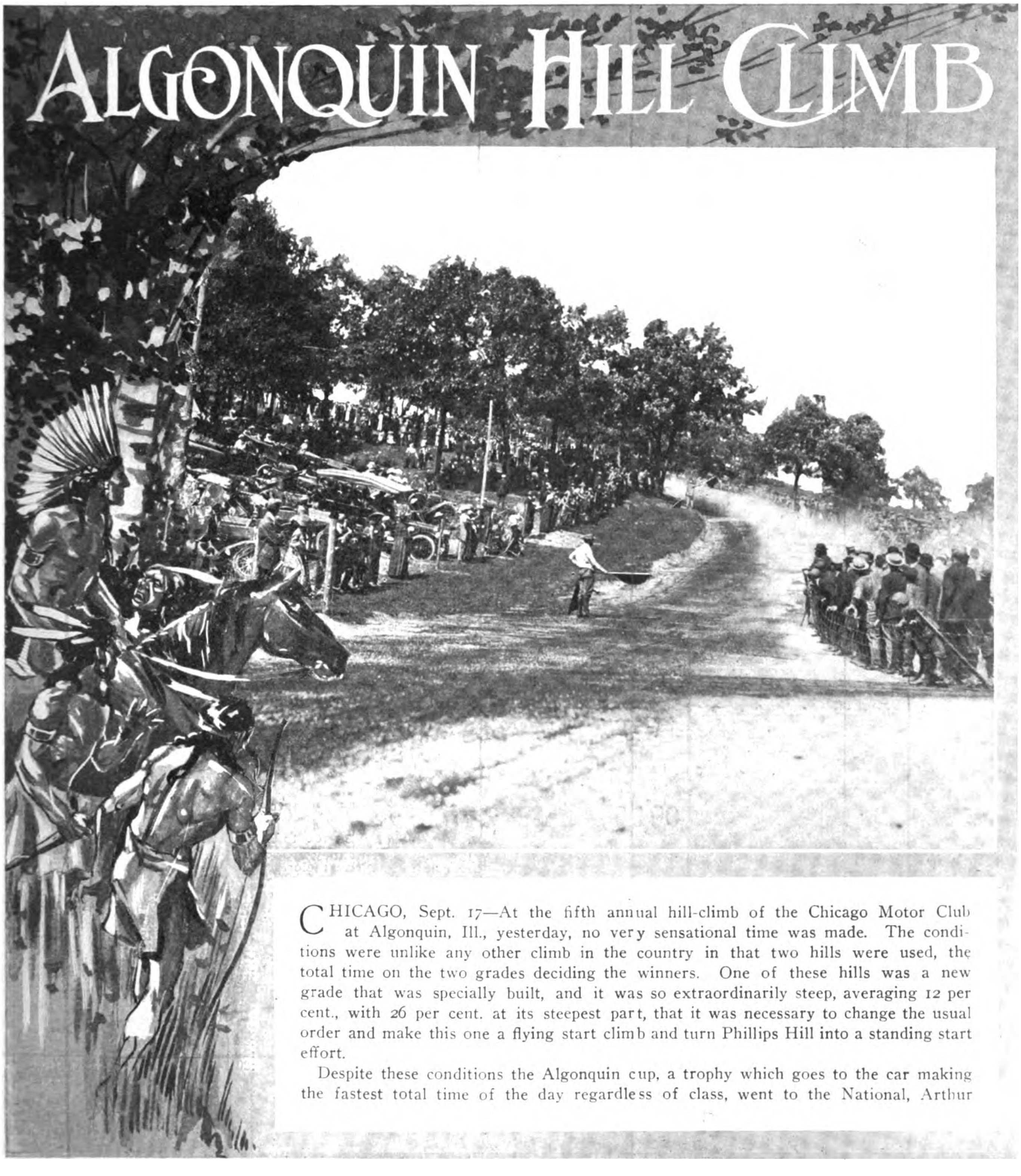
THE AUTOMOBILE

ALGONQUIN HILL CLIMB



CHICAGO, Sept. 17—At the fifth annual hill-climb of the Chicago Motor Club at Algonquin, Ill., yesterday, no very sensational time was made. The conditions were unlike any other climb in the country in that two hills were used, the total time on the two grades deciding the winners. One of these hills was a new grade that was specially built, and it was so extraordinarily steep, averaging 12 per cent., with 26 per cent. at its steepest part, that it was necessary to change the usual order and make this one a flying start climb and turn Phillips Hill into a standing start effort.

Despite these conditions the Algonquin cup, a trophy which goes to the car making the fastest total time of the day regardless of class, went to the National, Arthur

Greiner driver, with an average of 42 miles an hour for the two hills. On the new hill, the National went up to 38.8 miles an hour to the 1,000 feet, while on the half-mile Phillips Hill its time was :39 4-5. A 45-horsepower Benz, driven by Hearne, climbed Algonquin Hill fastest, its :17 2-5 being a shade better than the National's :17 4-5. On Phillips Hill, though, the National did :39 4-5 twice.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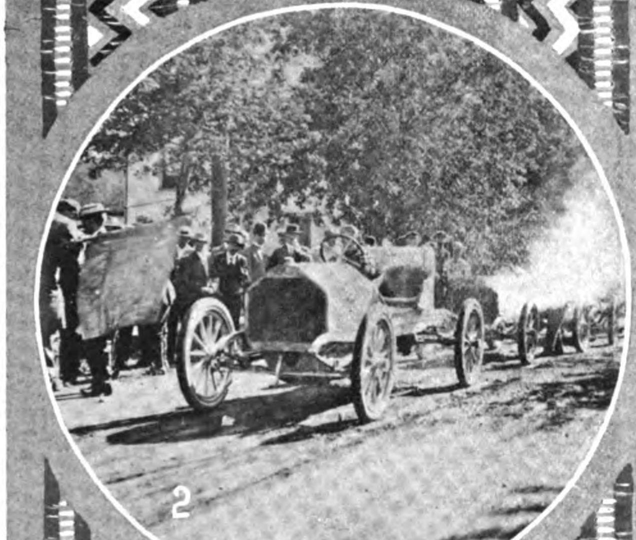
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Fig. 1—One of the Kisselkars starting up the stiff grade
Fig. 2—Contestants lined up ready for the start
Fig. 3—Moline, No. 8, performed well in its class
Fig. 4—Ford, No. 6, won in Class A, Division 2A

No. Car	Driver	A. M. Time	P. M. Time	Total Time
Class A, Division 1A—$800 and Under—				
1—Brush	Lincoln	1:17	1:46	3:03
Class A, Division 2A—$801 to $1,200—				
6—Ford	Rice	:27 4-5	:53 4-5	1:21 3-5
5—Ford	Gruener	:31	:55 1-5	1:26 1-5
3—Cartercar	Pendleton	:32	1:00 4-5	1:32 4-5
2—Oakland	Harding	:35 4-5	1:00	1:35 4-5
Class A, Division 3A—$1,201 to $1,600—				
7—Parry	Dull	:24 4-5	:50 4-5	1:15 3-5
8—Moline	Salisbury	:26	:57 4-5	1:23 4-5
10—Staver	Monckmeier	:31	1:06 2-5	1:37 2-5
Class A, Division 4A—$1,601 to $2,000—				
12—Jackson	Hearne	:24	:46	1:10
11—Velie	Cooney	:23 2-5	:49 2-5	1:12 4-5
16—Kisselkar	Branstetter	:28 3-5	:54	1:23 3-5
14—Inter-State	Seek	:29 3-5	:55 1-5	1:24 4-5
Class A, Division 5A—$2,001 to $3,000—				
17—National	Seek	:19	:46	1:05
Class B, Division 2B—161 to 230 cubic inches—				
18—Velie	Stickney	:23 1-5	:46 1-5	1:09 2-5
20—Staver	Monckmeier	:22 4-5	:46 4-5	1:09 3-5
Class B, Division 3B—231 to 300 cubic inches—				
22—Falcar	Gelnaw	:19 3-5	:40	:59 3-5
26—Moon	Callionette	:19 1-5	:43 1-5	1:02 2-5
21—Parry	Dull	:21	:45	1:06
23—Falcar	Pearce	:21	:45 1-5	1:06 1-5
25—Pullman	Jackson	:21 1-5	:46 2-5	1:07 3-5
29—Falcar	Hughes	:21 4-5	:48 3-5	1:10 2-5
24—Kisselkar	Schoeneck	:22 2-5	:49	1:11 2-5
Class B, Division 4B—301 to 450 cubic inches—				
36—National	Greiner	:17 4-5	:39 4-5	:57 3-5
32—Velie	Cooney	:19 3-5	:42	1:01 3-5
31—Velie	Stickney	:20 3-5	:41 2-5	1:02
34—Kisselkar	Branstetter	:21	:45 2-5	1:06 2-5
37—Jackson	Hearne	:24	:46 4-5	1:10 4-5
33—Midland	Ireland	:20 4-5	:50 3-5	1:11 3-5

The Falcar, Velie, Staver, Jackson, Parry and Moon all won is their respective classes. The formula used consisted of multiplying the cylinder capacity by the time as expressed in seconds and dividing that result by the weight of the car. Under this figuring the winners were the Brush, Cartercar, Staver, Marion and National. The Staver made the best percentage of the lot, its figures being 7.41.

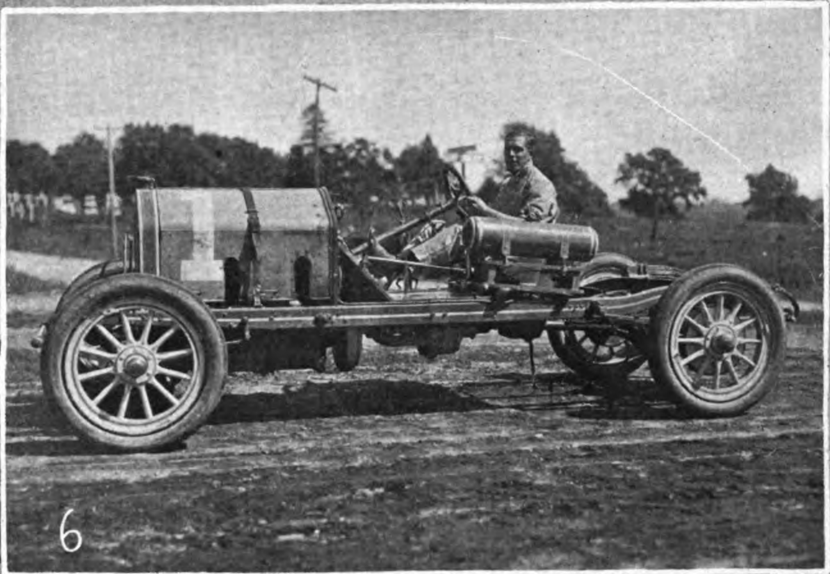


Fig. 5—The Kisselkar just after leaving the tape
Fig. 6—National, No. 55, winner of the free-for-all
Fig. 7—An immense crowd congregated at the start
Fig. 8—Marion, No. 15, winning in Class A, Division 4A

Class B, Division 5B—451 to 600 cubic inches—				
38—National	Greiner	:18 2-5	:39 4-5	:58 3-5
39—Benz	Hearne	:19	:42	1:01
Class B, Division 6B—601 to 750 cubic inches—				
40—National	Greiner	:19 3-5	:41	1:00 3-5
Class B, Division 3B—300 cubic inches and under—				
46—Moon	Callionette	:19 4-5	:41 4-5	1:01 3-5
47—Falcar	Gelnaw	:22	:40 1-5	1:02 1-5
49—Falcar	Hughes	:20	:43 4-5	1:03 4-5
48—Falcar	Pearce	:20 2-5	:44 3-5	1:05
Class B, Division 5B—600 cubic inches and under—				
50—National	Greiner	:18 4-5	:41	:59 4-5
Free-for-all—				
55—National	Greiner	:18 1-5	:41	:59 1-5
59—Benz	Hearne	:17 2-5	:42	:59 2-5
51—Velie	Cooney	:19 2-5	:41 2-5	1:00 4-5
54—Stod'rd-Dayton	Englebeck	:20	:41 4-5	1:01 4-5
52—Velie	Stickney	:19 1-5	:42 4-5	1:02
53—Midland	Ireland	:21	:44 4-5	1:05 4-5
56—Ford	Rice	:24	:44	1:08
57—Ford	Gruener	:21	:48	1:09
58—Lexington	Mattoon	:27	:52	1:19

Class A, Division 1A—$800 and under. Handicap—

No. Car	Driver	A. M. Time	P. M. Time	Total Time
1—Brush	Lincoln	3.88	4.93	8.51
Class A, Division 2A—$801 to $1,200. Handicap—				
3—Cartercar	Pendleton	2.99	5.60	8.59
2—Oakland	Harding	3.33	5.58	8.91
4—Cartercar	Hammerly	3.31	6.02	9.33
Class A, Division 3A—$1,201 to $1,600. Handicap—				
10—Staver	Monckmeier	2.36	5.05	7.41
7—Parry	Dull	2.75	5.54	8.39
8—Moline	Salisbury	2.80	6.23	9.03
Class A, Division 4A—$1,601 to $2,000—				
15—Marion	Monsen	2.73	5.27	8.00
11—Velie	Cooney	2.64	5.58	8.22
12—Jackson	Hearne	3.04	5.83	8.87
Class A, Division 5A—$2,001 to $3,000. Handicap—				
17—National	Seek	2.58	6.20	8.78

Records Fall at Syracuse

ONE AND FIVE-MILE MARKS FOR CIRCULAR TRACKS REDUCED SMARTLY—NATIONALS WIN THREE RACES AND FORD TAKES ONE

SYRACUSE, N. Y., Sept. 17—Before a crowd estimated at 80,000 persons, the automobiles had a memorable inning at the finish of the State Fair this afternoon. The program consisted of two ten-mile dashes under piston displacement classification, both of which proved victories for Nationals, but the winners turning up in different cars; a five-mile race under similar classification, which was won by an S. P. O. car; a five-mile special for residents of Syracuse, which also went to a National car; a five and a ten mile free-for-all; a ten-mile free-for-all handicap, won by a Ford, which defeated a National which won one of the other events and the S. P. O., and one and five-mile time trials against the world's mile circular track records of 49.29 and 4:24.20 respectively, both of which were reduced by a Fiat. The marks set were 48.92 and 4:11.90. Automatic electric timing devices were used and a claim for official recognition of the marks will be made.

The racing was full of action even if sturdy competition was lacking in the free-for-all races. The feature of the day's racing was the showing of the Nationals and the Ford entry. It was reported that a Simplex 90 which had been entered in several of the events broke a camshaft just before the call to the post. This robbed the free-for-alls of much of the contest element.

Aside from the attractions of the card, the crowd enjoyed an address of Colonel Roosevelt which was carded to take place before the races. The speech was to have been 50 minutes long, but was shortened to half an hour by the anxiety of the crowd to see the racing machines.

The racing officials were: Honorary referees: Colonel Roosevelt and Lieutenant-Governor Horace White. Referee, A. R. Pardington. Announcer, Peter Prunty. Judges: E. L. Broadwell, Thomas J. Wetzell, Alexander T. Brown, Ray B. Smith and H. W. Smith. Clerk of the Course, Nelson C. Hyde. Timers, M. C. Kleck, E. B. Van Wagner, N. H. Oliver, W. C. Poertner, C. M. Hall and Willett L. Brown. Technical Committee: Alden L. McMurtry, John Wilkinson and S. G. Averill.

The summaries:

No. Car	Driver	Time
Five miles, cars under 300 cubic inches—		
1—S. P. O.	John Juhasz	5:28.92
2—Mercer	E. H. Sherwood	
3—Maxwell	Ellery Wright	
Ten miles, cars of 301 to 450 cubic inches—		
1—National	W. King Smith	10:10.76
2—National	Louis Disbrow	
3—Velie	Roy Robbins	
Five miles, free-for-all—		
1—Fiat	Ralph De Palma	4:24.15
2—Ford	Frank Kulick	
3—Knox	M. Lee Brock	
Five miles, special for residents of Syracuse—		
1—National	Charles Rollins	12:49.60
2—Simplex	Roy Hawkins	
3—National	Richard Gleason	
One mile time trials (track record 52 3-5 seconds)—		
1—Fiat	Ralph De Palma	0:49.13
2—Fiat (second trial)	Ralph De Palma	0:48.92
Ten miles, free-for-all handicap—		
1—Ford	Frank Kulick	11:19.73
2—National	W. King Smith	
3—S. P. O.	John Juhasz	
Ten miles, free-for-all—		
1—Fiat	Ralph De Palma	8:50.71
2—Ford	Frank Kulick	
3—National	W. King Smith	
Five mile time trials (record 4:24.2 minutes)—		
1—Fiat	Ralph De Palma	4:11.90
Ten miles, cars under 450 cubic inches—		
1—National	Louis Disbrow	9:57.26
2—S. P. O.	John Juhasz	
3—Mercer	E. H. Sherwood	

Louisville Club's Run Makes Start

LOUISVILLE, KY., Sept. 20—With less than half the number of cars entered that participated in the 1909 run, the annual Reliability and Economy Contest of the Louisville Automobile Club started this morning. The reason for the small entry list is the fact that local dealers have not yet received their 1911 models to as great an extent as they had last year at the corresponding date.

The run will be 433 miles. The route to-day is to Harrodsburg, with the Lincoln Farm as noon control, a total of 142 miles. To-morrow's route is to Winchester, 149 miles, and the third and final day will be spent in running 142 miles back to Louisville.

The tour is divided into two general divisions: one for reliability and the other for economy. In the economy division, reliability will also count as a factor in winning, but the consumption of oil and gasoline will be taken into consideration.

The cars, entrants and drivers in the reliability division follow:

No.	Car	Entrant	Driver
2	Cadillac "30"	Ira S. Barnett	W. McDonald
3	Oldsmobile Limited	Olds Motor Works	F. W. Tuttle
4	Oldsmobile Special	Olds Motor Works	Harry Smith
5	Hudson	A. L. McCormick	
6	Regal	Atlas Machine Company	W. H. Emler
8	Cadillac "30"	Ira S. Barnett	George Younger
		ECONOMY DIVISION	
1	Cadillac "30"	Ira S. Barnett	
8	Cole "30"	A. L. Martin	

The official cars include the following:

Car	Entrant	Use
Cole "30"	A. L. Martin	Press
Packard	Lee Miles	Pacemaker
Oldsmobile	Olds Motor Works	Confetti

Richmond Endurance Attracts Entries

WASHINGTON, D. C., Sept. 18—Ten cars have been entered to date in the five-day endurance run to Richmond and return under the auspices of the Washington *Post*. The entries are three Buicks, two Oldsmobiles, two Washingtons, two Maxwells and a Columbia. The dates selected are October 14-18, giving four running days with a Sunday layover in Richmond. The distance is 475 miles.

The route is via Leesburg, Winchester, Staunton, Charlottesville, Scottsville, Columbia, Richmond, Louisa, Orange, Locust Dale, Culpeper, Warrenton. The night stops will be Staunton, Richmond and Warrenton.

The probabilities are that 25 cars will compete. In addition to a trophy for each division, there will be a sweepstakes prize.

Southern Race Meet a Success

COLUMBIA, S. C., Sept. 17—The two-day race meeting staged at the Fair Grounds here yesterday and to-day proved a big success from every viewpoint. There was one race yesterday, a 100-mile affair with six entries, which was won by a Buick by two minutes in 1:58.5. To-day's card consisted of three events, one each at one, five and fifty miles. The Ford entry won the mile race in 1:09, the Pullman took the five-mile event in 5:51 3-5 and the fifty-mile trial was annexed by the Ford in 55:53.

The long races were well contested, the win of the Buick having been accomplished through its good fortune in avoiding mechanical and tire trouble at all stages as well as to its speed. The Ford car won rather easily after a series of early brushes which accomplished the downfall of several of the heavier cars.

Engineering Section

DEVOTED TO THE DISCUSSION OF ENGINEERING PHASES OF AUTOMOBILING, INCLUDING DESIGNING AND CONSTRUCTION FEATURES OF PRODUCTS, AND INFORMATION TO AUTOISTS

GOOD MATERIALS MUST BE CAREFULLY STORED AND PREVENTED FROM BEING MIXED—DIAMOND CHAIN METHOD

MAKING a mistake when the proceeds of a day's work as represented in money are being counted, may result in the loss of a few dollars, which in the long run is readily charged off to profit and loss, and the amount of the damage resulting may be directly measured by the magnitude of the error made in the counting. But if in a plant where automobiles are being made a large variety of materials are found to be necessary for the best result, and the materials are not so separately stored that error creeps in, the opportunity for putting the wrong material into a part requiring a better grade of the same will be ever present, and the extent of the loss involved in the event of such an occurrence may be far beyond that as represented in the error of count as before mentioned.

It is out of the question to expect that the average workman will be able to tell a bar of chrome nickel steel from a Bessemer bar, if the two bars are of like diameter and stored in the same rack. Of course, the machinist who has to do the work would know the difference due to the cutting hardness of the one as compared with the other, but even his method of measuring would fall short of the requirement were a comparison to be made between a Bessemer bar and a piece of acid open-hearth steel of the same carbon content.

It would not be out of place to expect excellent results from crankshafts made of acid open-hearth steel, but should the materials be stored promiscuously, and the workman, through some inadvertence, were to use the Bessemer steel in the forging of crankshafts, the cost of this carelessness would be measured by (a) the cost of the Bessemer steel wasted, (b) the cost of forging the same, (c) the cost of machining work done upon it, (d) the cost of bluing, scraping and fitting, (e) the cost of the interruption of service and of the crankshaft brakes, (f) the cost of laying up the car while a new crankshaft is being made and put into position, (g) the extra cost involved in making the new crankshaft, (h) the cost of besmirching the reputation of the maker.

There are now so many sizes and grades of steel used in the better class of automobile work that it is no longer possible for any store-keeper, no matter how skilled he may be, to keep track of the respective grades and to be able to put his hands upon them promptly and on a sufficiently definite basis to satisfy the exacting demand. The illustration, as here afforded, is of the method in vogue in the plant of the Diamond Chain & Manufacturing Company, of Indianapolis, Ind. The racks as shown are placed on the ground floor of a substantial fire-proof building; they are of structural steel and the respective compartments are in point of dimensions fixed in the light of the quantity of each grade of steel carried in stock. In addition to having the respective grades of steel stored in separate compartments, it is the practice at this plant to paint the ends of the bars, using distinctive colors for the respective grades of the materials carried in stock. The question of just which color to adopt for a given grade of steel is a matter of no moment, provided this color is definitely assigned once and for all, and is never used for any other such purpose.

This plan works out to advantage in other ways besides making mistakes impossible. Workmen learn to do things systematically, if the system is plain and attracts their notice, and it has been found in this case that the men who do the work are really fond of daubing paint over the ends of the bars, the reason for which lies in the fact that it is easier work to paint bars than it is to lift steel. Evidently this painting project appeals to the artistic side of the workman, and it is one of the situations that illustrates perfectly the exercise of business acumen involved in a system that caters to the vagaries of men.

1911 Laboratory Prospects

SECOND INSTALLMENT, DEALING WITH THE LABORATORY SUBJECT AS IT IS HANDLED BY MAKERS OF AUTOMOBILES

AUTOMOBILE users' interest in the laboratory question ceases when the road performance of cars is analyzed. It is worth something to the user to know the limitations of automobiles, and to be able to foresee the limit of profitable performance. There are a great many things that it is possible to do with automobiles, but the question is, will it pay? In other words, what are the commercial limitations of the automobile? It seems to be convenient to overlook the fact that it is a commercial enterprise that is represented when a banker is taken from his residence to his place of business, or when the banker's wife is carried in comfort and in style when on shopping bent. It is even a commercial enterprise when the banker's daughter is transferred from her place of abode to the music master, and it is not far-fetched to hold that there is a certain commercial phase represented in the process by which the banker's son invests in a racing automobile and traverses a whole State, touching the high spots only.

Just what is the commercial aspect represented in the mad prank of the banker's son? Does he not represent the only laboratory that was in existence during the earlier life of the automobile art? Who is it of the pioneers of the automobile industry whose memory falls short just before account is taken of the speed-mad laboratories that paid good money for his make of automobile and served in the capacity of the dog on whom the lack of quality of the product was tried out with a view to finding out whether or not it was any good.

That these brave and enthusiastic autoists accomplished all that could have been mastered even in a laboratory at the time is a point that will be well appreciated by all who take into account the fact that in addition to locating the weakness in cars, there was the further advantage of conducting the tests under severe road conditions. Now that the art has progressed, and the automobile has lost much of its glamour, most citizens are willing to decry speeding, and they discountenance recklessness as it is practised by the banker's son who lacks neither money nor red blood.

It is fitting that the users of automobiles shall conduct their experiments in club laboratories rather than to indulge in

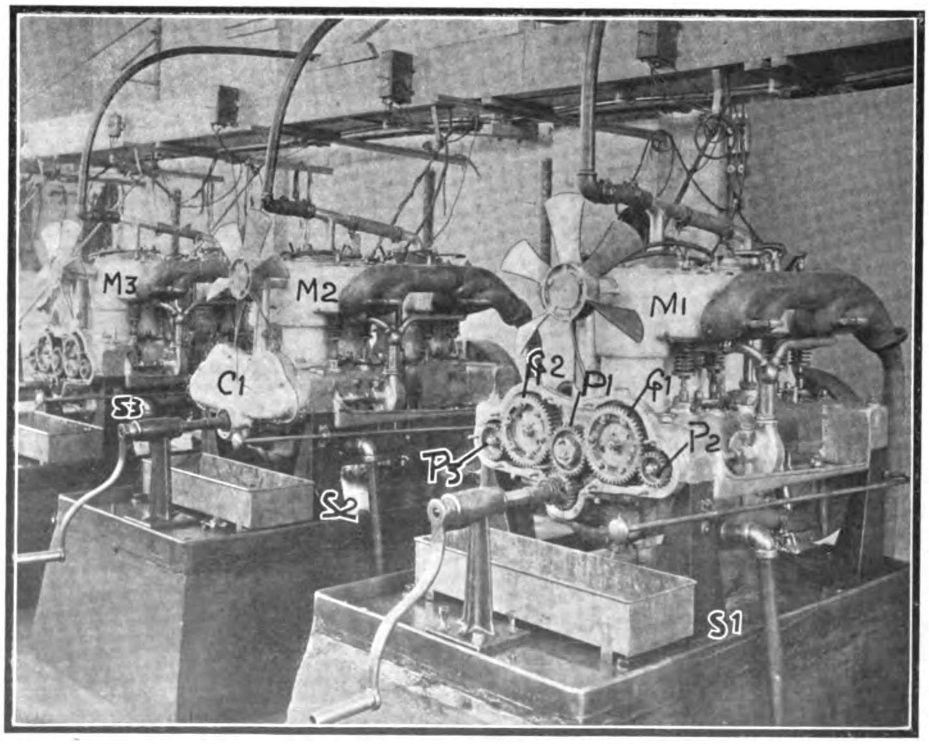


Fig. 16—Run-in test of completed motors at the Lozier plant, with means for loading and determining proper relations of parts

reckless driving on the road, and that the equipment shown as having been installed by the Automobile Club of America is representative of progress from the users' point of view may be taken for granted. The fact remains, notwithstanding anything that users may do along the line as here indicated, that tests should be made and laboratory investigations are better conducted before the cost of building the automobile is incurred. It is like locking the door after the horse is stolen, to avoid making tests during the construction period, only to do this testing work after the cars are built and sold.

The new idea, if indications count, has for its basis a full and proper investigation along laboratory lines during the constructive period of cars and a more or less careful review of the situation on the part of owners after the cars are made. There is one further point of interest, however, that has not been touched upon heretofore, *i. e.*, the Automobile Club of America and kindred establishments, to the extent that they indulge in laboratory work, offer excellent facilities to autoists of the class whose minds run to invention. If a member of the club, as a result of his experience, finds himself in the predicament of having an idea that refuses to down, he may go to the club laboratory and have the same translated into the form of a device or mechanism, and then he may have the plan put to practical test, and if it proves to be efficacious in the filling of a useful niche, all that remains is to add the commercial touches. In this way the experience of capable autoists is given to the world, and it is only in this way that matters such as this can be handled.

In the shops where automobiles and accessories are made commercial success depends upon concentration. The representatives of these plants have no time to devote to incidental experimenting; their success lies in confining their efforts to the undertakings for which the plants are instituted. Of course, there is a bond of sympathy between the man who in using a car discovers something that will benefit the art and the man who in making the car finds out that the degree of perfection he aims at is retarded for lack of something. The club laboratory should serve as the instrument by which a connection can be made between the user who finds out something and the maker who has a place to put it.

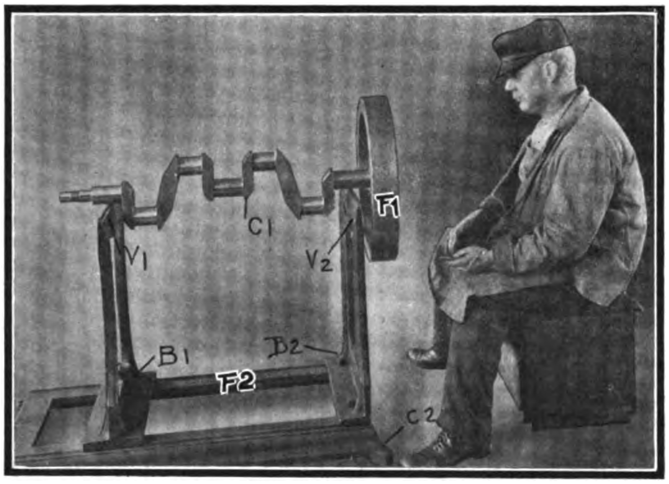


Fig. 12—Method of determining the static balance of a crankshaft after the flywheel is pressed on

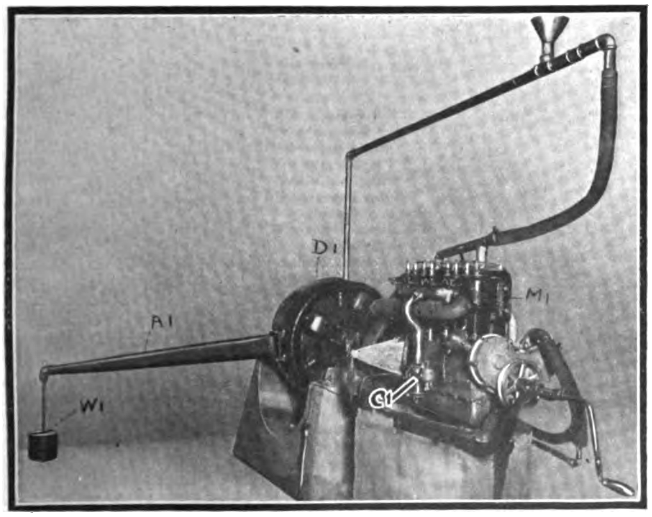


Fig. 15—Electro-dynamometer as used in the Inter-State plant at Muncie, Ind.

Fig. 9—Depicting the method in vogue in the Packard plant for inspecting valves

Some of the Methods in Vogue in the Shops

In some plants instead of having a separate laboratory devoted to testing and the various investigations the instruments of precision and equipment used for testing are distributed about and utilized in an incidental way. In other establishments the laboratory equipment is separated from the manufacturing plant, and the various tests and investigations necessary in the industry are conducted by a corps of men who do nothing else. It will not be the purpose here to attempt to determine as to the respective advantage of each of the methods; it is even possible to foresee that it makes very little difference whether a test is conducted in one room or another so long as the facts are brought out and they are utilized to good advantage. Fig. 9, for illustration, shows how valves are tested for accuracy in the Packard plant, in which L1 is the bed of a small lathe, H1 is the headstock, and T1 is the tailstock. Holders H2 and H3 with adjustments take the V's, V1 and V2, into which the stem S1 of the valve is placed, and the accuracy of the beveled seat B1 is determined by means of the extensometer E1. The work is quickly done, and an error of 0.0002 is readily detected, although the workman is enabled to reach a speed of from 20 to 30 valves per minute. There is no reason why this operation should be conducted in a separate laboratory, and it is even possible to foresee advantage in having the inspection performed during manufacture and as one of the regular operations. The moral effect of letting the machinist see that he must do accurate work, or have it thrown back on his hands, is worth more than can be estimated readily. The workman is most impressed by things that he can see and understand.

In the same plant the motor crankboxes and the transmission gear cases are machined in the regular way, and it is to be presumed that the jigs and fixtures utilized will influence for rapid and accurate work. Notwithstanding the excellence of the facilities afforded, it is deemed fitting to have each unit set up on a face plate and measured by a man skilled in this class of work. Referring to Fig. 10, F1 is the face plate, C1 is the lower half of the crankcase, C2 is the upper half of the same. The two members are bolted together after they are machined and are rested upon legs L1 and L2 at one end, with a screw jack S1

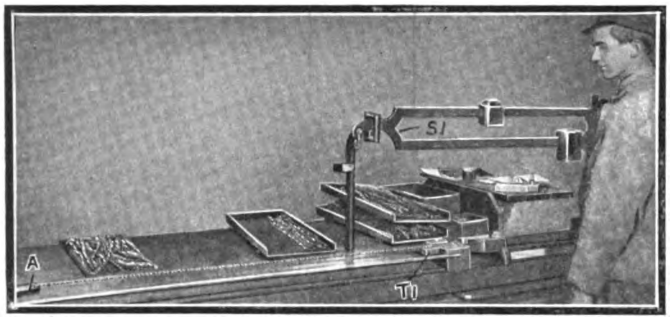


Fig. 14—Testing completed chains in the plant of the Diamond Chain and Manufacturing Company

placed to serve as the third support. The castings are provided with accommodation pieces which are milled off to a fixed distance from the flange faces so that when the legs L1 and L2, which are of a fixed length, are set up in position and the crankcase is rested thereon, the operator using a face gauge F2 fitted with an extensometer E1 has at his disposal a quick and accurate means of checking the work. He is enabled to observe with certainty the limits of tolerance maintained by the workman, and he can do this checking work in the shop alongside of the men who do the machining just as well as it may be done in a separate department devoted to inspection undertakings.

Illustrative of an important phase of constructive investigation work in the shop, reference may be had to Fig. 11, which was taken in the Packard plant, showing the face plate F1, with a crankshaft C1 and V-blocks V1 and V2 with instruments at hand for determining the accuracy of the work. The extensometer E1 is employed to determine if the main bearings are in alignment; it also tells if the centers C2 and C3 are identical as to axis. The fixed gauge G1 is used to size the holes H1, of which there are six, and the micrometer M1 is available for measuring the diameters of the pins, which measurements are taken at both ends, and at 90 degrees, it being the purpose to determine if the pins and bearings are round or elliptical, parallel or conical. The first requisite in the conduct of work of this character is a surface plate that is surfaced to great accuracy and so designed that it will not distort under temperature-changing conditions, to which must be added fixed gauges, extensometers and micrometers of known excellence, all of which in the hands of a skilled inspector.

As a further illustration of the excellence of the incidental method of checking the work during the process of manufacture reference may be had to Fig. 12. Here the crankshaft C1 with its flywheel F1 is mounted on V's V1 and V2, the latter being formed at the upper extremities of a pair of castings which have faced-off bases B1 and B2 designed to rest upon a cast-iron foundation F2, which is also machined with great accuracy, and is provided with crow feet C2, of which there are four with leveling screws attached, thus permitting the workman to level the V's, and after setting the crankcase in place and imparting angular motion thereto, it is allowed to some to rest unhampered, and the operator merely observes if the crankshaft with the flywheel in place is in a true state of static balance.

It is not the purpose of this test to arrive at an understanding of the kinetic conditions of the crankshaft and flywheel. This phase of the problem is taken care of during the designing process; kinetic balance is a mathematical matter to be disposed of, and since the design is symmetrical if the crankshaft and flywheel are machined to drawing size, the static balancing method is a very simple one by means of which inaccuracies in the manufacturing process are readily detected. This is another case of checking as incidental to the manufacture process, and there is no reason why this work should not be done in the very room where the parts are brought together and assembled.

Testing work is not necessarily confined to the processes by which inaccuracies of one or two ten-thousandths of an inch are determined; it is just as necessary to find out, for illustration, if the radiators are tight. Fig. 13 shows how this is done in many of the plants (this particular illustration being taken from the Packard), utilizing a compressed-air tank T1, fitted with a gauge G1, and a safety valve S1 with a pipe leading from the tank along the side wall to a point adjacent to the testing tanks. A length of hose H1 leads to each testing tank and is connected to the radiator R1 to be tested, the latter being submerged in water in the manner as shown, the tanks T2 being deep enough so that when the radiators are immersed therein they will be covered over by water. As the compressed air leads from the tank T1 to the piping and hose H1 to the radiator R1 if any of the air leaks out it will bubble up through the water and indicate the proximity of the fault in the radiator. The air pressure is high enough to develop weaknesses in the structure of the radiators, and it is a quick and efficacious way of locating any leaks that may obtain after the radiators are supposed to be finished. Each radiator bears the number of the workman who would be held responsible for faults, and his attention is directed to any of the faults of workmanship that may be properly charged to him. If the weaknesses developed are due to faulty material this fact is also arrived at, and it is in this way that perfection finally takes up its abode in an automobile. It is a clear case of the elimination of the weakling idea and of the fitting survival of the worthy thought.

Fig. 13—Testing radiators by compressed air to locate leaks and to prove mechanical strength

Checking up the work as it is represented by the component parts that go to complete a unit is only one phase of the great main situation. As the component parts are made and tested, if they are found to be accurate, the next step is by way of assembling the components into units. When these units are assembled they have to be tested also in order to ascertain whether or not they will work in harmony. Fig. 14 is a capable illustration of the idea to be conveyed. It was taken at the works of the Diamond Chain & Manufacturing Company, at Indianapolis, Ind., showing the final test to which chains are put after they are made but before they are packed ready for shipment. The test is made by fastening one end of the chain to an anchor A1, and the other end of the chain to a traveler T1, the latter being actuated by a lever under the control of the inspector, but the pull in pounds is measured on the beam of the scales S1. A certain number of the sprocket chains are tested to destruction in order to find out what the ultimate strength is, but all of the chains that are sent out to do service are tested to some percentage of the ultimate strength, the latter being some multiple of the safe working load. As a rule it is found that of the few chains that do show lack of ability the fault lies in a structural imperfection of the material in some one of the links. The inspection department is fitted out with the facilities by means of which the defective link is at once replaced by a good one and the chain is immediately thereafter retested and if it stands up to the retest it is passed into circulation. There is a certain deliberate accuracy attached to this process. It is quite as scientific as ingenuity is capable of inducing, and yet it has the speed, coupled with precision, that makes for commercial success.

While the opportunity affords it may not be out of place to enlarge somewhat upon the advantages that are inherent in the very process of testing, that instead of impeding progress offers a potential value, as in the case above cited. It is the experience of every shop man that the laboratory and methods of testing and checking to whatever extent they impede progress are unpopular. When a scheme invites accuracy and augments speed, its popularity is assured, and the results obtained under such conditions will be distinctly a commercial success.

Problem Is Intensified as It Leads Up the Line

It will be recognized that the practical inspection and test of the units and the further inspection of the incidental assemblages are all preliminary to the more complete investigation of the assemblies that go to make the completed car. Referring to Fig. 15, which is an electro-dynamometer D1 coupled to a motor M1, this may be taken as one of the units in a considerable testing plant that is designed with a view to testing every motor made with sufficient accuracy to assure the maker that its timing is on a proper basis and that its torquing ability under the several conditions of speed will be up to the standard set by the company for its product. In a test such as this the carbureter C1 is investigated to observe its range of performance. By calibrating the dynamometer and using the curve of calibration the laboratory expert is permitted to note at a glance for every speed within the working range of the motor whether or not the carbureter is delivering a capable mixture. The weight W1 on the end of the arm A1 that will just hold the arm horizontally at any given speed may be fixed by consulting the curve of calibration, and if the carbureter is capable the motor will furnish the necessary power to conform to the general demand as indicated by the curve of calibration. As the speed of the motor is increased in response to the will of the operator the weight W1 is changed accordingly, and the torquing curve of the motor being tested may be plotted in a few moments if the carbureter is working properly, the timing is right, ignition is up to a fitting standard and the conditions of lubrication are as they should be; but should the motor fall below the standard set the means at hand are such as to enable the operator to quickly investigate the situation and put his finger on the festered spot.

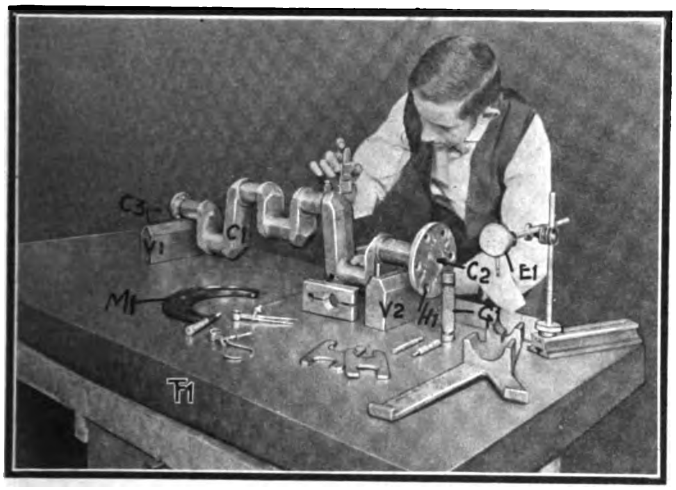


Fig. 11—Inspecting crankshafts in the Packard plant, using micrometers, fixed gauges, and extensometers under proper conditions

As a further advance embodying the laboratory idea with the practical situation, the makers of automobiles undertake to put the units through that which is known as a run-in test. Fig. 16 will suffice for the moment as indicative of the idea in which the motors M1, M2 and M3 are in a long row on test stands S1, S2 and S3, of which there are a sufficient number provided to test all the motors made as fast as they are produced. There is working room around each test stand so that the testers are enabled to inspect the motors under running conditions, finding out if all the joints are tight, and noting whether or not there is any noise or disalignment of relating parts. As the illustration shows, the cover C1 of the half-time gear housing is removed from two of the motors shown, disclosing the pinions P1 and the half-time gears G1 and G2, also the pinion P2 that drives the water pump and the pinion P3, which is placed to actuate the magneto. If this train of gears is not properly installed the tester will be able to note the fact; if there is any noise he will undertake to locate the cause thereof, and in fine the great value of the run-in test lies in the opportunity afforded for determining under working conditions just how good the performance is, and if a remedy becomes a necessity the reason for the same is not hard to find.

Caring for the Automobile Top

As an important feature of proper car equipment, the automobile top is deserving of a degree of attention commensurate with its relative value as a factor in automobile service. It is an expensive part of the car, and it is exposed to a particularly harsh form of service.

It is crushed together, and in this position made to serve as a receiver of highway dust and dirt, and during storms its extended surface is mercilessly assailed by the elements, so that, on the whole, unless given exceptional care and fortified with some preservative material designed to strengthen and enlarge its capacity for service, the days of its usefulness are destined to be few.

The directions for caring for the top are, in the main, simple and not many. Clean as often as possible of mud, road dust and dirt accumulations of every sort, all of which are injurious to the leather, rubber or other fabric composing the top. In case these accumulations have taken hold of the surface of the top so that a light dusting will not suffice to remove the matter, whip a bit of castile soap in some clean, tepid water to make a froth of suds, and wetting up a soft sponge in the water, go over the top until thoroughly cleansed.

Never let this dirt and fetid matter remain long upon the top. Such substances destroy the enamel of the leather or rubber and this gone it is a short shift to decay for the top. After sponging off the top always dry it off with a wash leather.

With leather and rubber tops upon which the enamel remains intact and vigorous, this bathing in water, smoothed out with a spray of castle soap, as often as the top becomes foul with the filth of the road will to no mean extent prolong the wear of the fabric.

For the rubber top with a worn, broken and fractured enamel, showing a generally service-stricken surface, a dressing of real worth may be prepared as follows: Liquid asphaltum, one part; unrefined castor oil, three parts. Confine in a close vessel and agitate until a complete unity of the ingredients is secured. Should the dressing lack a sufficiency of black, add a bit of drop black cut with turpentine to a paint consistency. This will also do for the leather top. The castor oil renders the rubber or leather soft and flexible and neutralizes the tendency of the asphaltum to become brittle.

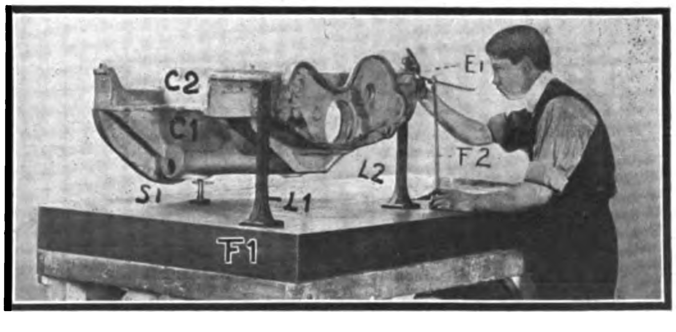


Fig. 10—Surface plate and gauge as used in the Packard plant in measuring up crankcases

Questions That Arise

CONCERNING THE POWER OF A MOTOR IN DIRECT PROPORTION TO SPEED; WORM-GEAR FORMULAE; CLEARANCE VOLUME IN CYLINDERS; TESTING PISTON DEFORMATION

[225]—Is the power obtainable from a motor in direct proportion to speed? If not, how does the power increase and when does it begin to recede as a result of the ills that creep in with increasing speed?

The following test is representative as a good average result, although the conditions indicated are considerably below the best expectation. In this chart (Fig. 1) the speed is plotted in revolutions per minute as ordinates and the horsepower output of the motor is given as abscissa. It will be observed that the line of increasing power is almost straight between 1,000 and 1,500 revolutions per minute. The peak of the curve takes place at 1,600 revolutions per minute, from which point on the power falls off at a rapid rate, it being substantially the same at 2,000 revolutions as it is at 1,000 revolutions per minute. For the purpose of showing that the power did not increase in direct proportion to speed at any time, it is only necessary to point out that at 1,000 revolutions per minute the power was 21 horsepower. The power should be 42 horsepower at a 50 per cent. increase in speed (1,500 revolutions per minute), but instead of 42 horsepower at this higher speed, the actual delivery was 40 horsepower.

[226]—What is the most simple formula of the worm gear, by means of which it will be possible to design worm gears for various purposes, including worm and sectors for steering equipment?

The following is conventional and sufficiently complete for the purposes named. It will be understood that a sector as used in steering gear is designed as a complete worm gear so that the formulæ of the worm gear applies perfectly. The illustration given is for the purpose of illuminating the text (Fig. 5).

CONVENTIONAL FORMULAE OF WORM GEARS USED IN DESIGNING

$$D = \frac{y\,P}{\pi} = 0.3183\,y\,P;$$

$$B = D + 0.6366\,P;$$

$$C = B + 2\,(N - N\cos A);$$

$$F = \frac{D + D'}{2};$$

$$M = \frac{D'}{2} + 0.368\,P;$$

$$N = \frac{D'}{2} + 0.3183\,P;$$

$$E = D' + 0.6366\,P;$$

$$B' = D' - 0.736\,P;$$

$$\text{Tang. } S = \frac{L}{\pi D};$$

$$L = P\,Z;$$

$$P = \frac{L}{Z};$$

$$Z = \frac{L}{P};$$

y = number of teeth in the worm wheel;
P = circular pitch;
S = lead angle in degrees;
tooth angle = 29 degrees.

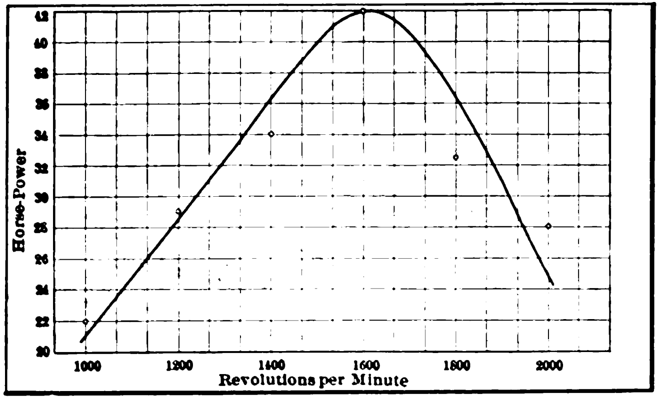


Fig. 1—Torque curve showing how the power increases with the speed up to a certain point and then falls away

[227]—Is the clearance volume exactly the same in each cylinder, considering motors turned out in regular practice?

There seems to be quite a little difference considering the tests available for inspection. With the difference as noted in the test here given, the performance of the motor appears to be up to every reasonable standard.

ACTUAL CLEARANCE VOLUMES

	CC	Cubic Inches	Per cent. of total volume
1	302.5	18.5	19.1
2	297.5	18.2	18.75
3	285.5	17.4	18.2
4	302.5	18.5	19.1
5	302.5	18.5	19.1
6	305.0	18.8	19.4

Piston displacement 78.8 cubic inches.

[228]—What is the practical performance of ordinary spark coils? Is there much lag?

The curve as given in Fig. 4 shows the performance of an ordinary spark coil; the lag is given as ordinates in degrees and the sparks per minute are given as abscissæ. Up to substantially 2,600 sparks per minute the plotting shows a straight line with a maximum lag of 20 deg.; after this the lag increases at an enormous rate, reaching nearly 50 deg. at 3,000 sparks per minute.

[229]—Is it possible to make pistons so light, that is to say, have the walls so thin that they will buckle in service?

It is suspected that this is a very ordinary difficulty and that it occurs in more cases than most autoists are cognizant of. The following test was made to ascertain the extent of piston deformation in one case; it is unimportant excepting to point out that piston deformation takes place if design is not proper:

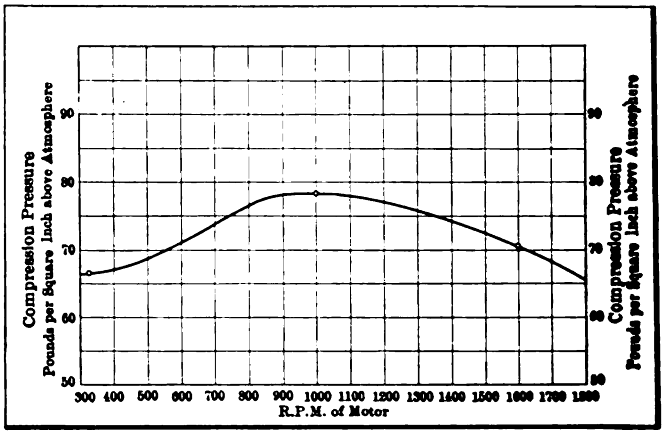


Fig. 2—Curve plotted to show how the compression changes as the speed of a motor is changed

Block Test to Determine Piston Deformation

Engine has been through testing block room and was taken out of stock. A marked heating effect was noticed, and after non-continuous running for a day the motor was torn down and the following measurements taken. Cylinder should be 3.625". Drawing calls for 3.622 straight except light chamfer near top bridge. Pistons are rough turned and filed, being in some cases touched up with emery cloth.

FOR THE PISTONS

			Clearance	
Cyl.	Parallel to wrist pin	Right angle to wrist pin	Parallel to wrist pin	Right angle to wrist pin
1	3.6215	3.6230	.0035	.0020
2	3.6220	3.6235	.0030	.0018
3	3.6221	3.6215	.0034	.0040
4	3.6225	3.6220	.0026	.0030
5	3.6225	3.6225	.0025	.0030
6	3.6220	3.6243	.0033	.0010

FOR THE CYLINDERS

			Clearance	
cyl.	Parallel to wrist pin	Right angle to wrist pin	Parallel to wrist pin	Right angle to wrist pin
1	3.625	3.625	....	....
2	3.625	3.6253	....	....
3	3.6255	3.6255	....	....
4	3.6251	3.6250	....	....
5	3.6250	3.6255	....	....
6	3.6253	3.6258	....	....

[230]—What is the usual arithmetical way of ascertaining percentage clearance in an internal combustion motor cylinder?

The first operation will be completed when the volume of clearance in cubic inches is known; the next step is to determine the volume in cubic inches of the space swept by the piston. With these data available the following will hold:

$$\text{Percentage clearance} = \frac{\text{Volume of clearance}}{\text{Volume of clearance} + \text{volume of piston displacement.}}$$

Volumes to be measured in cubic inches.

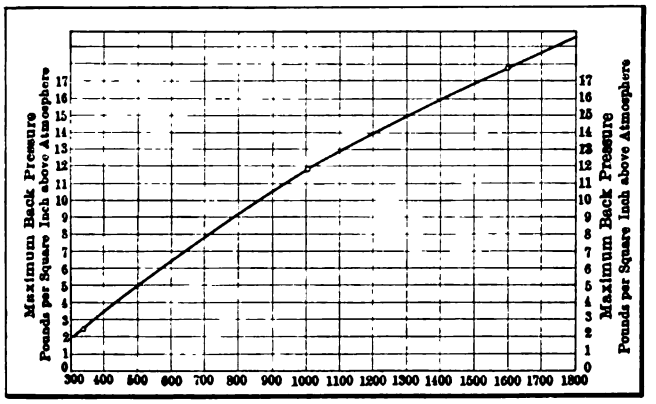


Fig. 3—Curve plotted to indicate the extent of back pressure of a muffler and the effect of increasing speed on the same

A numerical example is as follows:

Volume of clearance = 13.73 cubic inches.

Volume of piston displacement = 44.51 cubic inches.

$$\text{Percentage clearance} = \frac{13.73}{13.73 + 44.51} = 23.6.$$

[231]—Is the compression pressure constant or does it change with the speed of the motor?

In poorly designed motors the "cold" compression represents the highest point in the compression line. With such motors as the speed increases the compression decreases. This is due to wire drawing and other obstructive troubles to some extent and to back pressure on the exhaust side and inferior cooling for the rest. In fairly well-designed motors the compression increases with the speed of the motor for a part of the range, holds substantially constant over the working range and falls off slowly with increasing speed beyond this point. The curve, as given in Fig. 2, is representative of what might be termed good performance, in which the speed of the motor is represented as ordinates and the compression pressure is given in pounds per square inch above the atmosphere. An approximate tabulation of the results obtained in this case may be stated thus:

VARIATIONS IN COMPRESSION PRESSURE FOR VARIOUS SPEEDS

Revolutions per minute	Compression pressure in pounds per square inch above atmosphere
400	67.0
600	71.0
800	76.5
1000	78.5
1200	77.1
1400	74.3

The curve shows that the compression increased gradually up to about 800 revolutions per minute, remained almost constant between 800 and 1,300 revolutions per minute and fell away gradually as the speed increased up to 1,800 revolutions per minute. The running compression was almost as high as 1,800 revolutions per minute as it was cold.

[232]—Can mufflers be relied upon to eliminate the disagreeable sound without inducing back pressure?

As a rule, the reduction of sound from the exhaust of an internal combustion motor is at the expense of power. There are certain forms of mufflers that do better than others, but how much better can only be ascertained by proper tests. For the purpose of showing that back pressure does obtain and that it is in sufficient presence to merit serious consideration, a chart is offered (Fig. 3), a study of which will be enlightening. The speeds of the motor ranging between 300 and 1,800 revolutions per minute are charted as ordinates. The back pressure, which is given in turns in pounds per square inch above atmosphere, increases with speed as the curve shows and the variations in pressure are shown as abscissa. This chart says that for the particular muffler employed the back pressure increased with the speed as follows:

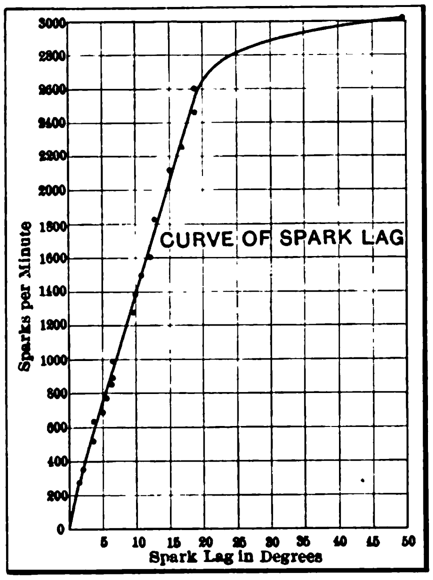


Fig. 4—Curve plotted to show the lag of spark of a spark coil as the speed of sparking is increased

APPROXIMATE INCREASE IN BACK PRESSURE WITH INCREASING SPEED

Revolutions per minute	Pounds per square inch above atmosphere
400	3.22
600	6.2
800	9.11
1000	11.95
1200	14.1
1400	16.0

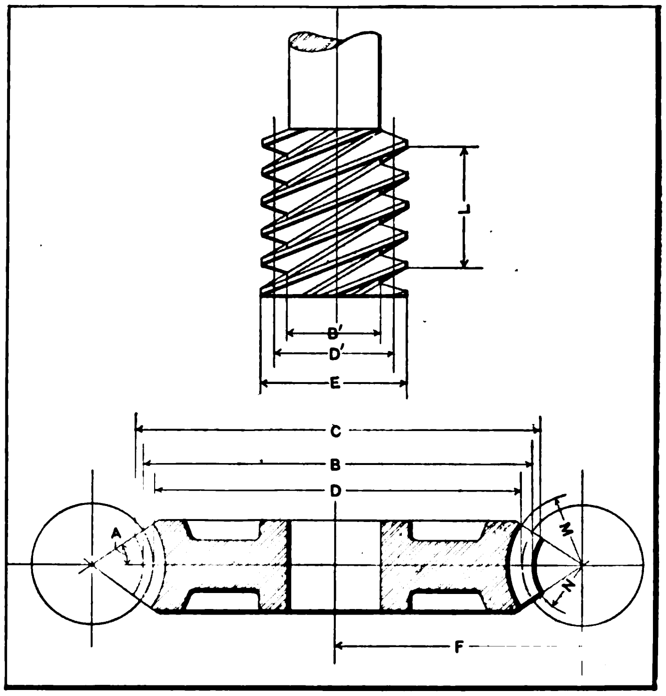


Fig. 5—Diagram of worm and sectors for steering equipment

Letters

COMMUNICATIONS FROM READERS MAINLY ALONG TECHNICAL LINES; LENGTHENING THE LIFE OF TIRES; CLAIMS OF THE KNIGHT PATENT; BRAKES SHOULD BE ADJUSTED WITH CAR LOADED; CARBURETER POPPING DUE TO POOR MIXTURE

Life of a Tire May Be Increased Considerably

Editor The Automobile:

[2,367]—I do not wish to complain, but it occurs to me that my tire bills are out of proportion, they being too high, and I fail to see how some of your good (?) advice can be taken excepting with a grain of salt. You say keep the tires fully inflated and they will last very much longer than otherwise, due to the fact that flexure will be reduced to a minimum. This is all very well, and there probably is something in it, but when I inflate the tires on the wheels of my car so that flexure is prevented it rides like a lumber wagon every time the speed is brought up to 40 or 50 miles per hour. Is it not a fact that the life of the rest of the automobile will be reduced to pulp if I inflate the tires so solidly that they will not cushion, since then the shock at high speed is so pronounced that it becomes uncomfortable to ride in the car?

New Rochelle, N. Y. C. M.

Take another grain of salt and think it over. Why should you drive your car so fast that you not only disrupt the speed limit but reduce the automobile to pulp as well? Perhaps your pocket book is perfectly capable of standing the strain even if the tires will not. There is a legitimate expectation from every make of automobile. You persist in passing beyond that point and prefer to ruin the tires of the automobile in order that you can indulge in your mad desire to wipe out the scenery, whereas were you to blindfold yourself you would not be bothered by scenic considerations, and with the speed reduced to a proper level the car would perform comfortably, the tires would last for a long time, and the cost would be low enough to permit an ordinary millionaire to pay the bill. Running on partially inflated tires results in all sorts of penalties, one of which is here illustrated. (Fig. 1.) In this case the tire was so soft that it picked up a railroad spike.

Yoke Type of Universal Joint

Editor The Automobile:

[2,368]—I have ball and socket joints on the steering rods of my car and it is my belief that they are not as good as if the bearings were long as in the usual form of bearing; since the action has to be universal, how must the joints be made?

W. W. Crandall.

New York City.

The idea can better be illustrated than described. Fig. 2 will suffice for the purpose.

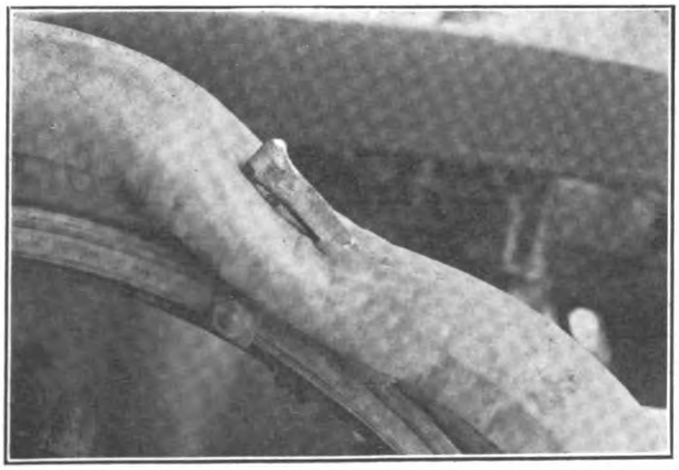


Fig. 1—Running on a soft tire—picked up a railroad spike

Sawdust May Be Put to Good Account

Editor The Automobile:

[2,369]—Is there anything that will effectually remove grease and grit from the hands after working with machinery? G. B.

Chihuahua, Mexico.

Take a quantity of sawdust, wet it with gasoline, add soap and use it for the purpose.

Letters Patent of the U. S. Issued to Knight

Editor The Automobile:

[2,370]—In The Automobile of Sept. 8 it was stated that the Knight patent has been issued; what is its principal claim?

Chicago, Ill. C. L. G.

The Knight patent was issued on Aug. 23, to Chas. Y. Knight, of Oak Park, Ill., the number of which is 968,166; a one-half interest in this patent is assigned to Lyman Bernard Kilbourne; the present control of the patent, according to advices, is vested in Knight & Kilbourne, of Chicago, Ill. The original application for the patent was made April 4, 1904. There are 28 claims; they are broad and sweeping; the "combination" claim is as follows: 28.—"In an internal combustion engine the combination of a fixed cylinder having intake and exhaust port, a cylindrical head projecting into said cylinder and spaced from the walls thereof and forming an annular space therewith, two concentric cylindrical elements telescoped with said cylinder over said head, around the combustion space of the engine, reciprocally in said annular space, the inner one of said elements having ports adapted to communicate with the said intake and exhaust ports and engaging the exterior of said head for controlling said ports therein and the outer one of said elements engaging the interior face of the fixed cylinder for controlling the said ports therein, a working piston reciprocating axillary with relation to said elements and surrounded by the inner one thereof, speed reducing means positively connecting the piston with said elements for reciprocating them with relation to the said head and fixed cylinder, and means for firing a charge in the explosion space." (See Figs. 3 and 4.)

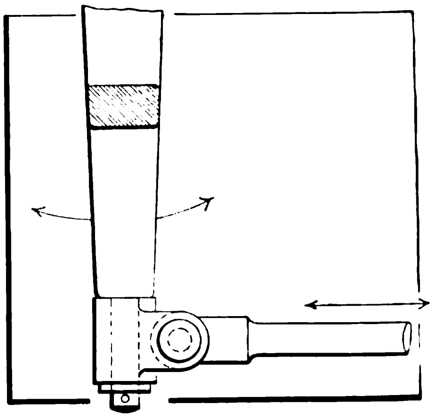


Fig. 2—Idea of a lever and rod with a universal joint connection, designed to supplant the usual ball and socket joint

See Page 287, The Automobile of August 18th

Editor The Automobile:

[2,371]—I was much interested in reading in your last issue your article giving the decision on the Selden patent.

For the information of myself and a great many other automobile owners, will you kindly give us the information as to when this patent expires, and if owners of unlicensed cars are in any way liable under such patent. M.

New York City.

The decree handed down by U. S. Circuit Judge Hough on

July 19 was given in full in The Automobile on page 106, issue of July 21. This decree was put into force by the action of the same judge, a memorandum of which was printed on page 287 of The Automobile of August 18. According to the information afforded, letters patent of the United States were issued to George B. Selden on November 5, 1895, No. 549.160, for improvements in road engines. The patent expires in 16 years from the date of issue. The Automobile, realizing the great importance of this patent, and having in mind the possibility of a new lease of life of the same, went into the matter at some length, even to the extent of consulting with legal talent, and as a result of this effort it was concluded that a reissue is not impossible. Should there be a reissue, it will be for 16 years.

Emergency Brakes of No Value Whatever

Editor The Automobile:

[2,372]—The puzzle that I have to solve has been with me for some time and I have tried to have it straightened out several times. Up to the present I have expended $70 without any good result, and a friend of mine who takes The Automobile states that you will solve my problem promptly and without any payment at all. The difficulty is this: When I tighten up the emergency brakes just as tight as they can be without dragging they seem to work, but when I go out on the road with the car I soon realize that the brakes are not working. I am sure that they work when I tighten them up and the question is: What is it that creeps in after I take the car out on the road? The car is a five-passenger light touring body and it gives good satisfaction excepting that it annoys me to think that I have no emergency brakes to fall back upon in a pinch. J. K.

Yonkers, N. Y.

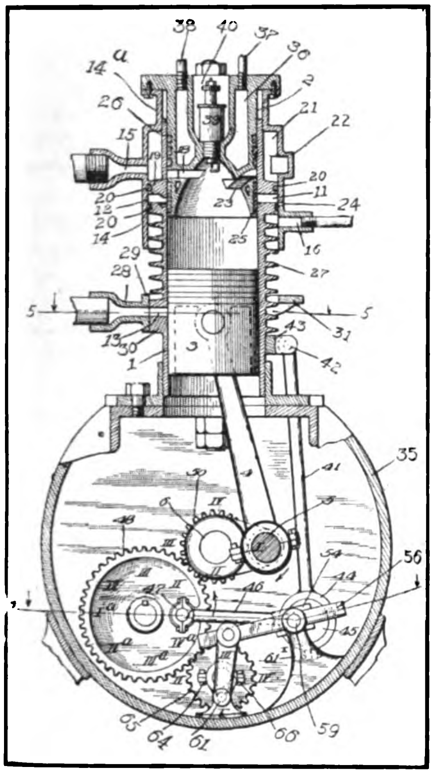


Fig. 3—Knight motor as shown in the original Patent Office drawing

The reason why the brakes do not work after the car is taken out on the road is that the adjustment is made when the tonneau is empty. The distance between the center of the rear axle and the point of fastening of the brakeshaft is too short. Tighten the brakes up so that they drag a little when the tonneau is empty and they will be free when the same is loaded down; another way is to adjust the brakes with the passengers in the tonneau. The real remedy lies in rebuilding the emergency brake system so as to increase the distances referred to. Fig. 5 is intended to show just what the trouble is, and why.

Looks Like Poor Distribution of Mixture

Editor The Automobile:

[2,373]—I have a 1909, 30-horsepower automobile that has caused me to awaken quite early in the morning. Cylinder No. 4 pops back and shoots out of the carbureter a portion of the charge. Have taken the machine to three shops, each of which stands high in its superior knowledge of gasoline engines, but have received no benefit. The cams have been examined; the valves set and polished, and the engine tested for a hidden crack, but all to no good. I have discovered by taking out the regular auto gasoline and putting in the tank 72 test that I can to a great extent overcome it, but it is not always convenient to use high-grade gasoline. Now, I notice that the manifold pipe is of a rather large size, and I also notice that the back end or the point farthest from the front cylinder is about three-eighths of an inch low, or the point where it is fastened to the cylinder No. 4 would have to be raised three-eighths of an inch to make it on a level. Now would gas drift faster to the higher end of the pipe, and would it have a tendency to form a pocket in the lower end of the manifold pipe? Should the manifold pipe be on a level when the machine is on level ground? T. J. Bossert.

Hollywood, Cal.

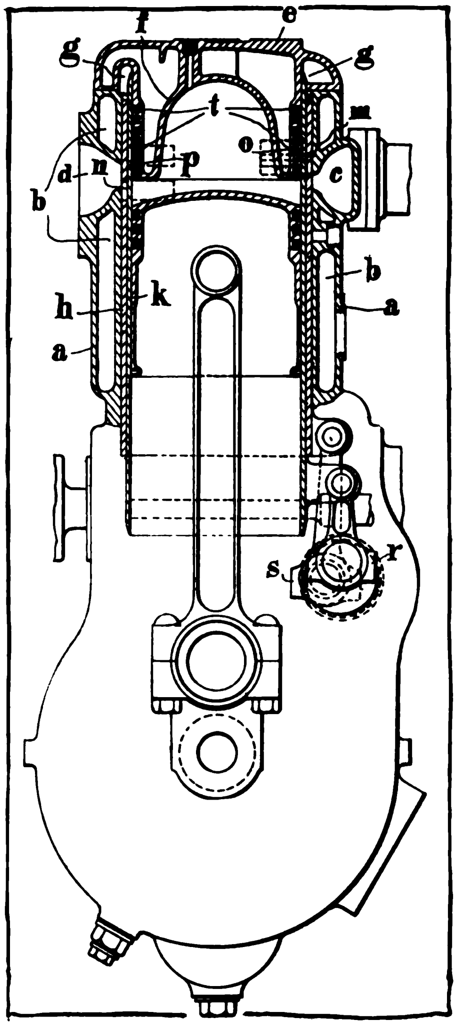


Fig. 4—Cross-section of the Knight motor as it was put into practice in the British Daimler plant

Popping in the carbureter is due primarily to the fact that the speed of travel of the incoming mixture is below the speed at which the flame propagates in the same. When the mixture is ignited in the cylinder of a motor it burns with a certain speed depending upon the proportion of gasoline to air, and also to the amount of the compression, conditions of scavenging and tem-

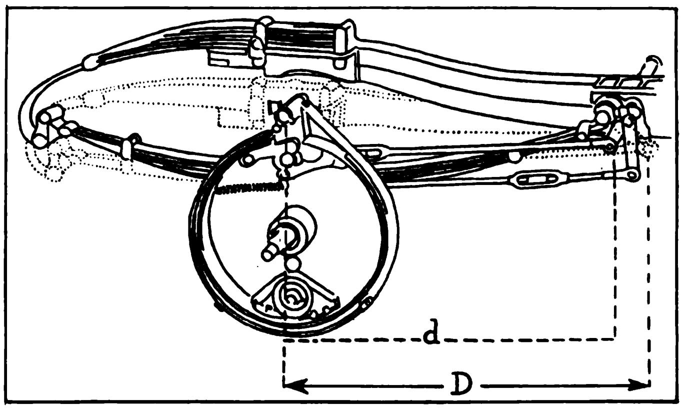


Fig. 5—Lever motion coupled up too short, so that brakes are thrown out of action when tonneau is loaded

perature. The speed at which the mixture passes through the intake depends first upon the depression, or difference in pressure, and second upon the size of the intake manifold. If the manifold is too large the speed of the gas will be so low, all other conditions fixed, that the flame will travel back into the carbureter, producing the phenomenon complained of. The way to overcome this difficulty is to use a manifold small enough in area to bring about the desired speed of travel of the gas in the direction of the cylinder. A way to reduce the tendency to this is to lower the inflammability of the mixture; this may be done by adding gasoline to the same. The latter may be accomplished by increasing the depression in the depression chamber of the carbureter, and this is brought about by reducing the quantity of auxiliary air admitted. But if the manifold is so designed that popping back takes place due to bad distribution, there are only two ways that we now think of for overcoming the trouble. The first remedy lies in the replacing of the defective manifold with one that is properly designed. The second remedy depends upon so timing the motor that there will be a definite lapse of time between the closing of the inlet and the opening of the exhaust valve. If the exhaust valve is closed 10 degrees after center, and the inlet valve is open 15 degrees after center, the difference represented by 5 degrees will be sufficient to overcome the trouble, it is believed. In addition to this timing remedy, it will be well to adjust the carbureter so that it will deliver a somewhat richer mixture than it does when popping occurs.

Don't

BEING STILL ANOTHER INSTALLMENT OF TERSELY-PUT ADVICE—THIS TIME DIRECTED TO THE PROSPECTIVE PURCHASER OF A CAR, AND THE READING OF WHICH MAY SAVE HIM TIME, TROUBLE AND MONEY

Don't make the mistake of examining every automobile manufactured if you only want to buy one.

Don't persuade yourself to believe that you can see so many things that you have no use for and then pick out the one idea that conforms with your needs.

Don't flatter yourself that you are so much smarter than anyone else as to permit you to enjoy many demonstrations and not have to pay for taking up the time of the many demonstrators.

Don't get the idea here that they will ask you for money; certainly not, but they will fill you so full of nonsense that you would not know a good automobile if it ran over you.

Don't measure the ability of an automobile based upon its high gear performance on a grade; it may be fitted out with a low gear ratio.

Don't decide as to the general ability of an automobile without observing its performance first on a level and then in hill-climbing work. If the car will travel fast on a level hard road and in addition to this quality has good hill-climbing ability, it is a sign of power and harmony.

Don't select the automobile that you are to pay good money for because it will go like the dickens on a billiard board or a boulevard; you might have to hire a horse to pull it up hill.

Don't figure out that the radiator is amply large for its intended purpose based upon your observation while the car is traveling fast; a good automobile can almost do without a radiator at the higher speed.

Don't forget that the ability of a radiator and the cooling system in general will best be brought out when a car is traveling on a long sandy road with the motor working at approximately full load and the sun beating down doing its prettiest.

Don't abandon the idea of finding out how good the cooling system is if a long sandy road on a hot day is not available. With the car standing at the curb and the spark retarded, the average poor radiator will throw up its hands.

Don't let the demonstrator persuade you to believe that the radiator is big enough if it offers all the evidences of a steam boiler blowing off.

Don't give up if the demonstrator who sold you a car was able to make it run to your satisfaction and you are not able to duplicate the performance; it merely goes to show that the demonstrator knew how to run the car—you don't.

Don't inflict your new-found trouble on your unprotected neighbors; they might want to go to Sunday-school. Anyway, if you persist in running your car on a retarded spark, the motor will overheat, but if you do not know what lubricating oil is for, the bearings will squeak. What you want is horse sense, not your neighbor's sympathy.

Don't race off to the sales agency and talk about being stuck after you buy a car and it fails to come up to your final expectation. Don't expect anything. Decide on what you want first, then buy the car.

Don't mistake a fine line of talk from an engaging salesman for chrome nickel steel in a crankshaft or other refinements in a car. Just keep in mind the fact that the salesman don't make the car.

Don't try to tell the maker of an automobile how to build it just because you want one. Put in your time finding the particular make that will do the work you have to perform.

Don't think you know more about it than the designer just because you read a technical paper; the paper may be barking up the wrong tree.

Don't overlook the fact that there are 360 degrees in a circle and a statement may be based upon the perspective as viewed from any one of these angles; this is the reason why a little knowledge is dangerous.

Don't jump to the conclusion that the cost of maintenance of a car will be low if the purchase price is high. The actual cost of maintenance is more likely to be in proportion to the square of the velocity of the car and substantially independent of the purchase price.

Don't buy a seven-passenger car before your family expands sufficiently to take up the reserved seats in the tonneau; your neighbors are mighty apt to fill the vacancies.

Don't imagine that an empty tonneau costs little or nothing; it is difficult to keep the rear wheels on the road when the car thrashes along at high speed under the influence of a heavy body that is not properly weighted down.

Don't forget that it is a costly expedient filling the tonneau even if it is the lesser of two evils.

Don't reach the conclusion that the carbureter is large enough for the intended purpose even if it does carburet at both high and low speeds. The carbureter might fail when the car is half-way up a long steep hill.

Don't assume anything. If the car you put your money in has no means for telling you how much lubricating oil there is in the crankcase, take all your chances in one direction only; keep putting in lubricating oil.

Don't use the Kentuckian's whiskey test as a means for determining the character of the lubricating oil you propose to use in your motor; it may look like oil, or it may smell like oil, and it might even taste like oil, but in spite of all these necessary qualifications it might act like trouble.

Don't experiment with lubricating oil; if the brand you are using proves to be efficacious it is your good friend—stick to your friends.

Kingston Carbureter

SECTIONAL ILLUSTRATION INDICATING RELATIONS OF PARTS: FLOAT IS CONCENTRIC; FLOATING BALLS METHOD OF REGULATING AUXILIARY AIR DEPICTED

JUST in proportion as the fuel problem becomes an issue, so does the problem of carburetion have to receive the attention that will bring the capability of the carbureter up to the more exacting requirement. There are other conditions that are slowly being recognized as of such influence that it will be to the point to discuss them and to try and form an estimate of their influence on the performance of motors and ultimately upon the automobile art.

As the number of automobiles in use increase, and the character of the skill of the owners thereof falls to lower levels, it is rendered more apparent to those who have to cope with the problems involved that greater effort must be made to simplify the equipment used, and by so doing compensate for the shortcomings of the users. That there is a falling off in skill, taking it under average conditions, is true, and this growing condition is ascribed to the fact that the major portion of the new additions to the ranks are men who know little or nothing about the mechanical problems involved in the make-up and maintenance of automobiles.

The time was when it seemed that the owners of automobiles would have to learn how to master the complex problems involved, but the whole situation was so much improved within the last few years that the real hope of betterment lies in another direction. Primarily, it would be a Herculean task to teach the better portion of 500,000 owners of automobiles how to do all the things that would have to be accomplished were it not for the improvements wrought, and the simplification of the automobile down to the level that makes it possible to place so complex a machine in the hands of the average man.

That carbureters represent much in the operation of a motor is a matter that is now well recognized, and in order to fully appreciate the questions of carburetion it will be necessary to digress a little and recount some of the more pressing demands. Taking the Kingston type of carbureter as the subject: using it to illustrate the points to be made, attention is called to Fig. 1, which is a section of the carbureter in which D is the primary air intake through which the initial air passes along to the depression chamber, by the nozzle, up to the mixing chamber above. The flow from the mixing chamber is impeded by the butterfly valve, and when the same is opened, the mixture flows past to C, which is the point of connection of the intake manifold, the same leading to the combustion chamber of the respective cylinders of the motor.

In the meantime the gasoline flows in through G into the float bowl when the float K lowers, there being a needle valve in the narrowed portion of the passageway, and as the depression is induced by the suction of the motor, the gasoline passes out of the float bowl to the nozzle. There is a needle valve A placed to alter the size of the nozzle and regulate the amount of gasoline that can pass out of the nozzle into the depression chamber under a given difference in pressure.

The mixture that is made by the flow of initial air past the nozzle in the depression chamber is too rich to be of service, and the next step in the process of carburetion is in the form of auxiliary air; this air is taken in through orifices, of which there are five; one of the orifices shows in section in Fig. 1 at L and the cover to the same is indicated as N at a point just over the ball. Referring to Fig. 8, the five covers over the same number of floating balls are indicated as B1, B2, B3, B4 and B5. In this figure the covers over the gasoline intake is indicated as G1.

In order that the reader will better understand the design and construction of the carbureter, reference will be had to reproductions of the carbureter. Fig. 4 shows the exterior of the carbureter looking at one side in which G1 is the gasoline intake, A2 is the fitting at the bottom for the primary intake, A1 indicates one of the auxiliary air intakes, and P1 is the mechanism for use in priming the motor if the occasion requires. Transferring the attention for the moment to Fig. 5, the letters of reference denote the following: A2 is the orifice of the primary air intake, B6 is the float bowl of the carbureter, G1 is the gasoline intake, A1 is one of the five orifices of the auxiliary intake, L1 is the lever placed to control the butterfly valve, and N1 is the exposed portion of the stem of the needle valve connected with the nozzle; this valve is manipulated by screwing it in to reduce the supply and out to increase the same. In order that the adjustment will stay permanent, a clamping screw is provided. Figs. 9 and 10 show several of the component parts of the carbureter and are offered for the purpose of acquainting the reader with the mechanical refinements that obtain in this work.

Necessities of the Occasion Discussed in Detail

If the reader can be brought to a good realization of the requirements and the methods in vogue for accomplishing them, the aim will have been accomplished. Take the needle valve for illustration: by referring to Fig. 2 the results obtained by manipulating the same will be understood. In this figure the ordinates read needle valve setting in degrees, and the abscissæ are plotted in terms of thermal efficiency. The particular motor was run at 1,000 revolutions per minute and the load was changed from 10 to 30 horsepower by 5-horsepower increments. The thermal efficiency was maximum when the least amount of gasoline was used, considering the delivery of the horsepower stated in each case. It will also be observed that the thermal

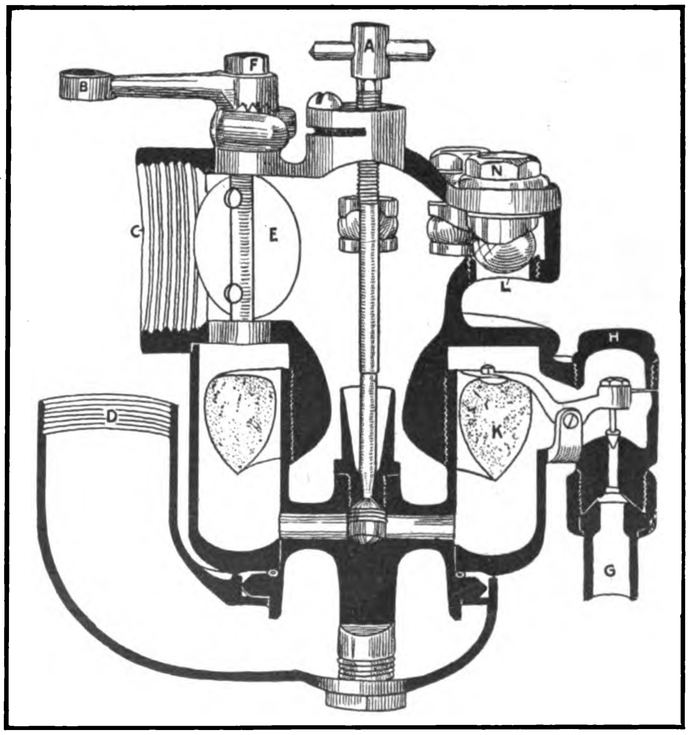


Fig. 1—Cross-section of the carbureter showing the primary intake, needle in the nozzle, floating balls, concentric float in the bowl, and method of adjustment

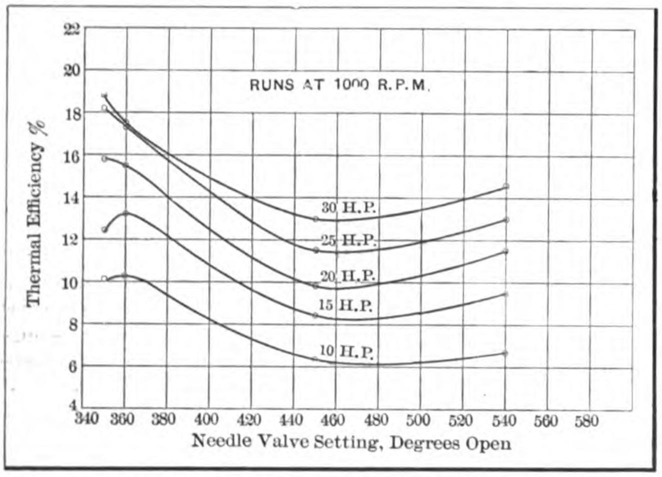


Fig. 2—Chart designed to tell the thermal efficiency of a motor running at different powers and a constant speed for several settings of the needle

efficiency was maximum at maximum loading of the motor.

The thermal efficiency for different loadings, at a constant speed and with 350 degrees of nozzle opening, according to the chart, may be repeated as follows:

THERMAL EFFICIENCY FOR DIFFERENT LOADS AT A CONSTANT SPEED

Horsepower with Nozzle at 350 Degrees Open	Thermal Efficiency in Per Cent.
10	10
15	12.3
20	15.89
25	18 12
30	18.83

The curves plotted for each horsepower output show a decreasing thermal efficiency as the nozzle is opened more, and in every instance the efficiency falls off rapidly as the quantity of gasoline is increased, which is what happens if the nozzle is opened more. One more point and this part of the subject will be passed: as the flow of gasoline is increased beyond a certain point, the thermal efficiency increases perceptibly, but the amount of this increase is not sufficient to be of any avail in every-day work; the best position of the nozzle is that which will afford the highest thermal efficiency, but the reason underlying this fact is not merely on account of the saving in gasoline that will be effected. It will be understood that gasoline, if it is fed into the cylinders of the motor in liquid form, and in excess, will "coke," and the serious trouble that follows the deposits of carbon over the combustion chamber surfaces will then have to be coped with. It is proper, therefore, to limit the flow of gasoline to that amount that will afford the highest thermal efficiency, independently of the fact that a little more might be obtained from the motor by enriching the fuel.

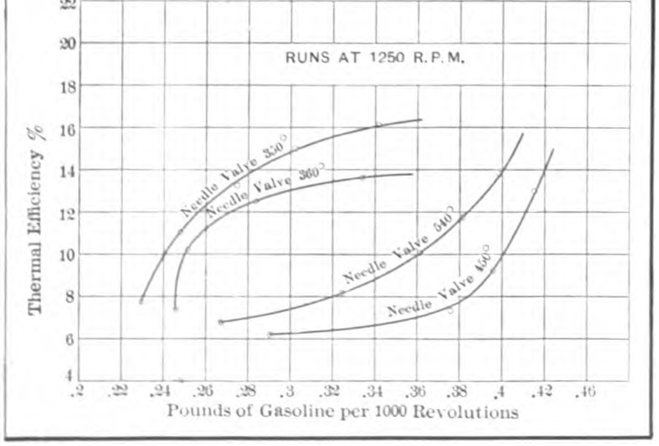


Fig. 3—Chart designed to show the thermal efficiency under different conditions of gasoline consumption at a constant speed

Referring to Fig. 3, another phase of this story will be recognized. In this chart the ordinates are plotted in terms of "pounds of gasoline per 1,000 revolutions of the motor" and abscissæ are plotted in terms of "thermal efficiency." In this case the speed of the motor was maintained at 1,250 revolutions per minute, and the needle valve was adjusted to 350, 360, 540 and 550 degrees; a run was made for each of these adjustments and the thermal efficiency was noted in each single instance.

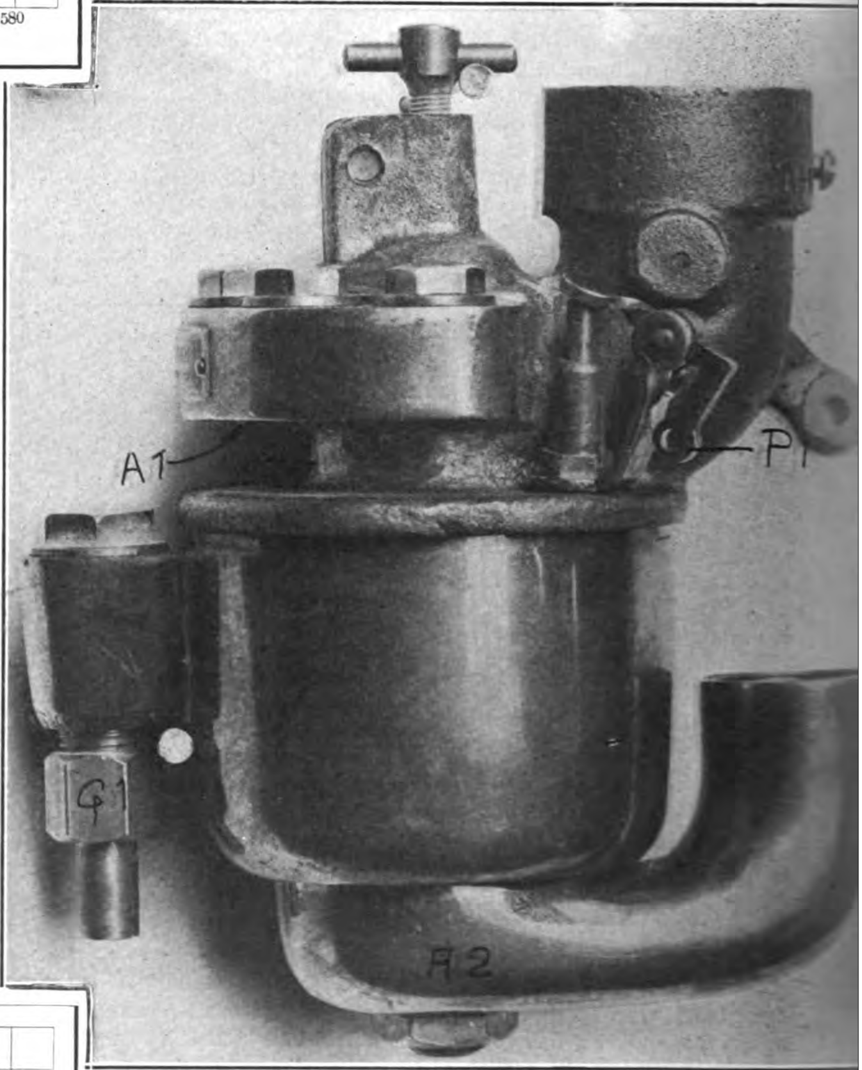


Fig. 4—Illustration of one side of the carbureter, showing the locati
the priming mechanism

The highest thermal efficiency was realized with the closest adjustment of the needle, *i. e.*, 350 degrees; this is as it should be, according to the information obtained in Fig. 2. With this close adjustment, the thermal efficiency was below 8 per cent. with the lowest power taken from the motor, and slightly above 16 per cent. with the highest register of power. The gasoline consumption of the motor advanced from 0.228 pounds per 1,000 revolutions with the lowest power, to 0.34 pounds of gasoline per 1,000 revolutions when the motor was delivering maximum power. This shows that the increase in gasoline that is necessary for good performance may be expected to take place automatically within limits. The second curve, with the needle turned to 360 degrees, shows that the thermal efficiency increases rapidly at first, but falls away, never reaching the level that obtains with the nozzle turned to 350 degrees. This performance offers a bare insight into the fact that if the motor is to operate at low power, slightly more gasoline will be worth considering, but under the conditions that obtain in automobile work, flexibility and a wide range of performance are assets that cannot be disregarded. Glancing at the curve with the needle turned to 540 degrees, it presents the astonishing condition which is represented by a reversal of the curvature as compared with the curvature when the nozzle is turned to a maximum of 360 degrees. The 450 degree position of the needle valve is the worst of all. This is further evidence of the fact that carbureters are very prone to dead points in their performance, and how to eliminate these dead points is one of the serious problems to be coped with by makers and autoists.

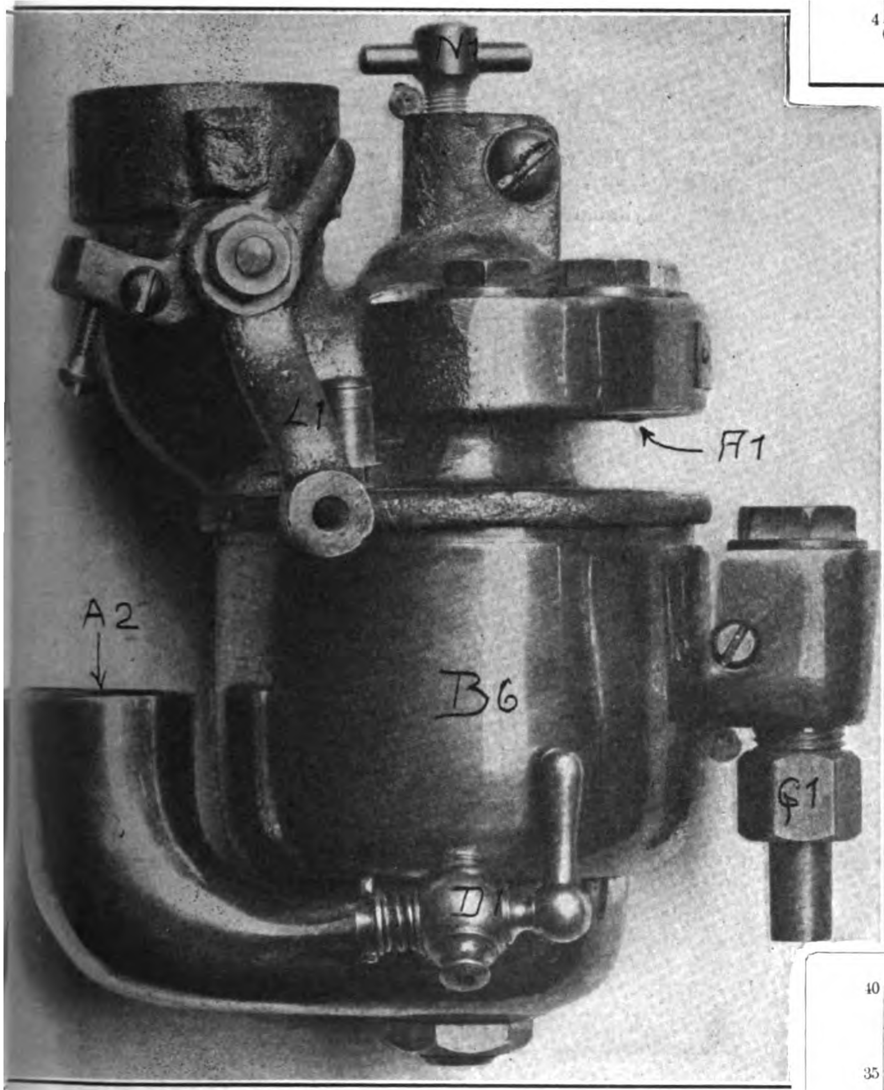


Fig. 5—Illustrating the other side of the carbureter and the location of the butterfly valve lever, draincock, and needle valve adjustment

Referring to Fig. 6, which is a chart designed to show the thermal efficiency and delivered horsepower when the motor is running at 1250 revolutions per minute, and the needle valve is given positions represented by 350, 360, 450, and 540 degrees of opening, this chart is corroborative of the information afforded in the charts Figs. 2 and 3. In this case the horsepower is plotted as ordinates and the thermal efficiency is given value as abscissa. Here again it is indicated that the highest thermal efficiency comes with the needle valve given the least opening, *i. e.*, 350 degrees. It is also shown that the thermal efficiency is lowest when the horsepower output is lowest, and at 350 degrees opening of the needle, the following is approximately true:

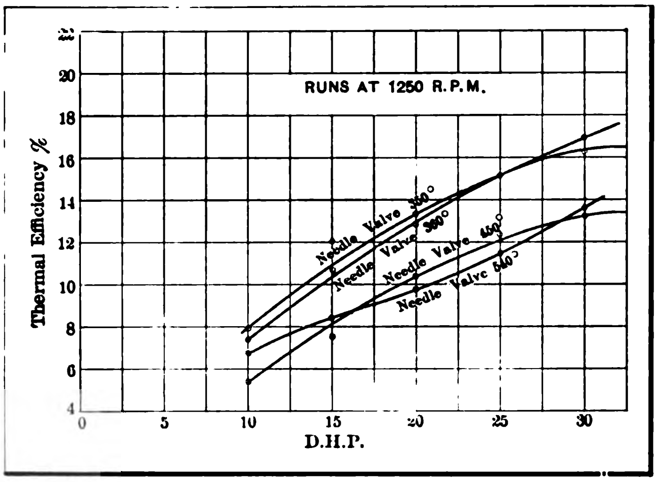


Fig. 6—Chart constructed to show the thermal efficiency for different needle valve settings and varying power with the motor running at a constant speed

HORSEPOWER AND THERMAL EFFICIENCY AT A CONSTANT SPEED

Delivered Horsepower at 1250 Rev. Per Minute	Thermal Efficiency in Per Cent.
10	8
15	10.45
20	13.56
25	15.2
30	16.21

An examination of the curve plotted for 360 degrees shows that the thermal efficiency is lower at all ratings up to 25 horsepower. Beyond 25 horsepower the slightly increased flow of gasoline adds somewhat to the thermal efficiency; the difference is not great, however. It is only when the needle valve is given a twist of 450 degrees that the thermal efficiency falls off considerably, and the 540 degree position of the needle valve affords varying results interlaced with the 450 degree position.

At all events, a study of these charts shows the interrelations of power, speed, and thermal efficiency, and points the way to proper carburetion. It is obvious that the auxiliary air control must be in precise accord with the requirements as measured by the flow of gasoline if the mixture is to be efficacious for the purpose. It is recognized that the amount of energy which will be taken into the cylinder of a motor is in direct proportion to the weight of gasoline sucked in, but this in itself is of

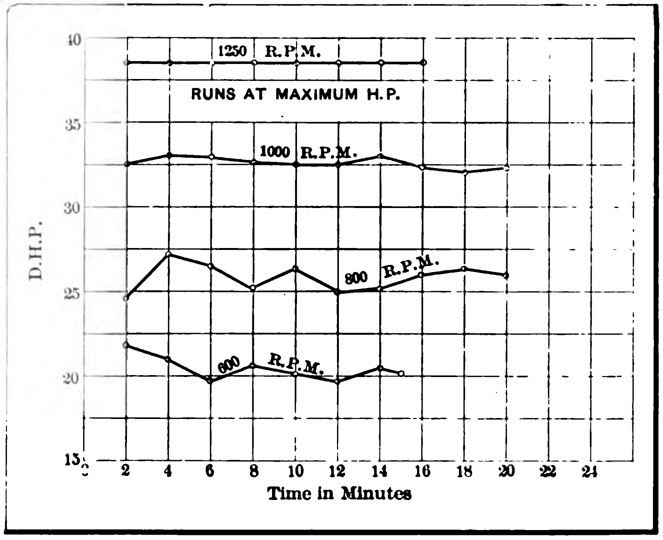


Fig. 7—Chart designed to show the constancy of the power delivered at different speeds in time

small avail. The energy must not only be taken into the cylinder but it must be in an acceptable form. To be in this form it is necessary that 8,000 volumes of air shall have intermingled with it one volume of (liquid) gasoline, the same to be vaporized, and so thoroughly intermingled with the air that during the process of combustion each molecule of hydrogen or carbon will be introduced to its affinity, oxygen, and the products of combustion resulting will be in the form of water and carbonic acid plus the regular quota of nitrogen, in the absence of unburned carbon, or any of the other compounds having a fuel value.

Fig. 7 is a chart which was designed to show the performance of a motor at the various speeds, and the variations in the horsepower at the speeds, also the effect of the malperformance of the carbureter, ignition, etc. At 1250 revolutions per minute the particular motor delivered 37.6 horsepower uninterruptedly and without variation during the time of the test. When the speed of the motor was dropped to 1,000 revolutions per minute, the power was substantially 32.5 horsepower, but there were a few variations above and below this level during the time of the test. At 800 revolutions per minute, the lowest point in the power curve was 24.5, the highest point 27.2, and there were considerable variations in the power delivery during the time of the test; but when the speed was dropped to 600 revolutions per minute, the lowest delivery was slightly under 20 horsepower; the maximum was about 22, but the variations were sharp and relatively wide. When a carbureter is doing exactly what is required from the best point of view, the performance will be in the form of a straight line as here shown for 1250 revolutions per minute, but when the carbureter falls below this fitting requirement and reaches the level as here indicated at 600 revolutions per minute, flexibility and range are scarcely normal expectations.

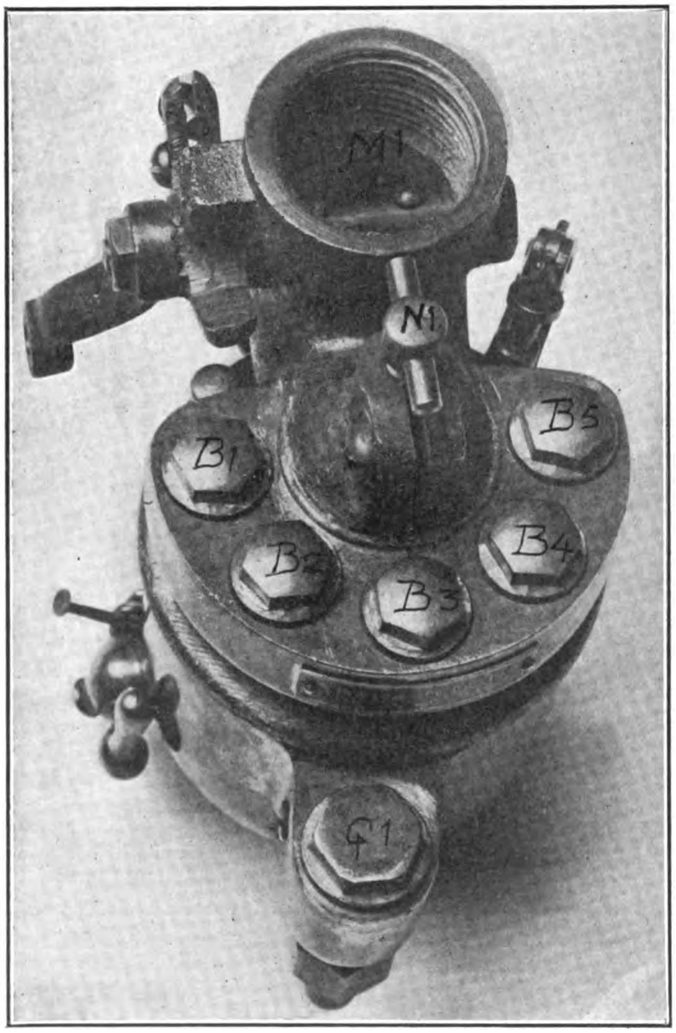


Fig. 8—Looking down upon the carbureter, showing the orifice for connecting the intake manifold and the caps covering the floating balls

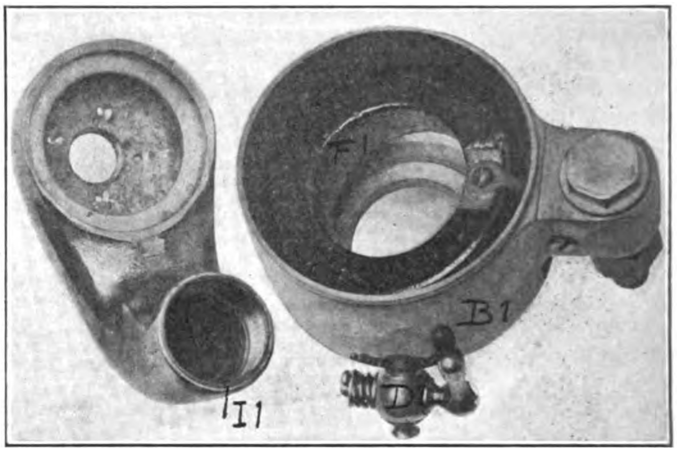


Fig. 9—To the left the primary intake casting, to the right the float chamber, with the concentric float in position

Since it is admitted that the difficulties involved in fixing the flow of gasoline out of a nozzle are few and readily coped with through the good office of a needle valve or in other suitable ways, the troubles which bring on lack of flexibility and crankiness of performance must be due to lack of proper proportion of the interrelating functional members.

The particular point involved in the construction of this carbureter that has to do with the softening of the performance and the smoothing out of the variables, is wrapped up in the plan of employing bronze spheres to obstruct the flow of auxiliary air, excepting in so far as the spheres are lifted by suction, and the air flows in through the openings thus afforded, under the impetus of a difference in pressure as represented by the depression within the mixing chamber overcome by the atmospheric pressure of 14.7 pounds per square inch.

These balls are prevented from departing from their position of vantage by the plugs in Fig. 1, which have concave ends conforming to the curvature of the spheres and which are screwed down so closely that the spheres are permitted to lift off of the seat a predetermined distance. The spheres are regulated as to weight by selecting materials of the right specific gravity, so that they lift when the depression is so regulated as to demand the presence of auxiliary air. The five spheres are of one diameter, and as the material is the same in each of them, and of same weight, they do not lift simultaneously under a given depression because they do not all occupy positions of vantage in the stream of inrushing primary air, hence there is

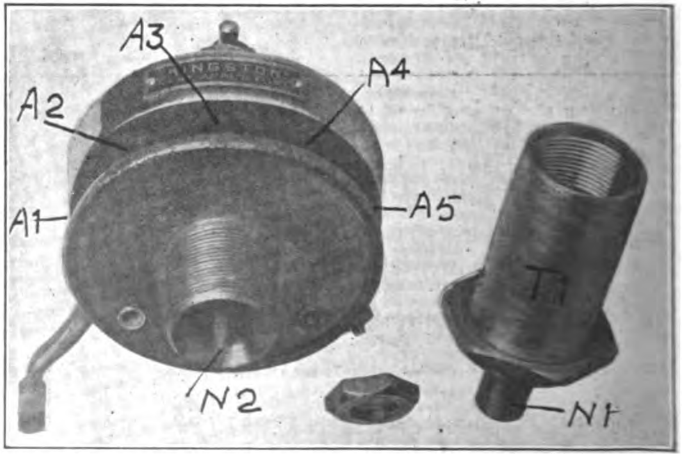


Fig. 10—To the left, showing the floating ball housing and the method of connecting the same to the lower half; to the right, the accommodation casting by means of which the two parts are joined

a variation in the depression, considering it locally, sufficient to permit of taking advantage of a difference in the time of the lifting of the several balls, so that great flexibility of the motor performance is to be relied upon, and finally it is worth while remembering that the balls are constant as to weight, cannot vary in the amount of the lift and are free from any mechanical incongruity such as would tend to alter their ability to function in service, as the result of wear, atmospheric conditions, or changed environment. It is claimed, therefore, for this type of carbureter, that having fixed the proper sizes of the balls, the right number, and the position that they should occupy, on a laboratory basis, the experimental phase of this situation is done for on a basis of finality, leaving nothing for the automobilist to adjust in practice, excepting to coax his motor up to its right performance by altering the flow of mixture from the carbureter through the combustion chamber, by changing the position of the butterfly valve E, Fig. 1, which is a matter of altering the angular position of the lever B, the same to be connected up with an accelerator pedal which may be located at a convenient point.

G. & A. Carbureter

DESCRIPTION OF AN AUTOMATIC ADJUSTMENTLESS CARBURETER OF FRENCH DESIGN WHICH IS BASED ON THE PRINCIPLE OF THE VENTURI TUBE

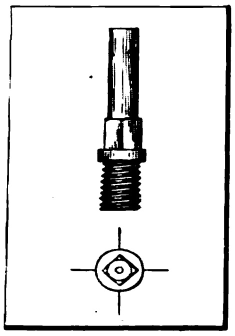


Fig. 1—G. & A. carbureter jet

IT has been the aim of designers of carbureters to evolve something that is entirely automatic, requiring no adjustment whatsoever, consequently having nothing to get out of order.

Messrs. Grouvelle & Arquembourg, of Paris, have for many years been gaining a reputation with their carbureter on famous racing cars, and for this reason they have made a more careful and scientific study of this matter. In fact, these studies date back to the very early days of the automobile. Their experiments have been thorough and extensive. In all this time data has been collected and tabulated on carbureters of several of the most successful cars, until to-day the product of all this experience is a carbureter without an adjustment.

Grouvelle & Arquembourg were among the first to manufacture radiators for the different well-known cars, such as Panhard, Mors, Darracq, etc. The distinctive features of their carbureter are the shape of the choke tube, the ball cage air valve and position of the jet.

The Venturi tube, which is the basic principle of the carbureter under discussion, derives its name from an Italian physicist who became known in 1791. Experiments show that Venturi invented nothing, but rather controlled a fact known to the Romans. A concession of water in ancient Rome was given according to the diameter of pipe and was so charged for, but the defrauder, to increase the amount of water supply, placed a cone in the outlet. Venturi in his book on Industrial Physics says that the supply of air through an outlet is made of two cones, one convergent of 30 degrees and the other divergent of 7 degrees; then the quantity of air going out is four times greater than if the outlet was plain.

Piston displacement was taken as a basis from which all calculations were made, and although many criticisms may be offered for using this as a starting point, the contentions to the contrary are as follows:

It has been shown by many eminent engineers, and notably by Arnoux in France, that piston speeds have practically reached an upper limit; in other words, that piston speed and maximum power are the same, regardless of the stroke. It is, therefore, very reasonable that piston displacement should be taken as a basis, for in ordinary practice it is the displacement of the piston in the main which determines the gas speeds in the carbureter passages.

It has been shown that when any fluid passes through a pipe of variable section the quantity passing any given section in a given time is the same; such being the case, the velocity of the fluid in the various sections is inversely proportional to the areas of the sections. Hence, it is evident from the foregoing considerations that the pressure is greatest at the largest section and least in the smaller. A practical application of this principle was made in the construction of the Herschel-Venturi water meter, and in later years this principle has been applied to the curbureter design.

To thoroughly understand the principle and appreciate the advantages of the Venturi tube in the carbureter design we will consider Fig. 6. The form of discharge tube here shown is interesting in that the discharge is greatly increased in the addition of the divergent nozzle at the outlet end, for it is found that the velocity of flow in the throat at (a) is greater than that produced by the head (h). When a pressure gauge is placed at (a) the pressure is found to be less than atmospheric; in fact the fluid is discharging into a partial vacuum, and the velocity at (a) is due to head (h), plus the head due to the vacuum.

An interesting experiment, which shows this phenomenon very strikingly, may be made by taking a glass tube three-quarters of an inch bore, and drawing it to a gradual waist of about one-twentieth of an inch diameter at the center. It is found that when water is forced through the tube at high velocity the pressure is so reduced at the waist that the water boils and hisses loudly—a phenomenon heretofore observed under certain circumstances in the action of carbureters, but one which has not been satisfactorily explained before, as far as can be learned.

In a case that came under observation when a Venturi car-

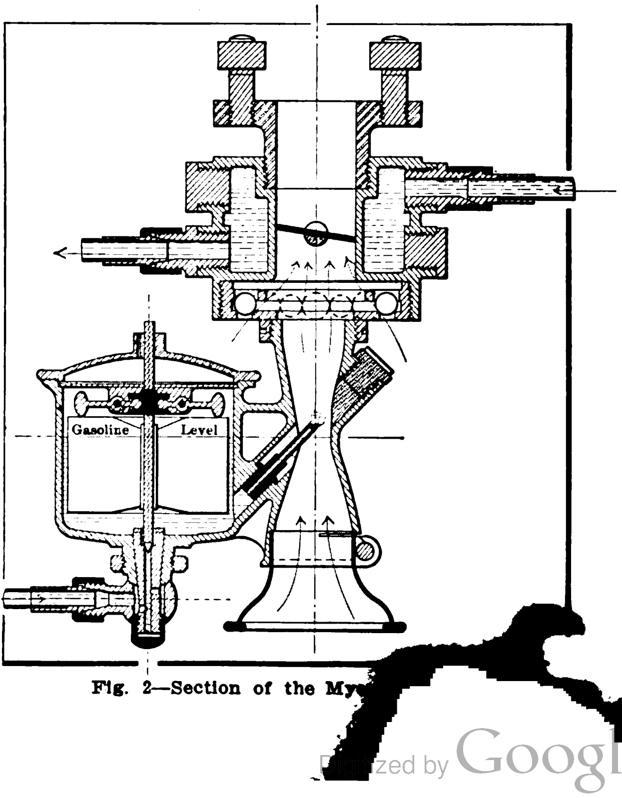


Fig. 2—Section of the My

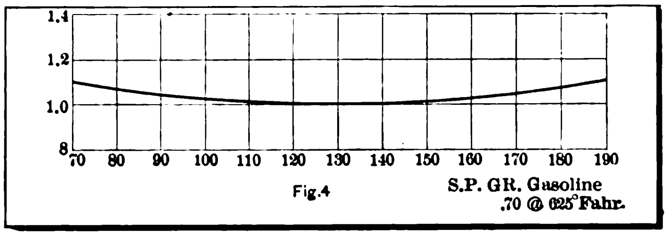


Fig. 3—Diagram showing gasoline consumption in relation to temperature of carbureter jacket

bureter was being tested the hissing was so loud as to be disagreeable. By making the "upstream" end smaller, thereby decreasing the ratio of upstream area to the throat area, the hissing practically ceased. Of interest is the fact that the gasoline in the Venturi throat is actually undergoing ebullition at reduced atmospheric pressure, and this is one of the many causes operating to effect homogeneity of mixture.

The employment of the Venturi possesses the following important advantages: Homogeneity of mixture, as explained above; reduction of wire drawing to minimum; compactness; light weight; ease with which the mixing chamber may be jacketed by water; mixing chamber may be placed in any plane, thus adapting it to any motor design, no adjustable or movable parts.

Mathematical Considerations Regarding the Flow of Fluids in a Venturi tube.

If we consider that there exists a certain pressure head, say "h," causing a flow of liquid in the Venturi tube, it will be seen from Fig. 9 that the principles stated above regarding the flow of a fluid in a tube having various cross-sections A and A' that at (1) the pressure head is

$$h_1 = \frac{V_1^2}{2g}$$

and at (2) the pressure head is

$$h_2 = \frac{V_2^2}{2g}$$

It is clear then that the loss of head between (1) and (2) or the head on the Venturi is given by

$$h = h_2 - h_1 = \frac{V_2^2}{2g} - \frac{V_1^2}{2g} = \frac{V_2^2 - V_1^2}{2g}$$

It will be recalled that the velocities in the different sections are inverse to the areas of these cross-sections; hence we have

$$V_2 = \frac{A_1}{\sqrt{A_1^2 - A_2^2}} \times \sqrt{2gH}.$$

While the velocity of the upstream end of the tube is given by

$$V_1 = \frac{A_2}{A_1} V_2, \text{ and } V_1^2 = \frac{A_2^2}{A_1^2} V_2^2.$$

Now

$$H = \frac{V_2^2 - \frac{A_2^2}{A_1^2} V_2^2}{2g} = \frac{\left(1 - \frac{A_2^2}{A_1^2}\right) V_2^2}{2g}$$

$$= \frac{\frac{A_1^2 - A_2^2}{A_2^2} V_2^2}{2g};$$

hence

$$V_2^2 = \frac{2ghA_1^2}{A_1^2 - A_2^2},$$

from which we find that the velocity at the throat is given by

$$V_2 = \frac{A_1}{\sqrt{A_1^2 - A_2^2}} \sqrt{2gH}.$$

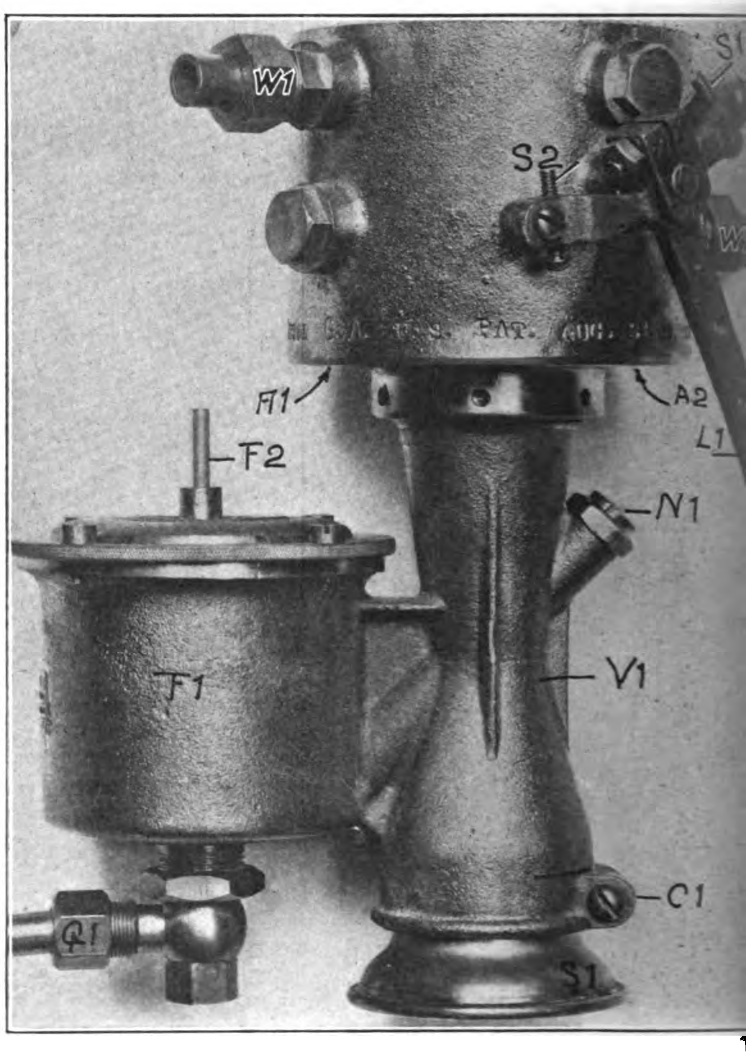


Fig. 4—Throttle side of G. & A. carbureter: S1, adjusting screw for op sition of throttle; S2, adjusting screw for closed position of throttle; W1, for water circulation round water jacket; W2, inlet for water circu round water jacket; A1, ball valves for supplementary air at high speed ball valves for supplementary air at high speeds; L1, lever operating th N1, spray cone, which can be removed to take out jet; S, brass cove with covered bottom; C1, release screw for same; F1, float chamber; F2, needle G1, gasoline intake.

$$\text{Throat ratio} = \frac{A_2}{A_1}.$$

The throat ratio for G. & A. carbureters has been taken as 1:4; we then have

$$\frac{A_1}{\sqrt{A_1^2 - A_2^2}} = \frac{4}{\sqrt{4^2 - 1^2}} = \frac{4}{\sqrt{15}} = 1.0328.$$

Hence

$$V_2 = 1.0328 \sqrt{2gH}.$$

From this expression we have

$$V_2^2 = \frac{2ghA_1^2}{A_1^2 - A_2^2} = \frac{2gh}{\frac{A_1^2 - A_2^2}{A_1^2}} = \frac{2gh}{1 - \frac{A_2^2}{A_1^2}}$$

$$= \frac{\frac{2gh}{1 - A_2^2}}{A_1^2}$$

and

$$2gH = V_2^2 - \frac{A_2^2}{A_1^2} V_2^2.$$

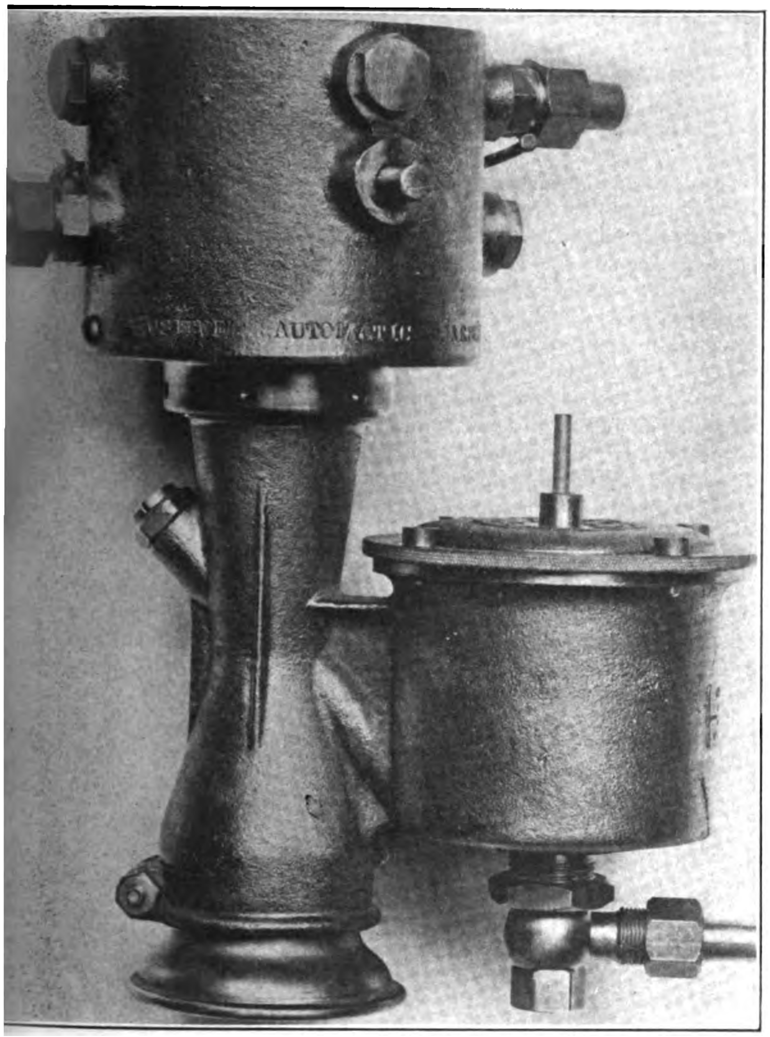


Fig. 5—Opposite side of G. & A. automatic carbureter

hence

$$V_2^2 = 2gH + \frac{A_2^2}{A_1^2} V_2^2$$

$$= 2gH + V_1^2$$

$$= 2g\left(H + \frac{V_1^2}{2g}\right)$$

and

$$V_2 = \sqrt{2g\left(H + \frac{V_1^2}{2g}\right)}$$

Thus it is seen that the velocity at the throat will be that corresponding to the head on the Venturi plus the head corresponding to the velocity of approach in (1). By velocity of approach

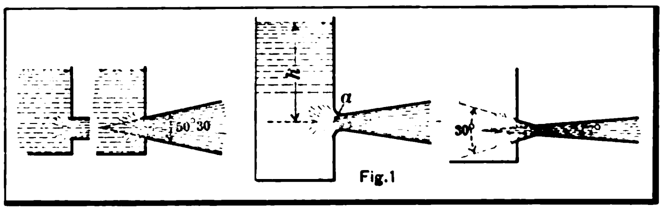


Fig. 6—Example of discharge tube with convergent cones

we mean the additional velocity gained by the moving liquid prior to reaching the throat. From measurements made upon carbureters which give very good speed torque characteristics, the following formulæ for the design of the Venturi are derived.

Referring to Fig. 7—

Let V = piston displacement in cubic centimeters,

d_1 = diameter in centimeters of Venturi throat,

d_2 = diameter in centimeters of Venturi facing upstream,

d_3 = diameter in centimeters of Venturi facing downstream,

A_1 = area in square millimeters of Venturi facing upstream,

A_2 = area in square millimeters of Venturi throat,

A_3 = area in square millimeters of Venturi facing downstream,

L = over all length in centimeters,

t = thickness of tube in millimeters; then the following formulæ give excellent results:

$$\frac{V}{A_2} = 496$$

$$A_2 = \frac{V}{496}$$

$$d_2 = \sqrt{a_2} \times 1.128$$

$$d_1 = \sqrt{a_2} \times 2.584$$

$$d_3 = d_1 - .5\text{cm.}$$

$$A_1 = A_2 \times 5.42$$

$$L = 6.05 \times d_2$$

$$t = 1.5 \text{ to } 2.5 \text{ m/m}$$

Heat Jacketed Carbureters

From tests that have been carried out it seems that the fuel consumption decreased with an increase of jacket temperature for a given output, but only up to a certain point, after which an increase was observed. The most effective temperature seems to be about 110 deg. Fahr.

During these tests it was incidentally found that in order to keep the Venturi tube of the carbureter at 110 deg. Fahr, supplying mixture to a motor of 100 m/m (3.93 in.) x 112 m/m (4.40 in.) it required an expenditure of 45.5 B.T.U. per minute, or approximately 1 horsepower. The motor ran at 1300 revolutions per minute and consumed 1.1 pints of gasoline per horsepower-per hour. Water jacketing the carbureter is, therefore, instrumental in effecting fuel economy and doing a portion of the work of the radiator. The results of these tests are shown in Fig. 3.

Calculation of Spray Nozzle Orifice

It was at one time thought that the size of the orifice in the spray nozzle could not be calculated, except by a lengthy process of trial and error, but observation of the orifices having the same shape proved that these may be calculated when the Venturi or throat area was determined.

When we deal with a gaseous combustible the determinations of the sections for air and combustible to pass weights of materials in proper

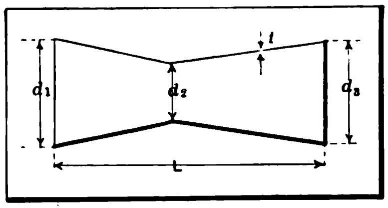


Fig. 7—Diagram of Venturi tube

proportion are given by the following equation, according to Krebs:

$$C = \frac{s\Delta\sqrt{2gH - \frac{D}{\Delta}}}{sd\sqrt{2gH - \frac{D}{d}}}$$

and simplifying

$$C = \frac{s\Delta}{sd}\sqrt{\frac{d}{\Delta}}$$

where

D = density of water,
Δ = density of air,
d = density of combustible,
S = section or area for entrance of air,
s = section or area for entrance of combustible,
H = pressure in millimeters of water,

the ratio between the two areas remains constant, no matter what vacuum is produced by the motor. When, however, the combustible is in the form of a liquid experience shows that the flow of liquid does not follow the air flow, and certain corrective factors must be introduced due to

(a) Differences in level existing between liquid in float and that in the nozzle,

(b) The necessary effort required to overcome the capillary attraction between liquid and nozzle, including the surface tension.

It has been found that when using the Venturi form of mixing chamber and a nozzle having the shape and outside dimensions shown in Fig. 1, the area of the Venturi throat and the nozzle orifice area are connected by the following relation:

$$\frac{S}{s} = 159.$$

Where $S = A_2$,
s = spray jet orifice area.

It is now easy to calculate the size of the spray nozzle orifice by the equation:

$$Sd = \sqrt{s \times 1.128} \text{ in m/m},$$

where Sd = diameter of the orifice.

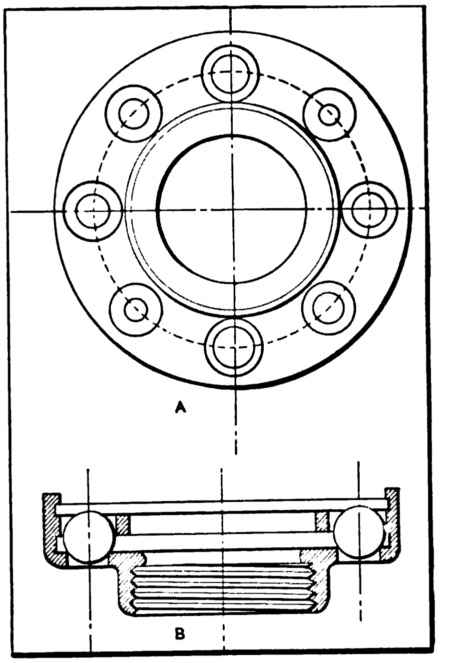


Fig. 8—(a) Top view of supplementary air intake; (b) side view of same

If the shape shown in Fig. 1 is deviated from, the above formula does not apply, for experiments show that the discharge coefficient varies with the shape and size of the nozzle; indeed, recent experiments made show that the discharge coefficient varies also with the variation in bore when the head is constant; this might be expected, since the effect of surface tension and wall friction is smaller in larger nozzles.

The exact size of the spray nozzle orifice also depends on the fitting and workmanship of each motor, as imperfections in igniters, pistons, valve stems, etc., introduce leaks which have to be taken care of by using a little larger jet.

The jet on the G. & A. carbureter can be very easily taken out by undoing the nut N1 (Fig. 4) and using a special tube wrench supplied with the car. It will be noticed that the jet is placed obliquely (Fig. 2), the gasoline atomizing in a conical shape in the smallest part of the tube where the suction is greatest.

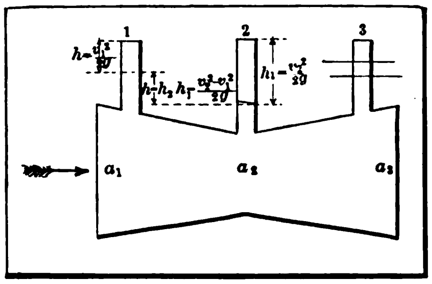


Fig. 9—Venturi tube with various cross-sections

Calculation of Size of Supplementary Air Ports

The flow of liquid from the spray nozzle orifice does not follow the air flow; in fact, as the speed of the motor increases, the liquid from the jet, in virtue of its inertia, flows more nearly in uniform stream, and means must be taken to vary this flow.

In practice it is comparatively simple to control the liquid flow by altering the vacuum or suction by causing an additional air supply at the downstream end.

It will be noticed in Figs. 8a and 8b that the auxiliary air is controlled by a series of bronze balls in a cage placed at the downstream end. These bronze balls are of various sizes and weights, and the ports also vary in diameter. Thus it will readily be seen that the bronze balls will lift successively and progressively, allowing the pressure at the upstream end to be relieved. Each ball has been calculated to the resistance of the port which it controls. Thus it has all the characteristics of the spring valve, but never varying in any change of temperature, giving also a positive mixture at any speed of the motor. This action also answers the purpose of a mechanical turbine.

The suction caused around the nozzle of the carbureter may be kept within the limits necessary to produce a uniform combustible mixture at all speeds by supplying auxiliary air through ports, the areas of which are determined from the equation developed by Krebs. The equation is as follows:

$$S = sC\sqrt{\frac{d}{\Delta}}\sqrt{\frac{H-h}{H}} - A_2.$$

Where Δ is the density of air,
d is the density of combustible,
S is the total auxiliary air area,
s = area of spray nozzle orifice,
H = depression produced by aspiration of motor,
A_2 = Venturi throat area,
h = a factor depending on the difference in level which exists between the liquid in the float chamber and nozzle; also on the necessary effort to overcome the capillary attraction of the nozzle.

A. J. Myers (Inc.), of 244 West Forty-ninth street, manufacture the G. & A. carbureter in New York City, and have delivered several for submarine work. From tests carried out with several 250-horsepower motors it is possible with the G. & A. to run as slow as 90 revolutions per minute and as high as 1,200 revolutions per minute. These submarines are fitted with Jencick motors having eight cylinders of 7-inch bore and 8-inch stroke; the size of the interior of the G. & A. used is 4 inches. Twenty-six of these have been ordered for the United States Government.

Protect the Magneto and Save Trouble

Always keep the magneto covered with a leather or vulcanite protector as it will exclude dust and flies and rain that find their way to this valuable part of the car equipment.

Digest

EXTRACTS ON TECHNICAL LINES FROM FIFTY FOREIGN PAPERS—DEVELOPMENT OF THE ELECTRIC FURNACE WITH "WHITE COAL"—SAVING IN TIRE MAINTENANCE—CAUSE OF REFINEMENT OF STEEL—SPREAD OF AUTOGENOUS WELDING

"White coal" and the electric furnace are entering into combinations in Europe which are attracting great attention the technical world and seem to have a tendency to wipe out the national boundaries of important industries, causing them to move to wherever the desired combinations of "white coal" and shipping facilities may be obtained in most liberal measure. The coast of Norway, where countless millions of horsepowers are stored in rapid rivers in the immediate vicinity of deep water ports which are open practically all the year round, seems to be the most favored locality and bids fair to become the seat of industries rivaling or exceeding in magnitude those clustered around Niagara Falls. With the electric furnace applied to steel making and with iron ore of excellent qualities available from Swedish and Norwegian mines, the outlook offers food for reflection also among automobile manufacturers. The manufacture of nitrates used for fertilizing purposes and of nitric acid is one of the new industries located largely in this region, though two large companies have been formed to work on the same general plan at Johannesburg, South Africa, and an Austrian company located at Patsch, near Innsbruck, has parted with rights under its patents to the French company, "La Nitrogène" which contemplates another large installation of this industry, also with water-power, in France. Briefly, the industry consists in robbing the atmosphere of its nitrogen by means of an electric arc furnace which shatters the air into its constituent parts. The Norwegian Nitrogen Company, capitalized at 41 million francs, uses for this purpose 40,000 horsepower taken from the waterfall Svaelgfos at Notodden, Norway, and 15,000 horsepower from Lienfos, another cataract near by. The company's latest public statement shows that a large profit has been earned almost since the inception of the work in 1908, and the company has now taken over a larger waterfall called Rjukan and is arranging to utilize 220,000 horsepower from this source for the German chemical factories of Saaheim. It has also acquired Wamma, Matre and Tyrin, three other "white coal" supplies, and in 1914 will have 500,000 horsepower near tidewater to offer manufacturers at a price of about $40 per horsepower per year. The cost to the Norwegian company is said to be less than $8. The method developed by Birkeland and Eyde for taking nitrogen from the air is of general interest, inasmuch as the heat of an electric arc is applied to a large surface. To this end, two electrodes, consisting of water-cooled copper tubes with closed ends, are placed in a horizontal plane and an arc is produced between them by a 5,000-volt alternating current. At right angles with the electrodes in the same horizontal plane there is placed an electromagnet excited from direct current. The electromagnet deviates the arc into a vertical semi-circle alternately above and below the horizontal plane, and if the alternation is sufficiently rapid the result is a large electric flame half over and half under the electrodes. In practice, the flat electric flame disk is two meters in diameter, and the air carries this flame with it into the furnace and is heated by it to 3,000 deg. centigrade. A considerable portion of the air is thereby split into nitrogen and oxygen, and by rapid cooling these two elements are prevented from again uniting. Schoenherr, one of the engineers of the Badische Anilin & Farbenfabrik (lately much mentioned in connection with Friederich Bayer's new process for the synthetic production of rubber), has also developed an electric furnace for taking nitrogen from air, and this is used concurrently with the Birkeland type at the Norwegian works, and a third method is that invented by Pauling in 1904, used in Austria and now to be used in France. One received a very peculiar impression, says the author, in approaching one of these noiseless factories, which work without raw material, without smoke and almost without workmen. Only electric current, air and water enter into the buildings and none of these elements in a very modern production is visible to the eye. Yet the output reaches high into the thousands of tons annually.—*Mem. et Trav. des Ingénieurs Civils de France,* July.

In occasional dealings with engineers from France it may be convenient to possess a copy of the *Annuaire des Ingénieurs de France,* 1910, 600 pages, published by J. Loubat & Company, Paris, price 5 francs, in which book, just out, are listed all engineers graduated from the technical schools of that country.

That there is a saving in the maintenance cost of pneumatic tires amounting to 15 per cent. by the use of wire wheels instead of the customary wooden wheels for automobiles is said by C. Faroux to be a contention capable of verification in practice; that is, the author maintains that the economy is indisputable, and he estimates it from the data at his disposal at about 25 per cent.—*La Via Automobile,* August 27.

The Road Congress held this year at Brussels passed definite recommendations which had been worked out by the technical commission of the Automobile Club of France, with regard to the maximum speeds at which different classes of automobile pleasure and utility vehicles can be considered as not injurious to road surfaces and also with regard to the width of tires required for different loads and constructions. The details as given seem to represent a compromise between the interests of the automobile industry and those of the road authorities.—*La France Automobile,* August 27.

Owners of an electric furnace of 150 kilowatts, in Germany, wished to ascertain the heat losses due to radiation and thereby the caloric efficiency of their plants. For several days a bath was maintained at a constant temperature of 1250 to 1260 degrees centigrade, and this required the energy of 33 kilowatts. The thermic efficiency at 1250 degrees was thus 150 minus 33, divided by 150, or 78 per cent. At 1425 degrees the efficiency was similarly found to be 74 per cent. In order to reduce these losses due to radiation of the walls, double walls were built around the furnace and in the space between the inner and outer walls gas was burned to keep the walls hot. Apparently the object was to secure an equable temperature throughout the whole mass of molten metal. Trials with much larger furnaces built on the same plan succeeded perfectly.—*Jour. du Four Electrique,* Aug. 1.

"Internacional Matematikal Lexico," by Louis Coutural, 36 pp. G. Fisher, publisher, Jena, Germany, price 1.50 mark, is a pamphlet in "ido" language, giving the equivalents of all mathematical terms in "ido," English, French, German and Italian.

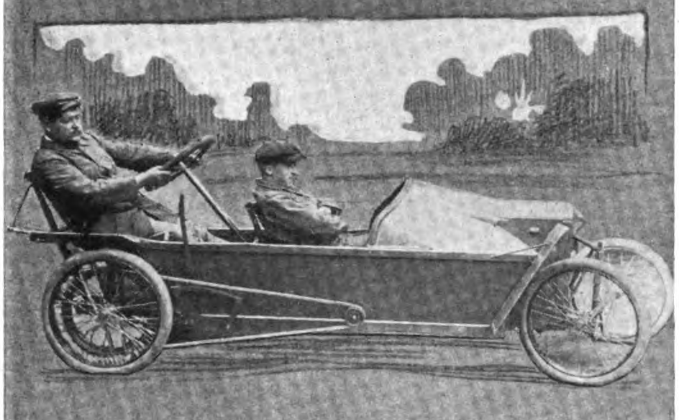
Details of temperature measurements in Nathusius 5 1-2 ton steel furnaces given by Prof. Neumann of Darmstadt disclose heats scarcely higher than those employed in the Siemens-Martin basic process. The well-established refining effects of the electric melt must, therefore, be attributed rather to a non-oxidizing atmosphere in the apparatus than to high heat. The account shows that, while it is possible to maintain much higher heats in the electric furnace, these are not necessary or desirable except possibly for the easier disposal of basic slags.—*Journal du Four Electrique,* September 1.

Calcium carbide to the amount of 2,000 tons is now used in the autogenous welding industry in Europe, as compared with an only slightly larger tonnage used for illumination purposes during the same period of one year. Some silica carbide is also used.—*Journal du Four Electrique,* September 1.

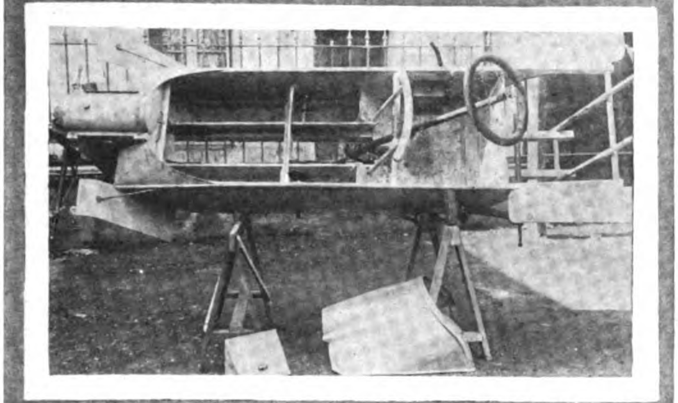
Courses in chemical technology especially intended for students of law and social economy have been instituted at several Prussian universities.—*Zeitschrift für Amewandie Chemie.*

The Littlest French Car

TINY SUBSTITUTE FOR THE MOTORCYCLE THAT IS MEETING WITH FAVOR—IT COSTS LESS THAN $300 AND CARRIES TWO COMFORTABLY



Bedelia Two Seated Runabout



Chassis Tilted Showing Interior

Front View Showing Motor

THE motorcycle being looked upon with disfavor in France, attempts have not been wanting to find a substitute in the form of a small car costing little more than the two-wheeler, while having double the carrying capacity and infinitely more comfort. Among the half-dozen $300 cars which have been brought forward during the past year only two or three have received any support from the public. Among the successful ones is a vehicle known as the Bedelia, and which may truly be described as the connecting link between the motorcycle and the automobile.

This car, which is put on the market complete with a two-cylinder air-cooled motor for a fraction under $300, is an eminently simple yet really practical construction with accommodation for two passengers tandem fashion and a fairly reasonable amount of room for baggage. Its two tubular axles are 99 inches apart, and the track is 36 inches. Between the two axles is carried a long boat-like body, with its main frame of armored wood and the side members covered in with sheet aluminum. At the forward end the body is narrowed to just the width necessary to receive the motor, which may be either a single or a two-cylinder V-type air-cooled model. The sides of the motor are enclosed by a sheet metal sliding panel and the top occupied by the electrically-welded gasoline tank. The front remains open in order that a strong current of air may be carried onto the motor.

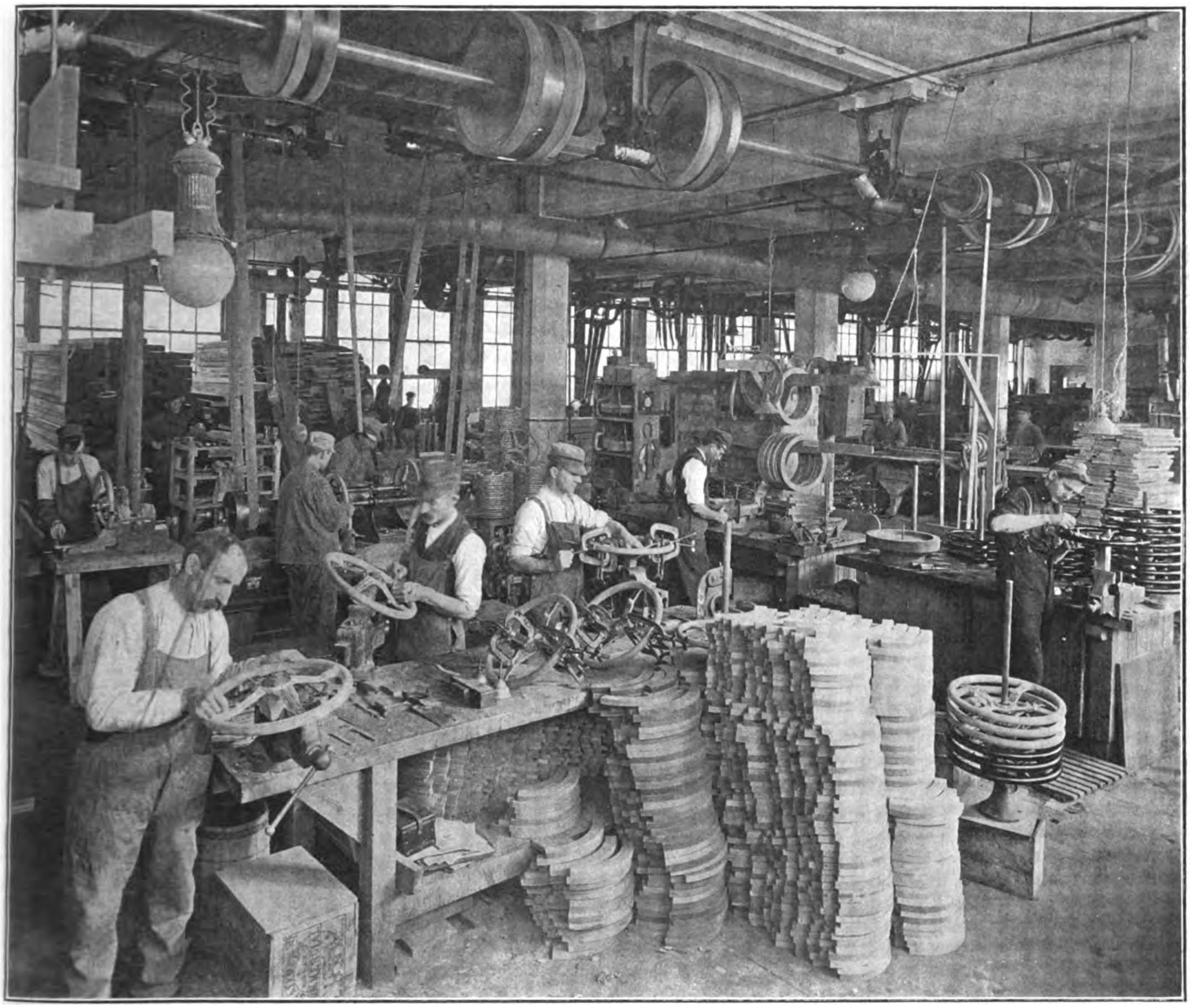
The first step in the transmission is a single chain from the motor shaft to a countershaft midway on the length of the car. Tension of the chain is varied by altering the position of the motor, and for this purpose a broad wooden wedge is carried between the rear of the crankcase and a transverse frame member, and on the movable hangers being slackened off a little the wedge is driven home until the slack of the chain has been taken up.

Two pulleys are mounted on each extremity of the countershaft, and from one of these the drive is taken to the rear wheels by means of V-belts. The second pair of pulleys is of smaller diameter than the set usually employed; thus when heavy work has to be performed a rapid reduction in gear ratio can be made. This change is made possible by the fore-and-aft motion given to the rear axle. It is attached to the rear of inverted semi-elliptic springs shackled at their forward end, and provided with a central seating which can be moved forward or rearward, as desired, by means of a side lever. It is this which also allows of slackening off the belt sufficiently to make the engine run free. The front axle is pivoted on a vertical spindle, with a coil spring for suspension. Steering is by inclined column with connection made to the axle by means of a stranded wire cable wound round a drum on the base of the steering column.

The driver's position is entirely at the rear, directly over the axle. His passenger is carried in a reclining position exactly in the center of the body, and is really provided with a better suspension than can be found on some cars costing ten times the price of the little Bedelia. Being low and covered in by a sheet-metal bonnet, he is thoroughly protected against the wind. The car is built so low that no step is needed to get into it. Its head resistance is very low, and, as can be imagined, its weight is very moderate. Fully equipped for the road the makers state that the car does not scale more than 330 pounds. The combination of long wheelbase and narrow track makes the use of a differential unnecessary. In France the Bedelia is taxed as a motorcycle. Although it has four wheels of 650 mm. diameter its cost of upkeep should not be any higher than that of a two-wheeler.

Among the Makers

ILLUSTRATING THE METHODS OF FASHIONING WOODWORK FOR STEERING WHEELS—DETAILS OF THE DETROIT ELECTRIC FOR 1911—KELSEY BUILDS A MOTORETTE—OVERLANDS FOR 1911



SHOWING PROCESSES IN THE MANUFACTURE OF MAHOGANY RIMS FOR STEERING WHEELS—PACKARD

WOODWORK in automobiles includes second-growth hickory for wheels, mahogany for the rims of steering wheels, dashboards in various effects, ash as it is employed in body framing, and white wood and other varieties of soft wood in body work, not forgetting that chassis frames, in some of the better class of automobiles, notably the Franklin, as well as the Panhard, are fashioned in wood.

That wood is a substantial material is no better illustrated than by the fact that the first chariot wheel of which this civilization has knowledge was made prior to 4000 B. C., and after it was used in service for a time, the length of which history fails to relate, was buried in a mummy pit at Nineveh, where it remained in seclusion until it was uncovered a few years back, and it now rests in a museum in New York. This wheel was examined and photographed by the Editor of THE AUTOMOBILE a few months ago, and the wood is in an excellent state of preservation, although it shows evidences of services once rendered.

Perhaps the most important point in relation to the woodwork in automobiles has to do with the proper selection of the wood that is to be employed. It is not true that there is any material shortage in the supply of second-growth hickory as it is demanded for use in spokes, but it is true that some of the hurry-up methods employed in the manufacture of wheels are productive of the kind of wheels that should not find an abiding place in automobiles. In Missouri, where second-growth hickory may be found in abundance, which State is now relied upon by the wheel-making industry to supply the demand for this character of wood, the natives are skilled in the art of felling the trees at the proper season of the year, *i. e.*, in the winter time. They are conversant with the good that comes if the wood is cut into suitable lengths and corded there to be left until it is nature-seasoned, and thereafter to be shipped to the plants wherein it undergoes further culling, and the best selections are fashioned into spokes and felloes. But in the mad desire on the part of those who care little for quality to put in an appearance of furnishing much for little without really doing so, all these necessary methods of procedure are short cut, and the wood is shipped as it is felled in the green state, after which it is thrust into a seasoning oven, or, better yet, subjected to a kiln-drying process and the life is baked out of it.

Wheels thus produced offer dangers to the autoist; they collapse on a curve when the speed is high, but even if they do eke out a precarious existence, as it were, they creak and groan under the load, so that the autoist, who is so unfortunate as to pay good money for the car so made, groans too.

Fortunately, this practice is being discountenanced by the makers of automobiles of pretense, and rather than put up with the damaging association with half-baked wheels from poorly selected wood, they are installing their own wheel-making plants, and selecting the wood with care and discrimination. In the meantime the purchasing public finds itself confronted by a coat of paint, shielding the good wheel and the bad wheel equally. How is the purchaser to know the difference between the two? Perhaps the reputation of the company that makes the car will be as good as the woodwork that is used in the wheels of its product.

In this connection it is interesting to note that wire wheels have gained great favor in England. Quite a few manufacturers fit their car as a standard equipment with wire detachable wheels. The claim of the makers of these wheels is that they will stand greater side strains than those made of wood. The other advantage of these wheels is that a spare can be carried, doing away with detachable rims. The spokes are fitted tangentially.

Detroit Electrics for 1911

MODEL P IS A ROADSTER TYPE WITH A LOW CENTER OF GRAVITY; MODEL N IS A LARGE FOUR-PASSENGER VICTORIA; MODEL D IS A BROUGHAM

CHIEF among the changes in the Detroit Electrics as manufactured by the Anderson Carriage Company, of Detroit, Mich., is represented in the direct shaft-drive transmission without reduction from chain to gears. Fig. 1, depicting the Model P Roadster type, is an excellent illustration of the result showing a low center of gravity with an underslung chassis frame, large diameter road wheels and other evidences of progress. This car has an 86-inch wheelbase, half elliptic springs front and rear and the Edison battery is placed under the bonnet in front, making the same quite as get-at-able as a motor in gasoline work. In fine, the general construction of this new model has all the earmarks of the gasoline car, and the body, with its fore-door construction and high superstructure, conforms to the newer practice in body work. Back of the seat line the platform is commodious, affording ample room for the carrying of personal baggage, besides a roomy tool box and whatever else the tourist might care to take along.

It is considered of no real value to rate an electrical motor at some specific power; it is more to the point to furnish a motor that will operate at a low fixed loss and deliver power as required under the varying road conditions, limiting the increase in temperature of the hottest part of the motor to some safe point, as 50 degrees centigrade, if the motor is run under certain prescribed conditions, but these are all matters with which the purchaser is but little concerned provided the motor is so designed as to conserve the battery energy and make the radius of useful travel sufficient for the needs.

The electrical equipment, not considering the battery, is made by the Anderson Carriage Company in its own plant, and the problems involved in this portion of the equipment have been brought to such a high state of perfection that there would be no news value in a reiteration of the well-known facts regarding the established quality of electric motors for vehicle work, particularly when they are produced for a specific purpose such as this.

Edison Battery Is Not Generally Well Understood

After recounting the advances made in the vehicle construction, as shown in Fig. 1, it is more than likely that a discussion of the characteristics of the Edison Battery which is used in Detroit Electrics will be of the greatest interest. In presenting a type of car along lines as indicated in Model P the company has in mind the idea of affording to its clientèle the advantages which are so well appreciated as being present in electric vehicles, supplemented by the further advantage of increased radius of travel and decreased battery depreciation, insofar as the state of the art will permit.

Those who have experience with electric vehicles are perfectly alive to the fact that average per-

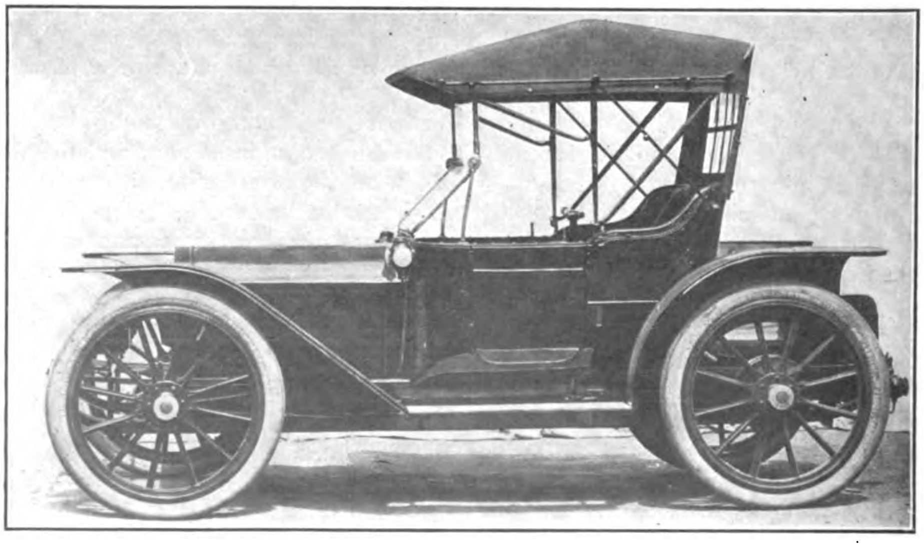


Fig. 1—Model P, Roadster type of Detroit Electric

formance of the battery is more to the point than anything that can be said involving initial radius of travel. In the past it has been found that increasing the initial radius of action was decidedly at the expense of average radius of travel. By radius of travel is meant the distance that a vehicle will travel and be able to come back on the same charge; the actual miles traveled would therefore have to be double the radius of travel. Initial radius of travel is, of course, the radius of action with a new battery; average radius of travel will therefore be the average result obtained during the useful life of the battery. In the earlier efforts along these lines it was found that the battery with the greatest initial output had the shortest life; under these conditions it was, of course, self-evident that if a battery was made with a large surface and light grids its initial output would be relatively high, but its ability to withstand continuous service was limited by the lack of stability of the construction. Then, too, there is the question of sulphation. If a battery is prone to sulphate this disorder will creep in in the night-time when the car is standing in the garage as well as in the hours when the car is running on the road. One of the claims for the Edison type of battery, as used in this car, has for its foundation the fact that automatic sulphation is eliminated.

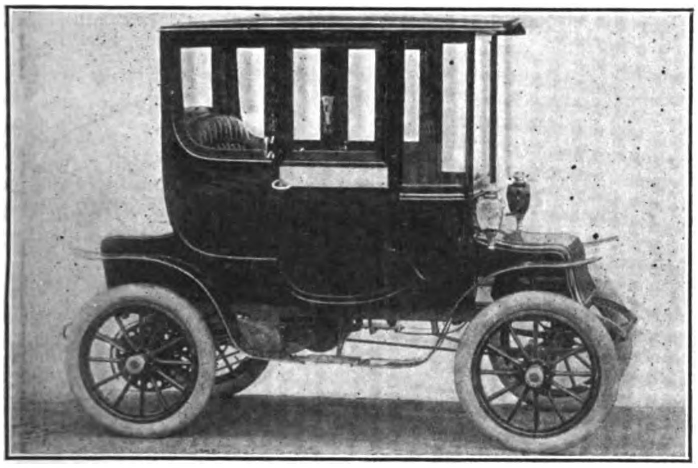


Fig. 2—Detroit Electric Model M Brougham

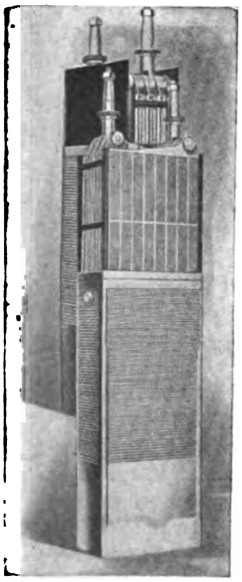


Fig. 3—Type A-4 cell with contents of container partly lifted, showing alternating positive and negative plates assembled

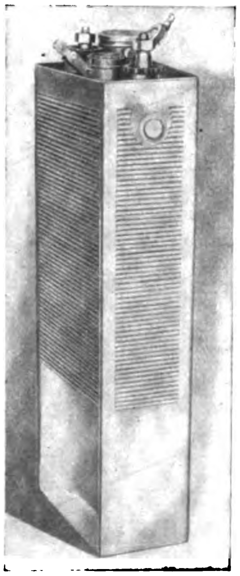


Fig. 4—Cell complete ready to go into a battery of cells

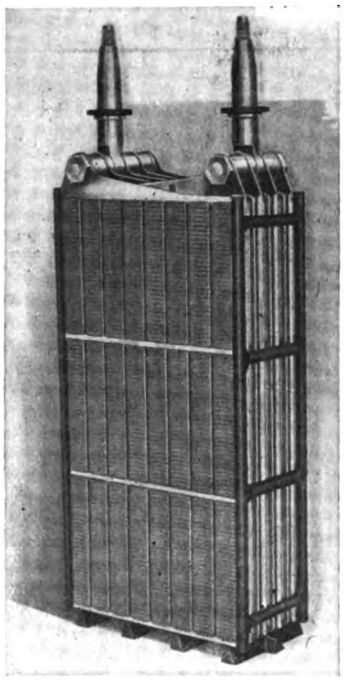


Fig. 5—Showing positive and negative plates of the A-4 cell assembled together, but removed from the container

Fig. 6—Type A-4 cell, showing the positive and negative plates in the container, and also the removed cover with openings

In this form of battery the positive plates consist of steel grids, which are nickel plated; they are in the form of nets of 30 tubes per grid, each of which is filled with active material, the latter being composed of pure metallic nickel in the form of leaves or flakes. The pure nickel flake is produced by an electro-chemical process. The negative plates are composed of 24 flat rectangular pockets which are supported in three horizontal rows in nickel-plated steel grids. These pockets are also formed out of thin nickel-plated steel and they are full of perforations. The active material in the pockets forming the negative element of the battery is oxide of iron.

The positive and negative plates are assembled alternately, as shown in Fig. 6, where they are placed within the containing cell, which is also made of sheet steel. A better idea of the construction of the plates or elements is shown in Fig. 8, with the positive element in the foreground and the negative structure in the background. The capacity of a type A-6 Edison battery is as follows:

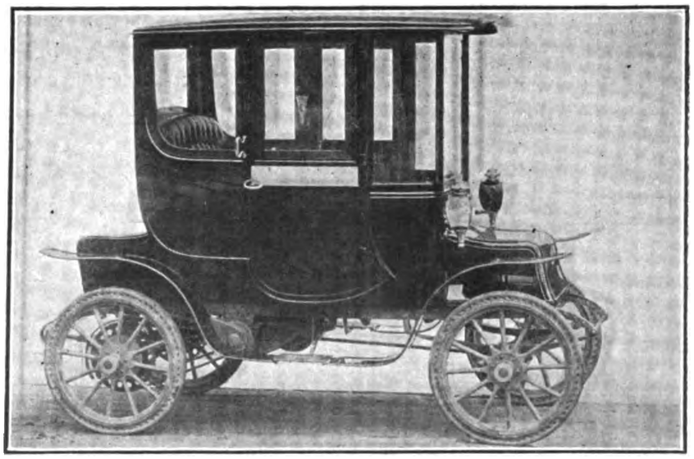


Fig. 7—Detroit Electric Model MS Brougham

CAPACITY OF TYPE A-6 EDISON BATTERY

Charged Seven Hours at 45 Amperes. Discharged at 45 Amperes.

Ampere-hour input	315.0
Ampere-hour output	268.5
Average potential difference of charge	1.692
Average potential difference of discharge	1.202
Watt-hour input	533.0
Watt-hour output	322.7
Ampere-hour efficiency (per cent.)	85.2
Volt efficiency (per cent.)	71.1
Watt-hour efficiency	60.6
Output per pound in watt-hours	16.8

The covers are so designed that the columns of the positive and negative plates pass through stuffing boxes formed in the apertures, the idea being to prevent the electrolyte from spilling out. The liquid which forms the electrolyte is a 21 per cent. solution of caustic potash dissolved in distilled water. This is poured in through an orifice in the cover and a means is provided for rendering the same tight so that the replacement, which is water, will only be that to make up for evaporation, which is at a slow rate.

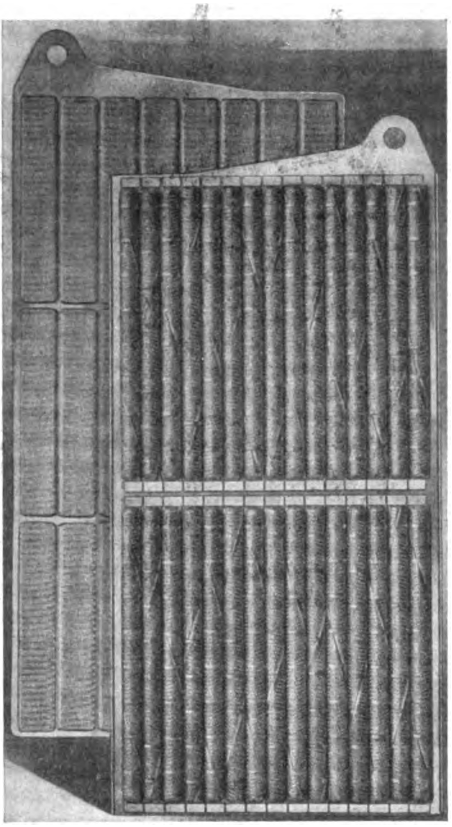


Fig. 8—Type A, positive and negative plates, showing the different structures of each, one tubular and one rectangular

Each cell delivers a mean of 1.3 volts, the maximum open circuit voltage being 1.5 volts, and the range of voltage per cell is between 1.5 volts on open circuit, and 1.11 volts when the cells are said to be discharged. The output of this particular cell is 268 ampere-hours. The battery is made in the several sizes depending upon the service demand, and increasing capacity is afforded by the simple expedient of adding to the number of cells in which the type A-4 has four positive plates and the type A-6 has six positive plates. The method of fastening the plates together is shown in Fig. 5, which is a type A-4 assembly, Fig. 3 being of the same type of cell with the elements partly lifted out of the can or container. The cell complete ready to be assembled into a battery, of which there may be any desired number, is shown in Fig. 4.

It is claimed for this type of battery that it has no deteriorating action, as the tendency to sulphate, and that its life is only reduced the amount represented by normal depreciation which represents an increment of useful work for an increment of life. Electrochemically the battery is in a state of stable equilibrium and when it is in good working order, which is mostly a matter of keeping the electrolyte up to the proper level and giving the battery its full charge, it will remain in this condition until the charge is tapped away in the form of useful work. In view of the stability afforded in the battery the owner of a car is enabled to figure on the radius of travel with much certainty, which is of considerable value to the user of an electric, and the inroads of time are at such a slow rate that satisfaction is a normal expectation.

In addition to the Model P car the company's offering for 1911 includes the Model M Brougham, as shown in Fig. 2, and the Model MS Brougham, as shown in Fig. 7. There are several other offerings and numerous options for purchasers of discrimination; those who prefer the chain drive are permitted to indulge in their whim and if perchance the lead-type of battery is given a preference, it, too, will be supplied to the exclusion of the Edison type of battery.

It is the fair claim of the company that the battery and other equipment used should be in the light of the service to which the vehicle is to be devoted; whim and fancy are not to be indulged in excepting grudgingly if good and sufficient service are prime requisites.

Kelsey Builds Motorette

PRESENTING A NEW TYPE OF GASOLINE MOTORETTE WITH A SINGLE REAR WHEEL WHICH SERVES AS THE TRACTOR

MOTORETTE, so-called, came from abroad and is substantially a reversal of the old tricycle idea in that the single wheel is placed at the rear and is used as a tractor, so that the front portion of the body rests on a conventional type of front axle pivoted on steering knuckles in the conventional way. The tricycle scheme was found to be defective. Cars so made were too easily turned over; a little experimenting, however, resulted in the Motorette, a good example of which is shown in Fig. 1, which is a new product made at the plant of the C. W. Kelsey Manufacturing Company at Hartford, Conn. There are many points of merit residing in this plan of vehicle, and that this situation received early recognition may be known from the fact that Leon Boillé, prior to the introduction of the well-known Leon Boillé type of automobile, took a turn at building motorettes, but the state of the art did not at that time encourage his further efforts.

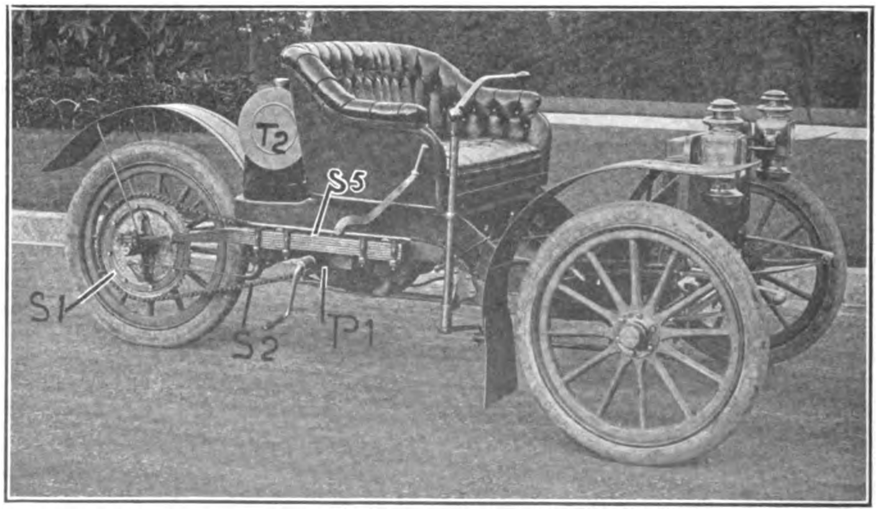


Fig. 1—Side elevation of the Kelsey Motorette, showing the single rear wheel drive and other important details

C. W. Kelsey, president of the C. W. Kelsey Manufacturing Company, while intimately associated with the automobile business along other lines for a number of years, and who will be remembered in connection with the Maxwell-Briscoe Motor Company as sales manager up to a short time ago, built his first three-wheel car as far back as 1897. His trouble then seemed to be due to lack of ability to induce a sufficient measure of lateral stability at the rear end of the car where the frame rested upon one wheel only. Fig. 2 shows how well this phase of the situation is taken care of in the present car, in which T1 is the tractor wheel at the rear of the car, and L1 represents a lever arm which reaches out about 48 inches, so that the turning moment, considering the weight of the man who is standing on the lever, is not far from 9,000 inch-pounds. With this considerable turning moment the sag of the frame at the rear is imperceptible and the tractor wheel remains substantially in the vertical plane. This illustration shows with excellent clearness that the third wheel, serving as a tractor, is also a sufficient support for the rear end of the vehicle. It will be readily appreciated that this form of construction does away with the necessity of using a differential gear for compensating purposes, since there is but one wheel to drive and there is no occasion for compensation. The two front wheels work entirely independent of each other just as they do on conventional types of automobiles, and, of course, they are quite free from the hampering consideration that demands the presence of a differential gear in the makeup of the rear axle of every automobile that uses two wheels for tractive purposes.

A further glance at Fig. 2 will disclose the sprocket wheel S1 fastened to the driving wheel, a side view of which will be found in Fig. 1, S1, and the sprocket pinion P1 is a sufficient distance forward to make the sprocket chain S2 comfortably long. The spring suspension at the rear incorporates the "buckboard" idea, using two flat spring members S3 and S4 (see Fig. 2), a better view of which, including the method of fastening, is given as S5 in Fig. 1. This machine, which will be marketed under the name "Motorette," weighs 475 pounds; the motor is of the double-opposed type in point of design, following along motorcycle lines, and is built self-contained, including a two-speed forward and one reverse planetary gear, which is incorporated in the same housing. The speed of the car is maximum at substantially 30 miles per hour. The construction is such that the ground clearance is 10 inches, and in the management of the car provision is made for careful oiling by a sight-feed system, which, together with other nice features of design, leaves nothing to speculation, nor is the operator in need of over-much skill. The lubricating oil supply and the provision for its use is on a basis of one gallon, and the gasoline supply of six gallons is held in a circular tank T2 back of the seat. This is enough of a supply of fuel to furnish the energy requisite for a travel of 180 miles maximum. The material and workmanship throughout the product are on a carefully worked out basis; Timken roller bearings are used in the rear wheels, and the front axle is of the I-beam section drop-forged from steel. The front spring suspension is of the full-elliptic type and considering the constant loading at the front end the springs are relatively supple so that the road performance is soft and the snubbing action of the springs fits the requirement under the most severe conditions of travel.

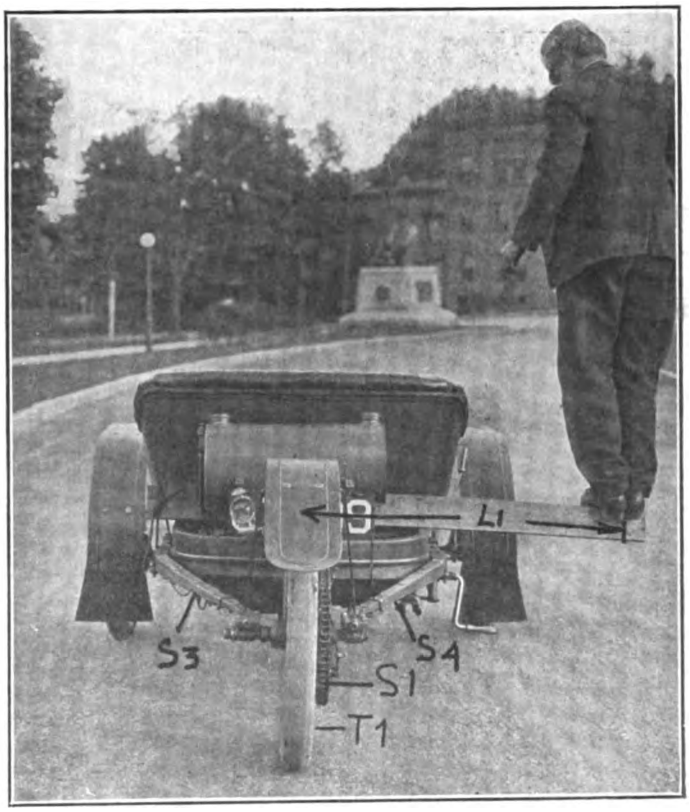


Fig. 2—Rear view of the motorette, showing lateral stability and a flexible spring suspension

The car is fitted with oil lamps, has a tiller steering gear, side lever control, and such other features as would seem to accord with the necessities in view of the character of the work for which motorettes are intended. The price is $385, f.o.b Hartford, and it is the present intention of the company to turn out about 10,000 of these little cars during the next eight months.

Overlands for 1911

SEVERAL NEW MODELS AND MANY REFINEMENTS WILL MARK THE COMING YEAR'S PRODUCT—SLIGHT REDUCTIONS IN THE PRICES OF SOME MODELS ARE ALSO ANNOUNCED

THE Willys-Overland Company, of Toledo, Ohio, are making a bold bid for 1911 business, and are presenting six models of pleasure cars with several types of bodywork. They are built along the lines of last year's models, but some departures have been made and Models 45, 49, 50 and 52 are new, with some distinctive features.

One particular change is that the 1910 model that sold for $1,100 will be sold in 1911 for $1,000, but with three-speed selective transmission will be marketed for $1,095.

The runabout Model 45 is entirely new and is fitted with a four-cylinder motor, 3 1-2 inch bore x 4 1-2 inch stroke, magneto ignition, multiple disc clutch and a low racy or torpedo body. The transmission is of the planetary type and the front axle is an I-section drop forging.

Wheelbase lengths vary from 96 inches in Models 45 and 46 to 118 inches in Models 52, 53 and 54. Models 37 (the delivery wagon), 38 and 49 are 102 inches long; Models 50 and 51, 110 inches, and Models 40, 41 and 42, 112 inches. Fifty-six inches is the standard tread, although there is an option of 60 inches in all models but Nos. 37, 45, 46, 50, 53 and 54.

Tire equipment calls for 34 x 4 front and rear on Models 41, 42, 52, 53 and 54; 34 x 3 1-2 for Models 40, 50 and 51; 32 x 3 1-2 for Models 38 and 49; 32 x 3 for Models 45 and 46, and 33 x 4 for Model 37 (delivery wagon).

Mechanical Refinements in Models 52, 53 and 54

The power plant in Models 52, 53 and 54 is on a common basis, utilizing a four-cylinder, water-cooled motor of the four-cycle type, the general appearance of which is presented in Figs. 4 and 8. Referring to Fig. 4, which is the left-hand side of the motor, the four cylinders C1, C2, C3 and C4 are cast individually of a special grade of close-grain iron, but they are so designed that the amount of finish allowed for in the bore is just sufficient for the intended purpose and the formula of the mixture used in the charge is such that the characteristic of the iron shows a chill tendency, the object being to have the

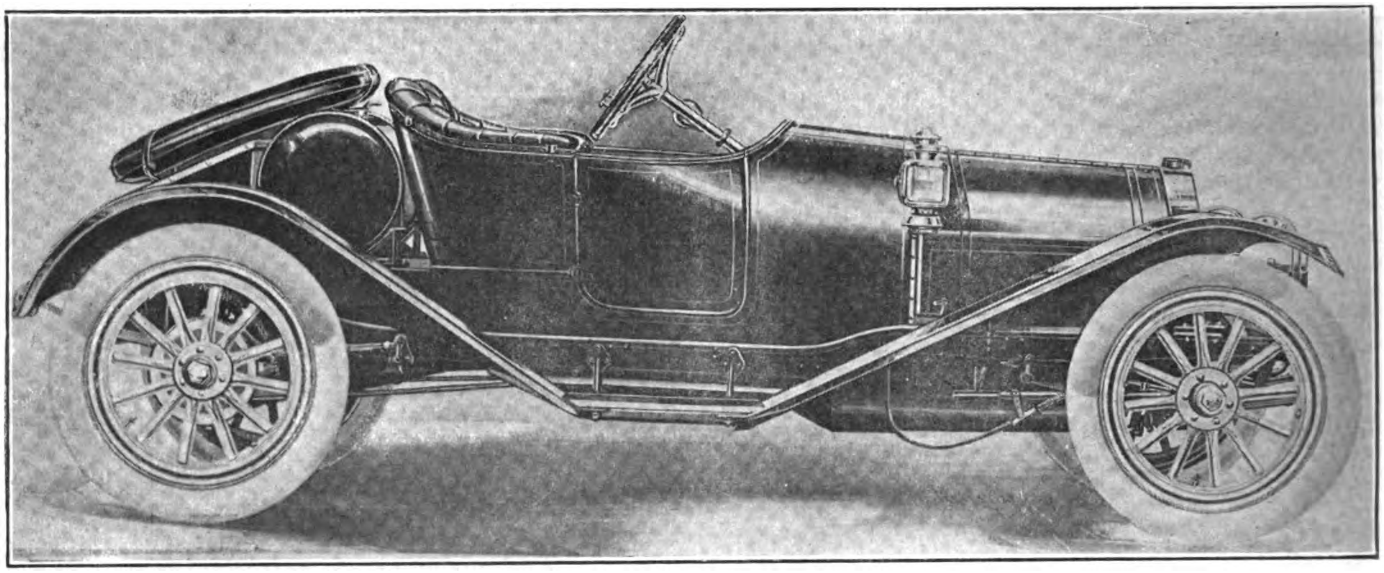


Fig. 1—Presenting Model 53 Overland with an overhanging cowl curved fore-doors, perfectly smooth exterior, a large gasoline supply and a place for the spare tire

finish bore of the character which comes from the presence of white iron, the result being that the walls of the cylinders take on a high polish and besides reducing friction to a minimum as well as inducing longevity, affords no anchorage for carbon formations.

The motor is cooled by the thermo-syphon principle and the back of the radiator shows at R1, with a water box W1 at the top, and a water connection C4, with a suitably designed water manifold M1, with its four legs L1, L2, L3 and L4 of varying lengths to suit the established hydraulic grade. Water connections are made at the top of the cylinders and the allowance for water space over the domes is deep. The refined details of this thermo-syphon system of cooling are in wide contrast with the relatively coarse practice of a year ago.

The greatest difficulty in recent times which bothers the autoist beyond reason and results in an undue cost is involved in the thermic relations as they are governed by the proper utilization of heat units in the fuel on the one hand and the efficacious disposition of the thermic losses on the other. Were it possible to get the average autoist to realize that a single heat unit represents enough energy to lift 142.4 pounds to a height of 1 foot in one minute of time, and that over 80 per cent. of all the heat units represented in the fuel goes to waste, the further task of showing the opportunities for thermic trouble would be much simplified.

At all events there are 20,000 heat units, more or less, in a pound of gasoline. It possesses a greater measure of energy than a pound of nitro-glycerine and it may not be generally understood that substantially 83 per cent. of the composition of this gasoline is nothing more nor less than coal; in other words, carbon. As the demand for fuel increases, the more volatile portion falls short of the requirement and less volatile products are incorporated as a commercial necessity. This reduction of volatility of the fuel coupled with the larger percentage of carbon present, operating under conditions that are a near approach to those that obtain in coke-ovens, leads to carbon trouble in poorly designed motors.

As to the refinements of the motors for use in 1911 Overland cars, the designer recognized the impotency of revamping the main ideas along trodden paths. It is a thermic problem, pure and simple, and with the coming of heavier and less volatile grades of fuel the paramount issue was that of carbon accumulations, it being necessary to solve the mystery of their formation and apply the proper remedy to prevent a continuance of the trouble.

In the older school of motor designing the attention of the expert was riveted on the main point, *i. e.*, power to the exclusion, perhaps, of the questions involving continuity of service. Of course the motor ceases to be valuable to the user when preignition sets in, as it does, due to carbon accumulations, and it was found after some effort that the compression must be fixed, not only to obtain the high thermal efficiency, but also for the purpose of more intimately intermingling the thermal components of the mixture with the oxygen of the atmosphere, of which the mixture is largely composed. Investigation along these lines resulted in determining as to the proper compression to establish, but it was also found that the interior walls of the cylinders as well as the heads of the pistons had to be finished to a high degree and then "buffed" in order to discourage the clinging of the carbon particles to the surfaces.

Glancing again at Fig. 4, the cylinders are cast L-type with a symmetrical exterior, bringing the inlet and exhaust valves to one side so that the exhaust manifold E1 is of graceful design, sweeping back beyond the last cylinder and then down, while the inlet I1 has a stand pipe S1 leading up from the carbureter and from its horizontal portion four branches, B1, B2, B3 and B4, lead to four well-designed transfer ports and thence to the inlet valves, which are of large area and short lift. The method of fastening the manifolds is clearly shown in Fig. 4, there being four yokes, Y1, Y2, Y3 and Y4, spanning the distance between the adjacent branches and serving in common for the intake and ex-

SPECIFICATIONS FOR OVERL

MODELS			BODY		MOTOR				COOLING		IGNITION	
	Price	H.P.	Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast.	Radiator	Pump	Magneto	Battery
Model 37........	$1000	22.5	L't del..	2	4	3¾	4½	Single.	Tubular..	Syphon..	Remy...	Dry....
Model 38........	1000	22.5	Any....	4	4	3¾	4½	Single.	Tubular..	Syphon..	Remy...	Dry....
Model 40........	1200	28.9	R'bout.	4	4	4⅛	4½	Single.	Tubular..	Syphon..	Remy...	Dry....
Model 41........	1300	28.9	Tour'g*	5	4	4⅛	4½	Single.	Tubular..	Syphon..	Remy...	Dry....
Model 42........	1400	28.9	Tour'g.	5	4	4⅛	4½	Single.	Tubular..	Syphon..	Remy...	Dry....
Model 45........	775	19.6	R'bout.	2	4	3½	4½	Single.	Tubular..	Syphon..	Remy...	Dry....
Model 46........	850	19.6	Torp'o.	2	4	3½	4½	Single.	Tubular..	Syphon..	Remy...	Dry....
Model 49........	1095	22.5	Any....	4	4	3¾	4½	Single.	Tubular..	Syphon..	Remy...	Dry....
Model 50........	1250	25.6	Torp'o.	2	4	4	4½	Single.	Tubular..	Syphon..	Remy...	Dry....
Model 51........	1250	25.6	Tour'g.	5	4	4	4½	Single.	Tubular..	Syphon..	Remy...	Dry....
Model 52........	1600	28.9	Tour'g.	5	4	4⅛	4½	Single.	Tubular..	Syphon..	Bosch...	Battery.
Model 53........	1600	28.9	Tor. Rt.	2	4	4⅛	4½	Single.	Tubular..	Syphon..	Bosch...	Battery.
Model 54........	1675	28.9	Tor. Tg.	4	4	4⅛	4½	Single.	Tubular..	Syphon..	Bosch...	Battery.

†Or 60 inches. *Or close coupled.

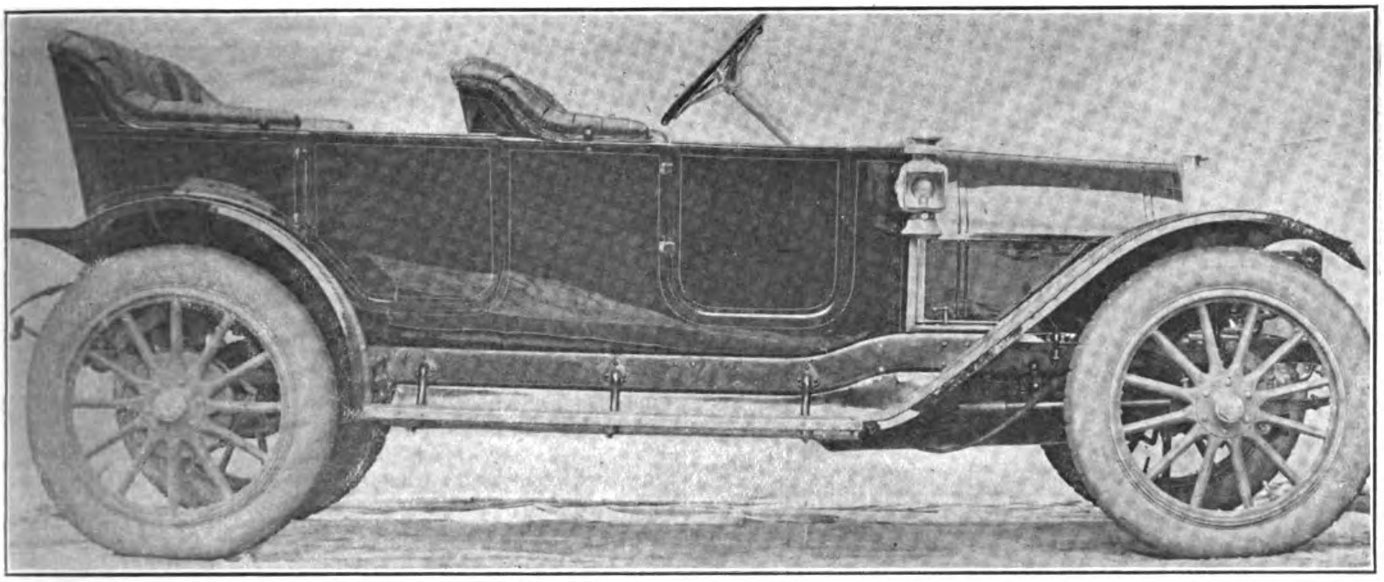


Fig. 2—Depicting Model 52, fore-door type of five-passenger touring car with a smooth exterior, wide entrance, and a clean running board

haust manifolds, and allowing for speedy removal of the piping.

RS AS OFFERED FOR 1911

	TRANSMISSION							BEARINGS				TIRES	
Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Trans-mis'n	Axle	Weight	Front	Rear
.disc	Planet...	2	Axle...	Shaft...	102	56	P. Steel.	5 Plain.	Ball....	Ball....	....	33x4	33x4
.disc	Planet...	2	Axle...	Shaft...	102	†56	P. Steel.	5 Plain.	Ball. ..	Ball....	....	32x3½	32x3½
.disc	Planet..	2	Axle...	Shaft...	112	†56	P. Steel.	5 Plain.	Ball....	Ball....	....	34x3½	34x3½
.disc	Planet...	2	Axle...	Shaft...	112	†56	P. Steel.	5 Plain.	Ball....	Ball....	....	34x4	34x4
...	Selecti'e.	3	Axle...	Shaft...	112	†56	P. Steel.	5 Plain.	Ball....	Ball....	....	34x4	34x4
.disc	Planet...	2	Axle...	Shaft...	96	56	P. Steel.	5 Plain.	Ball....	Ball....	....	32x3	32x3
.disc	Planet...	2	Axle...	Shaft...	96	56	P. Steel.	5 Plain.	Ball....	Ball....	....	32x3	32x3
	Selecti'e.	3	Axle...	Shaft...	102	†56	P. Steel.	5 Plain.	Ball....	Ball....	....	32x3½	32x3½
	Selecti'e	3	Axle...	Shaft...	110	56	P. Steel.	5 Plain.	Ball....	Ball....	....	34x3½	34x3½
...	Selecti'e.	3	Axle...	Shaft...	110	†56	P. Steel.	5 Plain.	Ball....	Ball....	....	34x3½	34x3½
..	Selecti'e	3	Axle...	Shaft...	118	†56	P. Steel.	5 Palin.	Ball....	Ball....	....	34x4	34x4
	Selecti'e.	3	Axle...	Shaft...	118	56	P. Steel.	5 Plain.	Ball....	Ball....	....	34x4	34x4
	Selecti'e.	3	Axle...	Shaft...	118	56	P. Steel.	5 Plain.	Ball....	Ball....	....	34x4	34x4

There are eight spark plugs, S1, S2, S3, S4, S5, S6, S7 and S8, inserted in covers over the valves that are utilized in conjunction with the new Bosch "two independent systems" of ignition, which it will be remembered utilizes a Bosch high-tension magneto as the main source of electrical supply and a battery auxiliary which includes a self-starting button, affording adequate protection in the event of the unforeseen and the highest development in magneto ignition service under normal conditions. The wiring system has been planned in the light of modern investigations; it was learned that tubing of any kind utilized as a conduit of high-tension wiring diminishes the efficiency of the system because of the induced effects that are accentuated and distorted when a high potential, high frequency, electromotive force is impressed on an electrical circuit, if the same is in juxtaposition with parallel conductors that are so placed as to set up the phenomena which may be termed condenser effects. True it would be possible to put lightning arresters on improperly designed ignition systems and these devices would tap away the superimposed accumulations from time to time, but such methods lead to additional complication, whereas by resorting to the simple design as here presented the whole series of complex and troublesome tendencies is excluded from the calculation. The high-tension leads are run in the open and are held suspended by

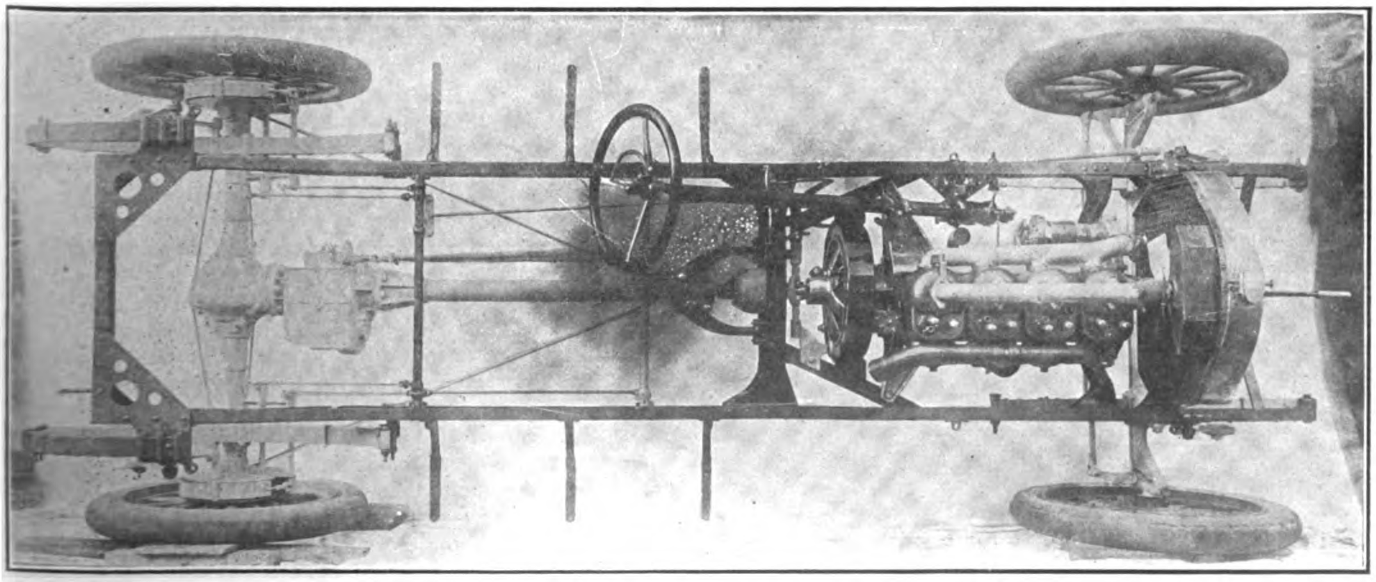


Fig. 3—Plan of the chassis of Models 52, 53 and 54, including 35 H. P. motor, cone clutch, universal joint and unit type of live rear axle holding a three-speed selective sliding gear

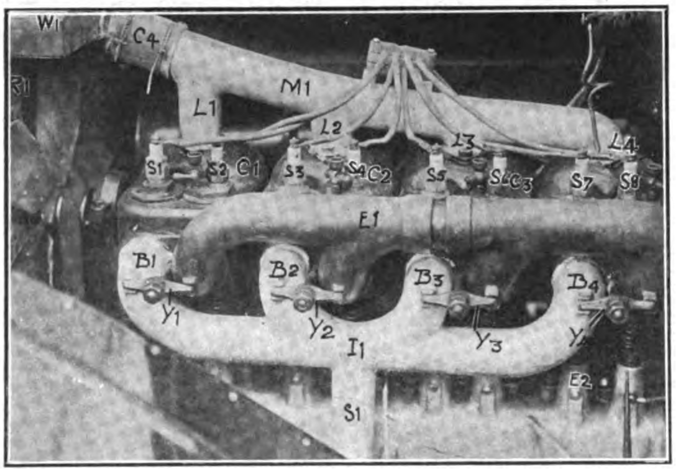


Fig. 4—Looking at the left-hand side of four-cylinder motor, showing the intake and exhaust manifolds, water connection, etc.

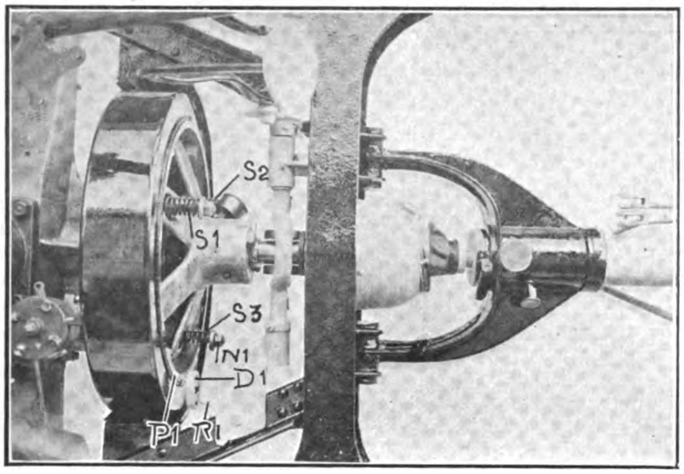


Fig. 5—Plan of the chassis at the combination cross-bar, showing cone clutch in flywheel, controlling mechanism and universal joint

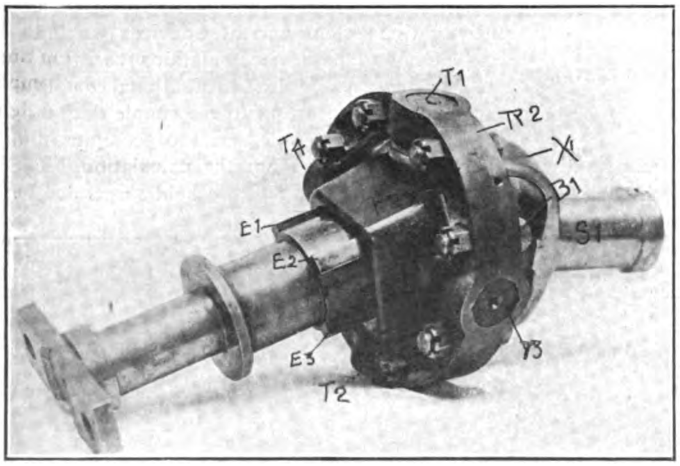


Fig. 6—Presenting universal joint with grease-tight housing removed, indicating liberality of bearing surfaces and efficient slip joint

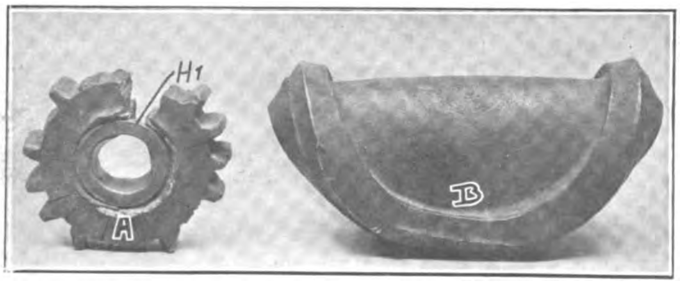


Fig. 7—Materials of which the gears are made after they were subjected to a test to destruction

several suitable cleats, one set of which is clearly shown at C6.

In the timing of the valves the principle utilized was on a basis of good and permanent work to the exclusion of the usual multiplicity of small parts and the hazard involved, having for its basis the getting out of adjustment of the one or the other of them. The square valve lifts reciprocate in properly contrived white metal bushings that are broached with square holes. Lubricating oil is prevented from seeping out through the good office of a clever contrivance involving the principle of the closure used in ball-bearing work for the identical purpose. At the outer extremity of the bearing an ante-chamber is allowed for, and the path of flow of the lubricating oil is back into the crank chamber through suitable passage ways with a baffle plate forming the extremity and serving as the heading-off member of the oil flow so that it all goes back into the crankcase instead of out and away. The extensions of the crankcase for the valve-lift bearings are shown at E2, of which there are eight, and at the point of contact of the lifts with the valve stems adjusting nuts are placed so that the timing of the valves may be altered at will.

The other side of the motor as shown in Fig. 8 presents the magneto M1 at a point just in front of the steering gear S1, and the water manifolds W1 and W2 are very clearly shown in this view. If it may be taken for granted that the reader is familiar with the Bosch magneto it will suffice to pass on to important matters of detail since they are among the conspicuous aims of the designer whose ambition is to make this 1911 work satisfactory to the autoist who, with his 1910 experience, would prefer to think that a surfeit of the petty troubles will go into history. Take the spark and throttle control systems as a foundation for discussion. It is pointed out that the universal joint U1 is of a ball and socket type and that the material used is of the true cementing order and the facilities afforded at the plant where the parts are made include an electric-welding equipment, muffle and other suitable furnaces and heat-treatment equipment on an extended basis with means for ascertaining critical and other temperatures.

In the new models that are here being described there will be an entire absence of useless trinkets and misplaced accessories: the running board is confined to its legitimate function and a nice illustration of the innermost thoughts of the designer is shown in Fig. 8; the signal horn S2 is located at a point above the magneto under the hood, with the bell pointed in the direction that the car moves, so arranged as to project the sound wave for a suitable distance ahead. It was found by experiment that the sound wave penetrates for a greater distance when the horn is placed in the manner as here shown than when the horn is placed on the running board, due to the fact that the upward sweep of the mudguards serves as a deflector of sound, so that the wave instead of being projected ahead, where it will do the most good, is reduced to the level of a mere noise which bothers the autoist instead.

Troubles in Operation Promise to Disappear

Every autoist has full knowledge of the fact that in spilling water out of a pail the sheet-like conformation of the stream can thus be induced to flow in through an elongated orifice. This information, while it should have been taken advantage of several years ago, finds a belated response in the newer design as shown in Fig. 10, taking on the form of an elliptically shaped filler F1 of the radiator, with a suitably contrived cover C1 for the same. The design includes limit stops S1 and S2, a means for holding the packing P1 in place and a locking bolt B1, which engages in a depression D1 automatically due to the action of a spring which is concealed in the guide boss G1; when it is desired to throw back the filler cap, pressure is exerted against the spring by applying the same to the handle of the bar H1. In order that foreign substances may not find their way into the radiator a screen is located within the filler F1, but the same is so placed that it may be readily removed, cleaned and replaced, thus offering some inducement to the autoist who desires to minimize his repair bill to keep foreign substances from the cooling system.

Perhaps the most wise provision that has been made in connection with the cooling system on a basis to thwart repair bills lies in the construction of the radiator, the same being formed out of flattened copper tubes lying alongside of each other with intervening spring-like gills that serve as separators. In order to find out whether or not a radiator could be constructed in such a way that it would not be disrupted were the cooling water therein contained to be frozen, the experiment was made with this type of radiator with the gratifying result that the freezing of the water in the tubes ended in a slight expansion of the walls, but as soon as the water was melted, which was a mere matter of running the motor until it afforded the requisite quantity of heat, the spring-like gills compensated for the expansion introduced and the tubes re-formed in their normal position did not show even a tendency to disrupt at any point and form a troublesome leak.

Provision Is Made for Handling Torque of the Motor

Translating the power of a motor is regarded as a difficult task in automobile work on account of the inherent defect that resides in every internal combustion type of motor owing to its relatively poor performance under speed-changing conditions. This lack of holding to a constant power when the speed is varied, coupled to the fact that the motor is irreversible, leads to the necessity of using a clutch to disengage the motor from the transmission at frequent intervals, and of a transmission gear system, by means of which the motor may be permitted to run at a high speed at times when the car must travel at a low speed. The clutch problem has ever been serious, and while many forms of clutches are more or less in vogue, the cone type in its final and protected form as shown (looking from the rear) in Fig. 9 and in perspective in Fig. 5, has few superiors.

Referring to Fig. 5, the power is transmitted from the motor M1, utilizing its functioning methods and equalizing the torque variations by means of a well-contrived flywheel of the minimum weight for the desired effect, the same being flanged to the crankshaft and supported by a large main bearing in the crankcase; but the stresses of the flywheel are resisted by a relatively stout chassis frame with channel section side bars B1 and B2 acting in conjunction with a substantial compound cross-bar C1 with diagonal braces D1 and D2 which not only resist diagonal stresses but serve as supports by means of motor arms A1 and A2 for the rear of the motor. The front end of the motor rests upon a cross-bar at one point only so that the scheme of transmission is three-point suspension. A universal joint is placed just back of the cross-bar C1 in a tight housing H1, the joint proper being shown in detail in Fig. 6. The torque of the motor as it is taken from the flywheel by the cone clutch is picked up by the universal joint and transmitted to the propeller shaft in the housing P1, (Fig. 9) and thence to a three-speed selective and reverse transmission gear which is a unit with the live rear axle. There are some refinements of design and construction to be considered in connection with the combination cross-bar C1, the universal joint as shown (in Fig. 6), the yoke Y1 (Fig. 9) and the other schemes for flexibility as shown in the chassis as a whole. At all events the yoke Y1 (Fig. 9) is related to the cross-bar C1 through flexible mountings M2 and M3, which permit the rear wheels to respond to road inequalities enabling the chassis springs to do their part. The tube T1 and its relating members are free in the vertical plane, but are restrained from lateral travel.

Having thus described the relations of the members and their inter-related functions, reference may now be had to the details of the improved cone clutch. As it is shown in Fig. 9 the housing H2 hides the flywheel from sight but discloses the outer rim of the truncated cone around its periphery P1. Instead of using a stout coil spring as the pressing member for the clutch, three separate springs are utilized, one of which is shown as S1. Glancing at Fig. 5, however, these springs show as S1, S2 and S3, and the locking nut N1 on the stubs over which the springs are placed shows in an accessible position so that adjustment of the springs becomes an easy matter for even the autoist of no ex-

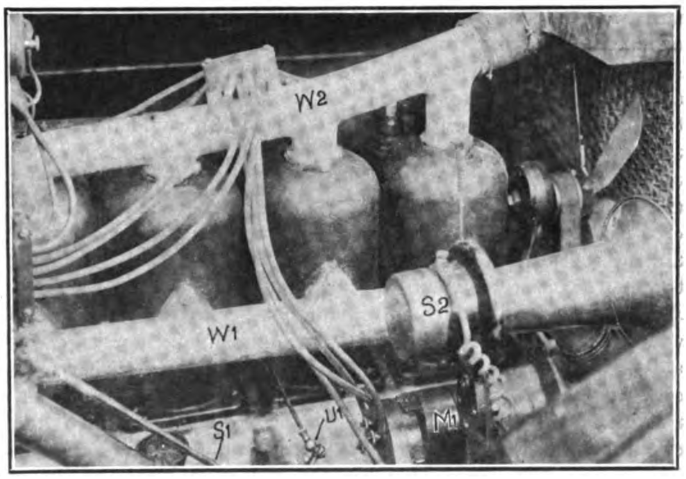


Fig. 8—Presenting the right-hand side of the motor, showing location of magneto, method of wiring, and placing of signal horn

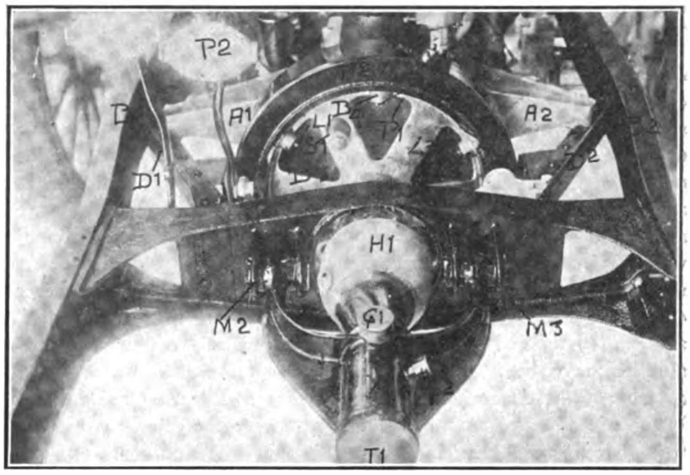


Fig. 9—Looking at the clutching mechanism and universal joint, also the torsion tube yoke and other features of design

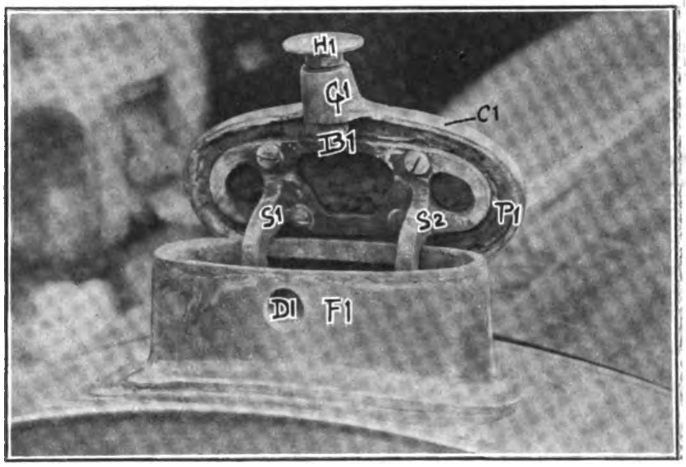


Fig. 10—New form of filler cap on radiator with shape that facilitates filling same, with tight packing and quick release

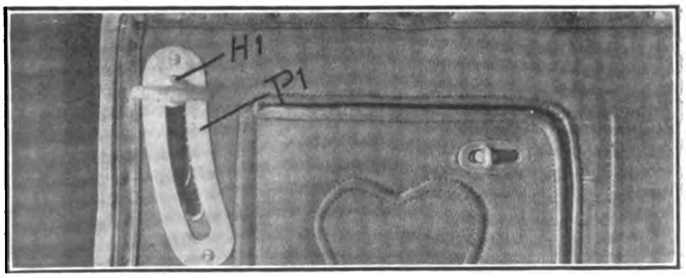


Fig. 11—Detail of the locking method used on the doors, a study of the leather employed and the excellent utilization of pouches

perience. But it is in just such measures for simplicity that trouble hides quite frequently; adjustment of three separate springs by a man of no skill would be an impossibility were it necessary to have the pressure of the respective springs on a balanced basis. Even an autoist of great skill would find it extremely difficult to make just such an adjustment, and in order that this question of the equalization of the pressure might be disregarded the plan includes a rocking yoke which is slipped over a ball-bearing concentric with the crankshaft extension and the extremities of the three arms of this yoke are provided with bosses which accommodate the members over which the springs S1, S2 and S3 are placed. Without going into further detail it will suffice to say that it is a matter of no moment whether or not the pressure on the respective springs is on a basis of equality, since if one spring is given more tension than another, a reaction takes place through the rocking yoke and a part of the excess pressure is transferred to the remaining members and the sum of the pressures of the three springs is accumulated and utilized in pressing the clutch against the conical face of the flywheel.

There are two points that have long been understood as severe strictures against cone clutches. One of these points lies in the flywheel effect, that is due to the diameter, weight and speed of clutches, which flywheel effect makes it extremely difficult to slide the gears in the transmission system, with the result that the gears are battered up and the autoist is reduced to a state of nervous temper that results in abuse to the motor since the gears are not utilized sufficiently for their intended purpose and the motor is overloaded sometimes until it stalls. At frequent intervals this loading to the point where it indicates to the autoist that if he does not slide the gears the motor will stall, this character of abuse offers but slight indication of a future large repair bill, and yet it is one of the most prolific reasons why makers of automobiles have been reluctant to state what would be the percentage of the depreciation of their wares. The first reform lies in the use of an aluminum spider of an extremely light construction, but in order that "spinning" may be reduced a drag brake D1 (Fig. 5) is placed so that it presses against the face of the clutch around the periphery P1, but the shoe of the drag brake is so contrived and fitted into the receptacle R1 that it requires. no attention on the part of the driver of the car. As a further means for introducing delicacy of clutching action and reducing depreciation, six mushrooms are located around the periphery of the clutch, with the heads of the mushrooms pressing out against the facing leather, and the stems thereof are in guides formed in the bosses B3, B4, B5, etc. Under the heads of the mushrooms stiff helical springs are placed and they press against the leather facing exerting 80 pounds pressure. Obviously, this amount of pressure, where there is no limit stop provided, would bulge the leather facing out and prevent the clutch from releasing when it is put through the declutching performance. The particular improvement that eliminates this difficulty is shown in the form of limit stop pins L1, L2 and L3 for each of the stems so that while the springs are capable of exerting 80 pounds each, pressing the mushrooms against the leather, the whole amount of outward travel of the mushrooms is limited to about one-sixteenth of an inch so that the clutch disengages readily and yet the delicacy of the performance is so pronounced that a pressure of less than 20 pounds suffices for the propulsion of the car up a 20 per cent. grade, but the engagement is soft.

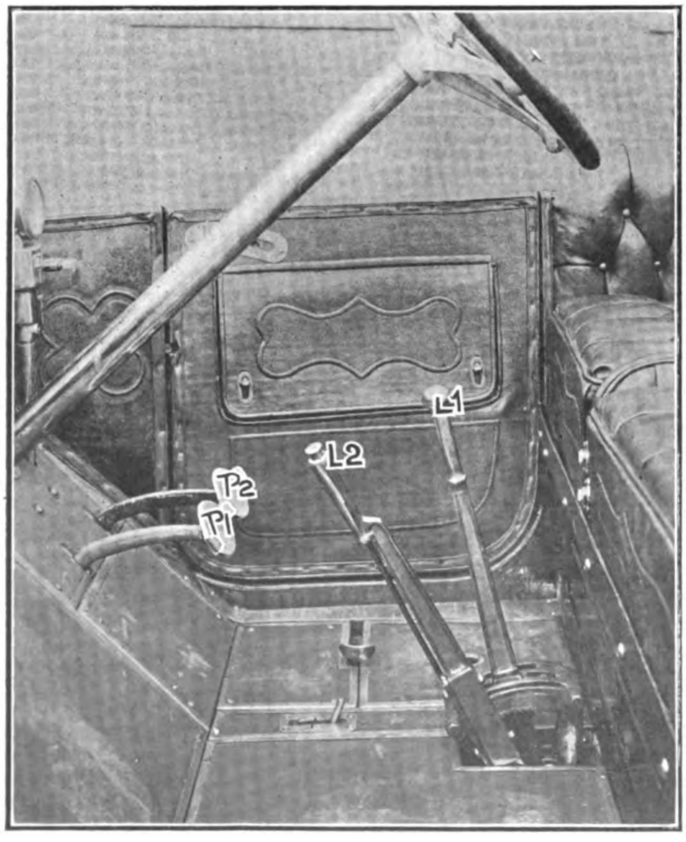


Fig. 12—Looking into the fore part of the body, the left-hand side showing the position of the driver on the right-hand side, free access and the side levers located amidship.

Reference was made to the universal joint as shown in Fig. 6 without calling attention to its refinements. Under ordinary conditions it is assumed that the duty of the universal joint is to transmit the twisting moment of the motor taking up angular positions depending upon the variables of the road surface. It is true perhaps that designers recognized the presence of a third inequality which takes on the form of reciprocating motion and a slip joint is generally utilized to compensate for these fore-and-aft variations.

In the new form of joint as here illustrated the telescoping function is performed by the large fluted member F1 with internal driving extensions E1, E2, E3, of which there are four engaging in slots in the mating member F2, which is also fitted with trunnions T3 and T4, working in bearings formed by a pair of rings R1 and R2, which are clamped together by bolts B1, of which there are eight. The yoke Y1 of the universal joint is integral with the sleeve S1 and the whole mechanism is enclosed in a spherical housing that is rendered oil-tight by means of overlapping joints to unit radius. The whole mechanism is packed in a hard lubricant and provision is made for the addition of lubricating material from time to time. The excellence of this joint in service is partly due to the large bearing surfaces afforded to a considerable extent because the trunnions P1 and P2 are in the same plane as the trunnions P3 and P4.

Intelligent Use of Properly Selected Material

The time has arrived in the building of automobiles when the user expresses a preference for the employment of the best materials for the purpose. It is not now a question of the use of alloy steel indiscriminately; it is important to employ the several grades of selected material that respond to the several demands. Fig. 7 is offered as an illustration of the character of steel that must be employed in the transmission gears if they are to serve efficaciously and last as long as the rest of the car. Fig. 7 shows a pinion that was tested to destruction after it was case-hardened. The crevices to be noted in the surfaces of the case are evidences of the fact that the pinion was subjected to an enormous deflection, but since the case failed to peel off it may be known that the bond between the case and the core was sufficiently tenacious for every possible exigency in service. The best indication of the excellence of this material is shown by the the fact that the hub H1 of the pinion A was subjected to such an enormous pressure that it was displaced more than one-fourth of an inch in the axle plane before destruction. B, Fig. 7, shows a gear blank that was deformed by being put under press until it was buckled over and flattened down. The illustration shows that it stood this abuse very well.

This particular steel has a composition as follows: Carbon, 0.28; chromium, 1.00; vanadium, 0.18; silicon, 0.26; manganese, 0.45; phosphorus, 0.02; sulphur, 0.02. This particular material is good for gear work because it presents a glass-hard surface and is possessed of a kinetic core; moreover, the tenacity with which the case adheres to the core is satisfactory for the purpose.

Fig. 13 represents the method of chassis suspension with a three-quarter elliptic spring at the rear, three U-bolts for clamping of the same, shock absorbers stoutly placed and a substantial gusset plate so formed as to support the action of the spring and transfer the reaction to the chassis frame, delivering the same over a broad area.

Body Work Takes an Advanced Position

Referring to Fig. 12 of a fore-door type of body, the steering wheel is located on the right-hand side, but the side levers are placed amidships. This arrangement permits of utilizing two fore-doors and gives the driver free access to the position of steering on the right-hand side of the car. The sliding gears are manipulated by the side-levers L1, the emergency brake lever is shown as L2, the clutch is manipulated by the pedal P1 and the service brakes are actuated by P2.

Fig. 11 is a detail showing the lock on the doors; it is in the form of the arc of a circle bounded by a plate P1 which serves as a guide for a cross-bar type of handle H1, and when the handle is pressed and its extension traverses the slot the motion thus imparted is communicated to a bar lock and the door is securely held in the closed position or it is released for opening as the case may be, all of which is accomplished without marring the smooth exterior of the torpedo type of body involved. An excellent idea of the fine appearance wrought by thus paying attention to the many details will be apparent by examining Fig. 1 of the Model 53 car. Fig. 2 shows the Model 52 fore-door type of car which seats five passengers, and the chassis of Models 52, 53 and 54 is shown in Fig. 3.

The Overland price proposition is especially favorable, as follows: Model 27, fitted with a two-seated body, sells for $1,000; Model 38, with four-seated body, $1,000; Model 40, 35-horsepower, with two, three or four-seated body, $1,200; Model 41, the same car with five-passenger body, $1,300; Model 42, with selective transmission, five-passenger body, $1,400 (the price of this model last year was $1,500); Model 45, with 96-inch wheelbase, low, two-seated body and gasoline tank at rear, $775; Model 46, the same car with two-seated, torpedo body, $850; Model 49 (the same as Model 37, but has selective transmission), $1,095; Model 50, 30-horsepower, with two-seated body, $1.250; Model 51, same with five-passenger body, $1,250; Model 52, 35-horsepower, wheelbase 118 inches, five-passenger body, $1,600; Model 53, same with two-passenger, torpedo body, $1,600; Model 53, same with four-passenger, torpedo body, $1,675.

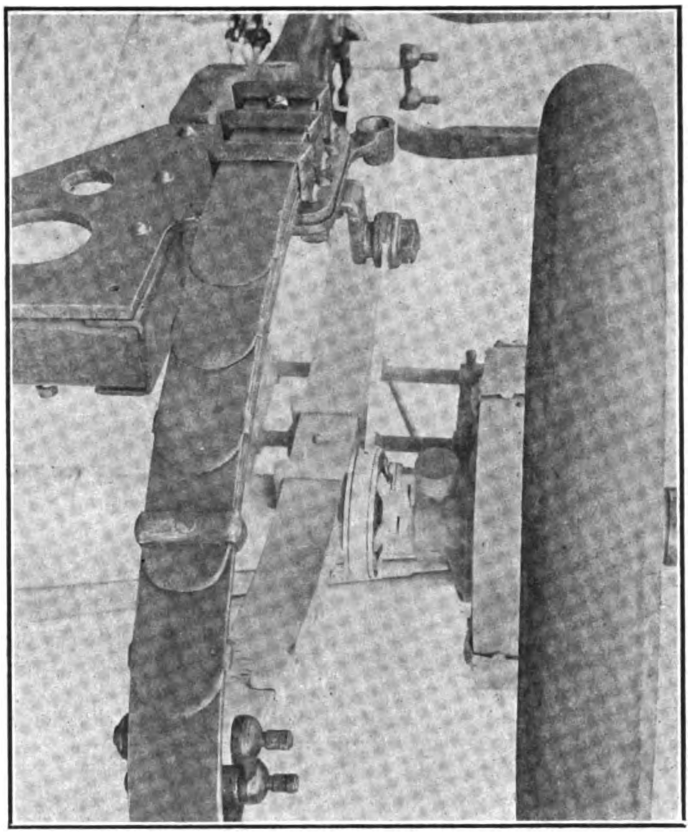


Fig. 13—A portion of the chassis, showing the rear spring suspension and details of carrying the same

Aeroplane Traffic

BY MARIUS C. KRARUP. [CONTINUED FROM LAST WEEK]—THE CHEAP AEROPLANES AND THE PATENTS—PRINCIPAL TYPES OF IMPROVED AEROPLANE MACHINES INDICATED FOR THE IMMEDIATE FUTURE

WHILE there may be dissension with regard to the figures and magnitude of the movement, the preceding analysis of the situation seems to bear out as a reasonable prediction that there is impending a widespread production of small and cheap aeroplanes, and that this production can not be suppressed. And it will be generally agreed without argument that the present development of the costly individual aeroplane, which has already metamorphosed most of the magazines devoted to sports and outdoor life into aeronautical journals and engages from two to ten columns in nearly every issue of the metropolitan dailies, can not be stopped. It must go on in some form. The Alps and the Himalayas, as well as the Atlantic Ocean, must be crossed by the air route before the human mind can declare itself satisfied, once having tasted the delights of jar-less travel through the empyrean and once thoroughly convinced that the physical laws of the universe are friendly and need only be coaxed with a suitable combination of power and insight. If all the aviators tumbled from the skies, one after another, the aviator will still be. *Ruat coelum, impavidum ferient ruinae,* as spoke prophetically Q. H. Flaccus, of ancient memory.

The impending widespread production of small and cheap aeroplanes must rest on the mechanical certainty that it is possible to accomplish at very low cost all that has been accomplished to date at high cost, and even to accomplish, incidentally, a little more, with regard to the safety of the conveyance, than has been offered so far in any one aeroplane machine, and all without exceeding the low cost limit which means popularity.

The coming development of the more elaborate machine, on the other hand, must rest on the necessity for doing much better, the need of much greater safety, much higher speed, much lower speed when required, greater carrying capacity, more comfort; and on the gradual recognition among designers and builders of the proper means to be adopted for these ends. At present, this development must of mental necessity take more than one direction, since all can not at once be made to think alike on the theories of flight, and questions of cost play a subordinate part and exercise little restraint where enthusiasm is coupled with ample means. Judging the immediate future from the immediate past, those who clamor only for more power and fancy that all problems are to be solved by a two-hundred horsepower engine weighing one hundred pounds will not be satisfied till their proposition shall have been tried out to the limit and every propeller shall have become the circumferential part of a rotary engine; and, no doubt, valuable discoveries will be made along the road of these efforts. At the same time, those others who see more deeply important and practical results in first developing the capacity of the aeroplane for slow travel by a minimum of engine power and in the safeguarding of equilibrium by other means than sheer speed, will continue their efforts, and in the course of time these two schools in aviation will meet on the common ground of obedience to the physical laws—obeying them all, rather than picking out some as important and neglecting others—and the costly individual aeroplane will take one or two standardized forms in which the question of high or low speed will be resolved into a question of the payload which the machine must carry. Between the spell of speed and the warning of danger the development will steer itself by degrees toward the final adoption of one type of flier, and the same type will also be reached by a third route through gradual refinement of the cheap flier of the immediate future and the introduction of economical processes for manufacturing the all-around satisfactory design and construction meanwhile and finally evolved for all. In these generalities all may agree. They cover many possible variations of fliers in the interim. It is, however, the sequence and relative degrees of popularity of the first improved types to be developed which is of greatest interest in this attempt at a reasoned forecast of the immediate future.

Before proceeding to specialize in this respect, the possibilities of interference with a rational evolution through the action of special privilege should perhaps be examined. It is frequently asserted that basic patents will greatly retard the whole growth of the aeroplane industry, and, when this is said, it is usually the patent rights of the Wright corporation which the speaker has in mind. The exactions to be expected from this source are not very likely to become burdensome, however, as any demands falling heavily upon each owner of an aeroplane would be difficult to enforce, and the situation seems to be one in which the industry, as such, may slip from under. Probably "means for varying the angles of incidence of the two sides of an aeroplane" are absolutely indispensable for successful flight, but it is at present not generally believed that this indispensable feature can be monopolized except in conjunction with "means for simultaneously controlling the position of a vertical rudder," and the vertical rudder (which is unknown among animated fliers) constitutes only one of many means for effecting side steering. In the case of the simple and cheap aeroplanes, it may be foreseen that any extraordinary financial pressure upon those wishing to engage in the manufacture will simply result in aeroplanes being made without any of the special contrivances which may be subject to tribute, yet so arranged that these contrivances may be added by the purchaser if they are really required, and it does not seem to be excluded that any device which may be desired by the public might be made by separate firms and openly marketed without conflict with anybody's patent rights, since at worst they would not infringe until placed in combination with the aeroplane machine. If the latter, for example, were made sufficiently supple to admit of warping the planes but not equipped with any device for carrying the warping into effect, it would scarcely infringe. And if the aero-supplies stores were to sell cables and pulleys by which such warping might be easily effected and which, if need be, could also be readily connected with the vertical side-steering rudder, if any such be used, it seems evident that the practical burden of possible infringement could be placed upon the more or less intangible or irresponsible purchaser of the plane, and that all legal proceedings would have to be entered against purchasers individually and severally, with the burden of proof as to the actual employment of the infringing combination resting squarely upon the plaintiff. Between the choice of enforcing the demand for a heavy and onerous tribute in a situation as described and, on the other hand, of reducing the tribute to a minimum to which the manufacturers would be glad to submit, and which would nowise retard the evolution of the new industry, there can hardly be a reasonable doubt as to the result, nor as to the justice of it, since after all the practical flying machine is the product of an age rather than of a man, and one in the profits of which the estates of a considerable number of pioneers might well claim certain shares if justice and legality were one and coextensive ideas, particularly so long as the question is of royalties demanded for a construction feature without which no flying can take place. That the feature discovered last among those indispensable attributes of a machine for flying should be worth so much more commercially than those equally indispensable features and proportions discovered by Lilienthal, Penaud, Ader, Langley, Chanute and others seems to be a concession to legality which there is no reason for making more burdensome to the world than it has to be in order that law and order may be maintained.

If the views expressed are reasonable, it may then be assumed that there is nothing in the present patent situation which will prevent the widespread manufacture of cheap aeroplanes suitable for accomplishing all that has so far been accomplished with aeroplanes of any description or cost, and with regard to desirable new improvements it may be taken for granted that whatever will be added in cost of production through their necessity will carry with it corresponding additions to safety and utility, which in turn will result in greater rather than lesser popularity. With regard to the more elaborate and costly industrial aeroplanes, the cost question, as dependent upon the value and validity of patents, is less clear but also less important. Whatever the laws of the land demand in the form of tribute to established rights will be rendered, but it is already apparent that, unless any method for presenting the main planes of a machine at variable angles to the atmospheric resistance shall be considered by the courts as the property of one concern—and this is scarcely claimed to-day to be a probable result of pending litigation—all existing prerogatives will surely be swept into the industrial clearing house where they may be equitably exchanged against one or another of the much greater number of new prerogatives which are bound to be created from time to time in the further improvement of aeroplane construction. The mere fact that the road to industrial perfection of air craft has barely been opened and that commercial results in the end are to be reached by this road only, unless the new manufacture is to be an anomaly in a modern age, precludes the absolute predominance of any one concern, now that thousands are working along the same lines; and the forecast of the probable development may therefore safely be made without reference to the restraining influence of patents.

It should be possible to get a perspective of the prospects by passing in brief review some or all of those facts in the situation which seem to have strongest bearing on the future.

It is known that none of the aeroplanes with whose flight the public is familiar is safe in a turbulent atmosphere. The good paterfamilias whose common sense is extolled in Roman law and held as normal for civilized persons, would not entrust his life to any of them except for very thrifty special cause or in very calm weather. The absence of safety is partly due to lack of natural stability, rendering very quick and skilled control movements necessary in case of disturbance, and partly to the physical impossibility of controlling by rudders unless the machine has speed and this speed (against the surrounding air) is mainly in the direction of the axis of the machine.

The moment cheap aeroplanes are offered the public and give as much safety as the best of the machines now made and exhibited, a much higher degree of safety will be insisted upon in expensive machines. This is a simple commercial law.

Assuming that a safer machine may be constructed, one which a skillful aviator can handle in rough weather, but that the uncertainties arising when the motor is stalled or the aviator gets-confused still remain, a certain demand for a machine of this order may be counted upon, but it will be confined to sportsmen and professional aviators.

If the continued operation of the motor is assured under practically all circumstances, so that a gliding descent to an uncertain landing place will never or very rarely be required, this will in itself mean a considerable reduction in the requirement for special skill and presence of mind, and the circle of possible purchasers must be correspondingly enlarged, but there will still remain a great majority of good fathers of families who will not shoulder the expense of a costly individual machine or the danger incidental to the acquirement of skill in handling it.

In order to enlist this great majority among the supporters of the coming aeroplane industry, it will be necessary to construct and develop a machine possessing all the qualities of the best individual machines and in which the handling may be given into the hands of a skilled conductor whose natural solicitude for his own safety will guarantee that of the passengers. And in order to have flight under these conditions cheap enough to attract large numbers, it will be necessary to have a large structure capable of accommodating as many persons as may be seated in a street car or omnibus.

If a machine of this construction can be turned out, its use will naturally greatly reduce the number of those who will take the cost and risk of even the best individual machine, if the latter can not offer practically the same guarantee of infallible motor power.

Considering that infallible motor power means not only full assurance of having the motor continue to work for the duration of one trip or journey but also the possibility of maintaining it in perfect order without too heavy a draft upon mechanical insight, and that nothing has transpired in motor manufacture, as yet, to warrant the belief that such a motor, of sufficiently light weight, will be produced within the next five or ten years, the whole situation points in the direction of the large or multiple machine with seating and carrying capacity for many, with the safety of the very best individual motor multiplied by coupling a number of such motors together in the same manner as contemplated in the employment of internal-combustion motors for large marine craft, and with the skill of operating the structure, as well as the skill in caring for it, delegated to specialists.

With a view to industrial enlargement of the aeroplane movement, the pressure for profits from expensive constructions must tend in this direction, and this so much more strongly as the experience gained in safe common carriers must act as a powerful stimulus for removing the hesitations which even game sportsmen will naturally feel against investing heavily in individual machines before the sensations accompanying flight under different weather conditions shall have become somewhat familiar to them without the incurrence of heroic risks. In this respect it seems worth noting that the press has very little to say about flights by the many individuals who have bought aeroplanes in France. It is common report that these mostly remain unused in the sheds.

The mechanical objections to all efforts for imparting automatic stability to relatively flimsy machines supporting a relatively heavy weight have been previously noted and are here for brevity's sake omitted.

The hold which the dirigible balloon has upon popular fancy may be mentioned as pointing to the multiple aeroplane as the form of construction which promises the greatest popular participation in aviation and therefore the greatest industrial development.

Among promoters it seems to have become an axiom that any venture which is based upon the amusement of the many has, as such, the best possible chances for financial success, and from this viewpoint there should then be great encouragement for the building of aeroplanes of the multiple type for use at amusement resorts, provided constructions of this order are possible and safe.

While much more might be said on the subject without exhausting it, it is perhaps already made clear that, industrially, the greatest possible stress in the developments of the immediate future should rationally fall in two different directions, first, toward materializing the small cheap aeroplane mostly based upon past experience and established data and, secondly, toward perfecting the multiple aeroplane capable of carrying many with perfect safety.

The main requirement of the moment must then be a construction which lends itself to the latter purpose. And it is clear that lateral enlargement of aeroplanes of the current types is beset with enormous engineering difficulties and increased troubles in maintaining the balance of the structure. It is also clear that longitudinal enlargement is inconsistent with control by rudders, fore or aft. The supporting planes themselves must be the rudders, that is, the wings must be adjustable. A structure with, for example, six pairs of adjustable wings could not

(*Continued on page* 509.)

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL CLIMBS, ETC.

Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4,'11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11,'11	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Mch. 4-11, 1911	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.

Races, Hill-Climbs, Etc.

Sept. 24	Belmont Track, Narbeth Race Meet, Norristown Automobile Club.
Sept. 28-30	St. Louis, Mo., Third Annual National Good Roads Convention.
Oct. 1	Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 1	Track, Springfield, Ill., State Fair.
Oct. 3	Louisville, Ky., Reliability Run, Louisville Automobile Club.
Oct. 6-8	Santa Anna, Cal., Track Meet.
Oct. 7-8	Los Angeles, Cal., Speedway Meet.
Oct. 8	Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 14-18	Washington, D. C., Start of Washington Post Reliability Run to Richmond, Va.
Oct. 15	Long Island Motor Parkway, Grand Prize, Automobile Club of America.
Oct. 15-18	Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.
Oct. 27-29	Dallas, Tex., Track Meet.
Oct.	Exhibition Auto vs. Aeroplane, Dutchess County Fair, Poughkeepsie, N. Y.
Nov. 3-5	Atlanta, Ga., Speedway Meet, Atlanta A. A.
Nov. 5-6	New Orleans, La., Track Meet.
Nov. 10-12-13	San Antonio, Tex., Track Meet.
Nov. 24	Redlands, Cal., Hill Climb.
Nov. 24	Savannah, Ga., Road Race, Savannah Automobile Club.

Foreign Shows and Races

May 1-Oct. 1	Vienna, Austria-Hungary Automobile and Aviation Exposition.
Aug. 1-Sept. 15	French Industrial Vehicle Trials.

THE AUTOMOBILE

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JUST now the automobile business is undergoing crystallization and the men who have the vigor and the red blood in their veins on a basis to permit them to do men's work are acting in an executive capacity with great efficiency.

* * *

AS in every other walk in life, there is bound to be a certain percentage of the actors who do not occupy the center of the stage, nor are they likely to have a large say in the final settlement of the many important details that are now scheduled for action.

* * *

PERHAPS there is a sprinkling of the character of a citizen who expects to get something for nothing; this class of man casts a reflection on a basis of discredit on the industry and he is hard to get rid of.

* * *

FORTUNATELY the foundation of the automobile industry is absolutely sound; the principal affairs are going along smoothly, but here and there a fester spot is being encountered; this condition is somewhat perturbing to the character of man who would shine as a fine weather sailor.

* * *

SCRUTINY discloses the fact that too little attention has been paid to the limiting of overhead charges; true, profits, instead of having been squandered in Europe, were put back into the plants with the expectation that the foundation will be more secure, and so it will.

* * *

THAT the result is just what might have been expected may be readily understood, but there is a slight plaint based upon the theory that the cost of the purse has made heavy inroads on the fund that incumbered a less pretentious hiding place.

* * *

IF there is anything to be said in despair of the automobile business at the present time, it may be summed up in the simple statement of the fact that there may be a little more raw material on hand than would seem to be absolutely necessary in view of the immediate demand for cars.

* * *

ORDERS are coming in steadily; the public persists in believing in the automobile on a utility basis; the banker who wishes to shine as a moulder of public opinion is proving that he is lacking in luster, and the conservative banker who wisely confines his activities to his legitimate sphere is lending real support to the industry.

* * *

HOW to do without the rumor monger who pesters the automobile landscape is a problem that would seem to be hard to solve were it not for the persistence with which the law of the survival of the fittest goes on its serene way.

* * *

NEVERTHELESS, the temptation to maintain that the law is a little rusty on its hinges is stout in many quarters, and certainly it would be to the distinct advantage of the automobile business were those who circulate baseless stories gagged by a spell of real work.

* * *

BUT success is more gratifying if it is seasoned with adversity, and while it is admitted that the peppery ingredients are ever present, it is impossible to hide the splendid measure of success that the automobile business is enjoying, the half of which lies in the ample evidence of growing volume that may be seen on every hand.

* * *

FROM now on it is reasonable to expect that bombast and the gamut of pyrotechnics will occupy a fitting niche in a well-designed and efficient cold storage plant while the real makers of automobiles will render their stagnated materials liquid and entertain solvency as an honored guest.

* * *

THERE is some talk about the restriction of 1911 output, but it is not well founded unless it is amplified: the ban is on hastily-made product; the volume of business as measured in dollars will be greater than it was last year by perhaps one-half.

* * *

THE main chance for making a serious mistake lies in not appreciating the keenness of the automobile public; it knows what it wants; if fore-door types of bodies, for illustration, are better than the other kind, the automobiling public will come to a full realization of the fact and it will go hard with the maker who disagrees with merit and a learned clientèle at the same time.

A.L.A.M. Sues Importers

TAKES AGGRESSIVE STAND AGAINST MORE ALLEGED INFRINGERS OF SELDEN PATENT, ASKING DAMAGES AND SEEKING INJUNCTIONS IN FEDERAL COURT

FOLLOWING the recent progressive steps in the Selden patent litigation, the A. L. A. M. has assumed an aggressive position with relation to further action. Suits for damages and profits arising out of alleged infringements of the Selden Patent and asking for injunctions against eighteen importers and dealers in foreign cars and the Fiat Automobile Company of Poughkeepsie, all of whom are not included within the list of licensees under the patent, have been filed and an additional number has been prepared upon which service has not yet been made.

The recent decree of Judge Hough, of the Federal Circuit Court of Southern New York, was directed mainly against the Ford Motor Company and Panhard and Levassor Company, but the action of the court was suspended in each case, after a bond of $350,000 had been filed by the former and one for $16,000 by the latter company.

While the suits against the defendants named have not been prosecuted to a conclusion, the decree filed by Judge Hough was final as far as three other defendants are concerned and it is in line with that phase of the decree that the present batch of suits is filed.

Under the complaints, the defendants are commanded to answer on or before October 3.

The ultimate hearing of the original suit, which has been appealed to the Court of Appeals, is set for the coming term. An adverse decision to the cause of the A. L. A. M. would overset not only the cases that have been appealed but would also nullify the action taken against the importers in this series of suits and those contemplated in the immediate future.

On the other hand, a decision sustaining the position of the A. L. A. M. would serve to make easy the course of prosecution in these cases.

The announcement is made officially that the A. L. A. M. is preparing another list of makers and dealers against all of whom similar suits will be commenced.

Among the companies that have already been served, with the cars they handle, are the following: S. P. O. Automobile Company (S. P. O.); Itala Import Company (Itala); Albert C. Otto (Saurer trucks); Fiat Automobile Company (Fiat); C. G. V. Import Company (C. G. V.); Delahaye Import Company (Delahaye); Zust Motor Company (Zust); Benz Auto Import Company (Benz); Hotchkiss Import Company (Hotchkiss); Daimler Import Company (Mercedes); Henry Ducasse & Company (Darracq); Renault Frères Selling Branch (Renault); Saurer Motor Trucks (Saurer trucks); Albert C. Travis (Mercedes); Healey & Company (Mercedes); Fiat Company of Poughkeepsie (American Fiat); A. T. Demarest & Company (English Daimler); J. M. Quinby & Co., Newark, N. J. (Isotta).

Wisconsin Court Hears Velie Suit

MILWAUKEE, Sept. 19—The Supreme Court of Wisconsin heard arguments late last week on a motion of the defendants in the $500,000 conspiracy suit brought by the Velie Motor Vehicle Company for a writ of prohibition to prevent Judge W. J. Turner, of the Circuit Court for Milwaukee County, from assuming jurisdiction in the matter. The case was taken under advisement.

Judge Turner recently dismissed the cases against twenty of the defendants by stipulation, holding four, of which number one was subsequently released. The remaining defendants are: Pope Manufacturing Company, Chalmers Motor Company and the Locomobile Company.

These defendants ask for a writ of prohibition, claiming that as service was made upon the Wisconsin sales representatives of these concerns, the foreign concerns have not received legal service of the complaint. The twenty-fifth defendant, the Kopmeier Motor Car Company of Milwaukee, a retail selling agency, is not concerned in the demand for the writ of prohibition. The Kopmeier company's demurrer was recently upheld, halting proceedings temporarily.

Variation in American Automobile Prices Since 1903

The Association of Licensed Automobile Manufacturers has just made public a most interesting tabulation in connection with the industry. It is a chart showing the variation in the average price of motor cars from 1903 until the present time. The reduction shown since 1907 is brought about by the great increase in the manufacture and sale of machines selling at $1,500 or less. The sales recorded by makers licensed under the Selden Patent are for American gasoline automobiles only. By comparison the sales of steam and electric vehicles are small.

The following comparative table indicates the average price for each year, including the first six months of 1910:

1903	Average price	.....$1,133.37	1907	Average price	.....$2,137.56
1904	" "	..... 1,351.45	1908	" "	..... 1,926.94
1905	" "	..... 1,609.79	1909	" "	..... 1,719.93
1906	" "	..... 1,853.93	1910	to July 1st	.... 1,545.93

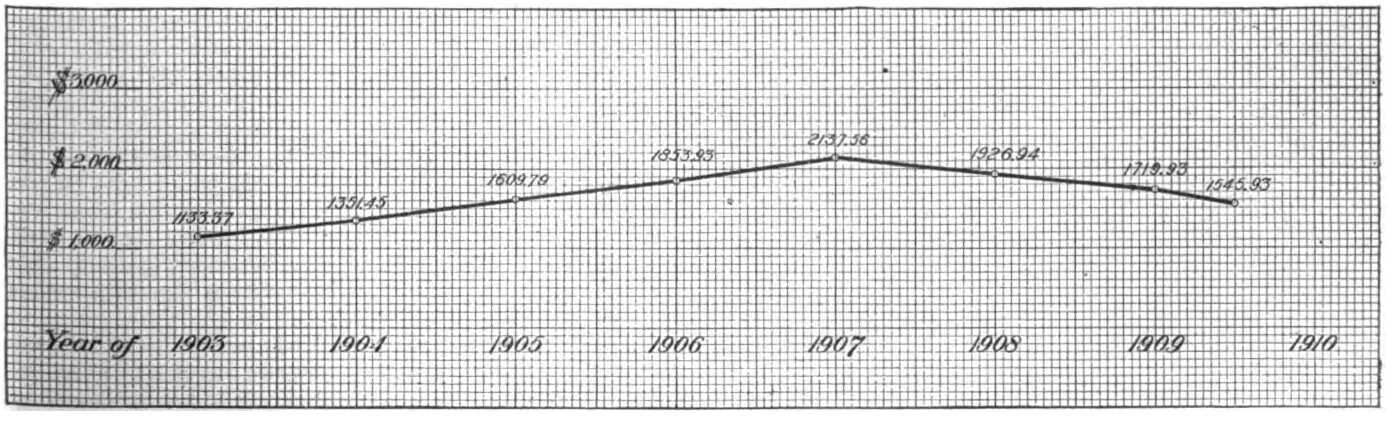
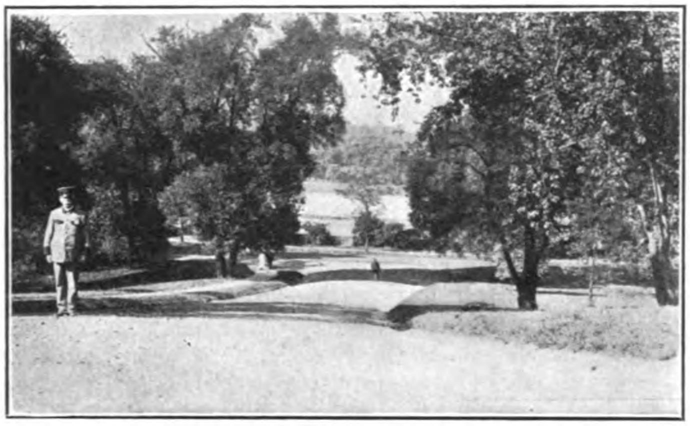
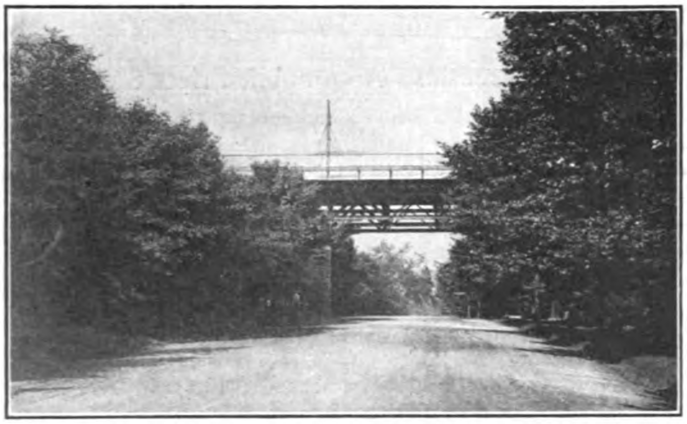


Diagram showing the fluctuation in the average price of American automobiles from 1903 to date

Home stretch—grand stand will be on right, press stand on left



"Dare-Devil Dip" down to the West River Drive



Under Strawberry Bridge on West River Drive

Where the flyers will make up time on the river drive

The Fairmount Park Rac

ONE of the richest prizes, one of the most characteristic of all the American road races and one of the most spectacular and unique events of motordom is the Fairmount Park 200-Mile Road Race of the Quaker City Motor Club, the third renewal of which is scheduled for October 8, one week after the Vanderbilt Cup event has been decided.

The money prizes hung up by the club this year total $6,500 and in addition there are numerous rich awards of plate and cash. The field this year will be divided into five classes under divisions 2, 3, 4, 5 and 6-C, which will allow any gasoline car or chassis made by a factory that has turned out at least 50 cars within the past twelve months, not necessarily of the same model and which measure from 161 to 750 cubic inches piston displacement, without minimum weight restrictions, to enter the race.

As the Vanderbilt Cup entries are restricted to cars measuring from 301 to 600 cubic inches, it will be seen that the field of the Fairmount Park race may include both larger and smaller cars than the ones that try for the Long Island crown.

On the face of the proposition it might seem that the admission of the big racing machines was unfair to those of smaller power, but it should be remembered that the course is exceedingly tortuous and that there are no long straight stretches upon which the big road engines' advantage in power would be emphasized. Then, too, there is a class prize of $1,000 offered in each division for the car that makes the best time in competition with those of similar power.

The entrant that makes the full course in the fastest time will win the grand prize of $2,500, and also its class prize of $1,000 and besides a number of other valuable prizes.

There will be no second, third and fourth money hung up by the club.

On account of the location of the race course, adjacent to the city of Philadelphia with population of over a million and a half, the attendance will undoubtedly be immense. In 1908 the estimated attendance was 400,000 and last year the figures were greatly increased.

With the broadening of the conditions of the race, which has been aimed to bring down a larger field of faster cars than ever before, the interest in the race will be intensified and preparations are being made to provide for a crowd approaching the million mark.

The start of the race will be made at noon and the cars will probably be sent away on 15-second intervals, the same as last year. Under the modified ruling of the Contest Board, the field may consist of thirty cars, and, as the race has filled to the limit on each of the two former occasions, it is to be assumed that the starters will number somewhere near the limit set. Owing to a change in the conditions of the race, which allowed Class C cars to enter instead of Class B, the entries so far have been comparatively few, but they are reported as coming in rapidly now. The entry box will not be declared closed until October 3.

The competing cars are required to make twenty-five circuits of the course, which is approximately eight miles long. The park boulevards over which it is laid are so wide that about two-tenths of a mile per lap can be cut off by hugging the pole all the way. Out in the middle of the road the circuit is exactly eight miles. It may be predicted with confidence that a determined effort to hug the pole will be made.

The history of the event is brief and glorious. In 1908 the race was confined to American-made cars and was won by a Locomobile 40, driven by George Robertson. Last year a Simplex 90, driven by the same pilot, scored a rather easy win from twenty

REPARATIONS FOR THE THIRD ANNUAL RENEWAL F THIS CLASSIC EVENT ARE NOW WELL UNDER AY—FIELD OF ENTRIES WILL BE LARGE

other competitors. The time made in the Fairmount race is never fast as compared with that made on several other road courses. The winners in the past have only approximated 50 miles an hour. This is the result of the winding course, lack of straightaways and the presence of several stiff grades. It is thought that the record for the race will be set at a higher mark this year, some drivers talking of a mile-a-minute speed.

Starting on the level South Concourse, the course takes a sudden shoot down the tortuous Sweet Briar Hill to the level of the Schuylkill at the West River Drive. Then comes a three-mile level, following the windings of the river to Neill Drive, where a left turn up the long grade carries the racers to the high ground on City Line road, and thence by a left turn into Belmont avenue. This broad thoroughfare is followed around the base of George's Hill and thence to the head of the stretch.

The committee of citizens acting with the Quaker City Motor Club and headed by Mayor Reyburn as chairman has extended a formal and cordial invitation to President William H. Taft to be the guest of honor during the race. If the President accepts the invitation he will be met at the Broad Street station and escorted to the course by a civic committee, the First Troop Philadelphia City Cavalry and a squad of police. The grand stand, in which the Presidential box is already being planned, will be situated in West Park, just south of Memorial Hall.

From October 3 until the morning of the race the course will be closed to traffic between the hour of dawn and 7 a. m. so that the contestants may familiarize themselves with the route.

One of the features of the race is the fact that half the receipts are donated to charity. In the past the amount turned over to work of this kind has amounted to about $10,000 a year. The city officials act in intimate conjunction with the officers of the Quaker City Motor Club and Mayor Reyburn, Henry Clay, of the police department, and representatives of the various charitable organizations that enjoy benefits on account of the race and the following delegation of clubmen form the executive committee in charge of the enterprise: Frank Hardart, L. D. Berger, Fred C. Dunlap, A. T. James and G. Hilton Gantert.

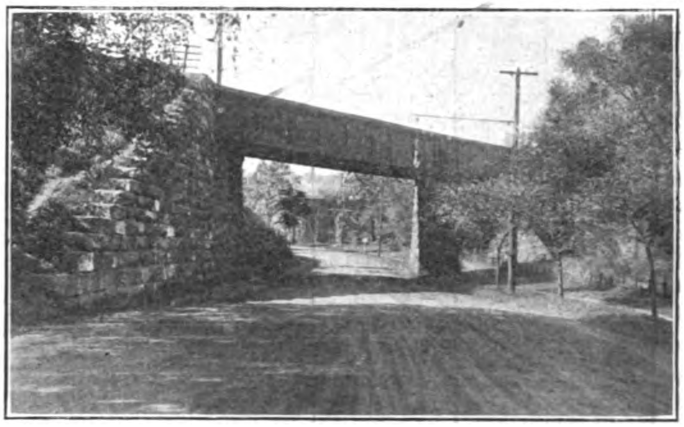
The following institutions are beneficiaries and participants in the funds raised on account of the race: Home of the Merciful Saviour for Crippled Children, Playground Committee, Mount Sinai Hospital, St. Mary's Hospital and the Police Pension Fund.

Up to the present, which leaves a margin of eleven days before the closing of the entry box, the entered cars are as follows:

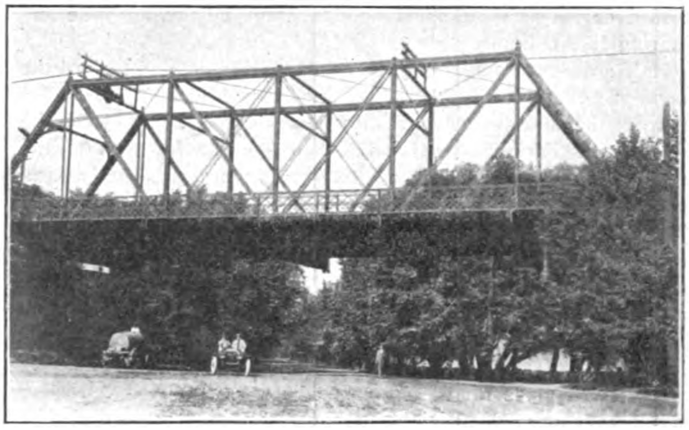
Car	Entrant	Driver
Alco	American Locomotive Co.	H. Y. Grant
Chadwick	Chadwick Engineering Co.	Len Zengle
Chadwick	Chadwick Engineering Co.	Al Mitchell
Benz	Benz Auto Import Co.	George Robertson
Benz	Benz Auto Import Co.	Ed Hearne
Apperson	Apperson Bros. Auto Co.	H. M. Hanshue
Jackson	Jackson Automobile Co.	E. F. Scheifler

The officers who will have charge of the race include the following: Honorary referees, John E. Reyburn and S. M. Butler: representative of the Contest Board, P. D. Folwell: referee, R. E. Ross; judges, Charles J. Swain, L. D. Berger, G. Douglass Bartlett; chief timer, Paul B. Huyette; scorer, W. C. Jackson: starter, G. Hilton Gantert; contest committee, R. E. Ross, G. Hilton Gantert, Fred C. Dunlap, A. T. James, A. E. Maltby, George M. Graham, Paul B. Huyette, Evans Church and Joseph L. Keir; technical committee, Percy C. Colket, C. Stead and Harry A. Lewis; clerk of the course, Joseph L. Keir; announcer, Clarence W. Cranmer and the racing secretary, Harry C. Harbach, secretary of the Quaker City Motor Club, who has charge of all the details of preparation and execution for the event.

Straight course after leaving the Strawberry Bridge



Under the B. and O. bridge just before leaving river drive



Where the Reading Railroad crosses the course at Belmont

Back of George's Hill, before reaching the stretch

Vanderbilt Cars Practice

FAST WORK DONE BY CUP ASPIRANTS AT OPENING OF COURSE. ENTRY LIST NOW CONTAINS TWENTY-TWO CONTESTING AUTOMOBILES

PRELIMINARY practice for the Vanderbilt Cup Race commenced Tuesday morning at dawn over the cup course on Long Island. Prior to the formal practice, the Lozier aspirant was run over the route a few times by Ralph Mulford, but nothing like high speed was attempted as the county roads were not closed at that time.

Five more entries for the Vanderbilt Cup have been received as follows:

Car	Entrant	Driver
Jackson	Jackson Auto Co.	E. F. Scheifler
Corbin	Corbin Motor Veh. Co.	Joseph Matson
Amplex	S. J. Wise & Co.	Walter Jones
National	Poertner M. C. Co.	L. A. Disbrow
Stoddard-Dayton	U. S. Motor Co.	Tobin De Hymel

Total entry list to date, 22 cars

The Mercer entry to be driven by E. H. Sherwood, announced for the Massapequa Sweepstakes, has been transferred to the Wheatly Hills Sweepstakes and a Corbin to be driven by Alvin Maisonville has been entered in the Wheatly Hills. An S. P. O. car, entered by Thomas N. Cook, to be driven by Jean Juhasz, and a Correja, entered by J. Mora Boyle, have been added to the entry list of the Wheatly Hills Sweepstakes. The Abbott Motor Company has entered three cars in the Massapequa Sweepstakes. A Lancia, which will be piloted by William Knipper has been entered in the Massapequa Sweepstakes.

Just at daybreak Tuesday morning, the roar of a racing motor was to be heard off to the westward of the grandstand as A. R. Pardington and a party of officials reached the stand. Presently in the gray dusk a swift-moving drab streak appeared upon the distant hilltop and in another moment the Amplex, two-cycle motor, darted past the stand with throttle and muffler wide and roaring like a lion.

Half a dozen watches snapped as the driver nodded toward the stand and the first official trial of the practice was on.

From the time the Amplex disappeared from view beyond the turn in the Parkway until it had rounded the far turn to the northwest and started back again toward the stand, the barking engine was clearly to be heard. Then for about thirty seconds the sound was lost, only to be picked up again as a throbbing against the eardrums when the machine topped the far hill and headed for the line. With a rush and a swirl like the explosion of machine-gun shells in a thicket, the car passed the stand again.

It seemed as if it must have done remarkably fast time from the amount of noise made and apparent speed, but the watches only showed 11:52 for the circuit. That rate of speed, however, would have proved sufficient to have won in other Vanderbilt Cups if maintained from start to finish.

The next aspirant for speed honors was the Simplex, driven by Mitchell. A broken spring-clip prevented anything sensational in the way of a trial, as the driver eased the car along and made the circuit in 12:18 according to announcement.

The second trial proved the end of the practice for the day, but on Wednesday morning half a dozen of the entered machines will go through their paces. The Benz trio, the two Simplexes, the pair of Marmons, the Apperson, two Corbins and the Lozier are on the ground and ready to commence practice.

The course is patrolled from 5 a. m. to 8 a. m. by a squad of flagmen stationed at every crossing and every doubtful spot on the route. The guards are equipped with a red flag and a white flag. The white means danger to the speeding contestant and the red means danger to the public and safety to the driver.

The course is practically in racing shape. The oil treatment of the county roads this year consisted of 1,500 gallons to the mile and will not be repeated before the race. One good rain is needed to put the roads in ideal condition and the weather appearances favor at least that much precipitation.

The start of the Vanderbilt Cup has been advertised for 5 o'clock sharp, but by October 1 it will be stone black at that hour and it is likely that the first car will not be sent away until about 6 o'clock. The Vanderbilt entries will be dispatched at ten second intervals and one hour after the last of the cars is sent on its long dash, the first of the Wheatley Hills entries will commence its race. After the contestants in that event have started, there will be another lull for a half hour and then the contestants for the Massapequa Sweepstakes will be called to the post. The idea is to hold the interest and attention of the crowd until the finish of the race and to provide a powerful motive for keeping the course clear until practically all the cars in the three events have passed the line.

If the plans work out as intended, it is not unlikely that the winning cars in the three contests will finish in the same lap. This of course contemplates fast time by the Vanderbilt winner, but external appearances seem to favor some exceedingly rapid work in that class.

The telautograph will be used in disseminating information from the stand to the scoreboards, there being one transmitting instrument and seven receivers in process of installation at present. The process of scoring will be augmented by the use of this instrument. The timers will hand the scores to the operator who will send them direct to the board markers. On either side of the press stand giant frames are being built to hold the boards, and the system of marking that will be used allows the operator to place the lap figures in appropriate squares behind the board and without obstructing the view from the grandstand, to display the figures on the face of the board.

The Warner timing instruments will be installed by Friday morning, when it is expected that all the contesting cars will be in camp.

There was a heavy fog over the Vanderbilt Cup course Wednesday morning when day broke and for a short time it looked as if practice would have to be postponed. But about 6:30 o'clock the fog lifted and in a short time one of the Pope-Hartford cars came down to the line with everything drawing alow and aloft and Bert Dingley at the wheel. The racy-looking white car flashed by the timers and was gone in a jiffy proceeding over the full course and finishing the lap in 11:21, which is the fastest time made in practice so far this year.

The Simplex (Mitchell) made a round in 11:41 and the other Pope-Hartford entry was also out. The Marion, entered in the Wheatley Hills, was given a spin by Basle at moderate speed.

Good Roads Convention Draws Interest

Interest in the Third National Good Roads Convention which will assemble in St. Louis, September 28 and remain in session for three days, is as wide as the country. While the proceedings and deliberations will be of more direct value to the Southwest than any other general division, the convention will be attended by big delegations from Massachusetts, Colorado, the Pacific Coast, Gulf Coast States and from nearly every other quarter of the land.

The program includes a series of addresses that will go to the root of road construction of the most advanced type. Among the speakers are the following: N. J. Batchelder, master of the National Grange; Charles S. Barett, president of the Farmers' Union; C. O. Raines, master of the Missouri State Grange; and a dozen other leaders of thought and action on the subject of good highways.

1911 Cars at Detroit

AUTOMOBILE SHOW AT THE MICHIGAN STATE FAIR MARKED BY THE FIRST APPEARANCE OF MANY OF THE COMING YEAR'S MODELS

DETROIT, MICH., Sept. 19—Never, in the history of the Michigan State Fair, has the gasoline motor had such a representation or played so conspicuous a part as this year. The opening of the 1910 fair also marked the opening of the new automobile building, a handsome, two-story brick structure, 125 by 275 feet, with a floor space of more than 68,000 square feet. Nearly all of the space is occupied and the opening found most of the exhibits in place.

Following is a list of the exhibitors:

Security Auto Co., Olds Motor Works, Lion Motor Sales Co., Maxwell-Briscoe-McLeod Co., Ford Motor Co., Anderson Carriage Co., Cadillac Motor Car Co., Detroit Motor Sales Co., Herreshoff Motor Car Co., Brush-Detroit Motor Car Co., Elmore Auto Co., Cartercar Co., J. P. Schneider, Overland Sales Co., Van Dyke Auto Co., Cass Motor Truck Co., Port Huron; Keeler-Hupp Motor Co., Montgomery Motor Sales Co., Winton Motor Carriage Co., Grabowsky Power Wagon Co., Rapid Motor Vehicle Co., Buick Motor Co., Regal Motor Car Co., C. B. Fear, J. H. Brady Auto Co., W. A. Patterson Carriage Co., Flint, Mich.; Standard Oil Co., Atlantic Refining Co., Cleveland; Auto Supply & Manufacturing Co., Searchlight Gas Co., Pittsburg; Auto Equipment Co., Eastern Rock Island Plow Co., Indianapolis; Flint Wagon Co., Gillespie Auto Sales Co., Jackson Motor Co., Jackson, Mich.; Michigan Magneto, Portland Cement, Emil Grossman Co., New York; Manson-Campbell Co., Wayne Oil Tank & Pump Co., Seitz Auto & Transmission Co. and the Craig Auto Co.

Saturday has been set apart as Automobile Day at the fair and a great racing card has been arranged by the Wolverine Automobile Club, which will have full charge of this feature of the big show.

Buick Financed; Nash Is Manager

Definite announcement of the success of the Buick Motor Company in negotiating a loan of $2,500,000 to provide working capital for the coming year's business has been made. Boston capitalists were interested in the financial plans of the company and it is understood that the matter has been arranged on a permanent basis by the sale of bonds rather than by the floating of short time notes or certificates.

The big plant at Flint, which has been shut down, will be run at its full capacity under new management. Charles W. Nash, who has been general superintendent for several years, will be the general manager. The production for 1911 is estimated at 18,000 cars.

Hartford Tire Men in Convention

The three-day conference of the field representatives and branch managers of the Hartford Rubber Works Company terminated in a dinner at the Shoreham at Morris Cove, New Haven. Those present at the convention were: Justus D. Anderson, president; Harry E. Field, vice-president; E. S. Benson, secretary; J. P. Keough, treasurer; C. B. Whittlesey, superintendent of the works; John Shea, master mechanic; Franklin Kesser, sales manager; D. W. Pinney, assistant treasurer, M. C. Stokes, motorcycle tire department; Charles Clark, motor tire department; W. H. Reed and A. E. Martel, solid tire department; Guy Turner, repair department; Fred Appleton shipping department. The following branch managers were present: E. S. Roe, New York; W. H. Barnes, Philadelphia; Charles Langmaid, Boston; O. S. Johnson, Buffalo; P. H. Goodall, Cleveland; H. Severance, Detroit; A. W. Kirk, Atlanta; W. H. Powell, Chicago and the following salesmen: A. D. Cruden, Harry Snyder, E. H. Fahey, and W. Brown, New York; G. D. Niles, L. C. Havener, L. Frohock, Boston; E. H. Johansen, J. R. Hoffman, E. L. Duffie, and H. V. Koons, Philadelphia; S. N. Keller, Buffalo; H. B. McIntosh, Thomas McClurg, Cleveland; J. H. Tompkins, Detroit; P. B. Simmons, H. E. Smith, G. R. Noble, G. H. Wright, W. W. Clark, Chicago; E. S. Edwards, J. Morgan and C. P. Towne, Connecticut.

Commercial Vehicles in New York Run

Under the management of the New York *American*, a commercial vehicle reliability test will be held in the metropolis October 28 and 29. The course of the run will be over various streets of New York and aside from mechanical ability to maintain a fixed schedule of speed, the test will include economy of operation.

Up to date four entries have been made as follows: Morgan, five-ton truck; Gaggenau, seven-ton truck; Garford, two-ton truck and Renault, two-ton truck.

Aeroplane Traffic

(*Continued from page* 503.)

be conceived as of the biplane type. It must be a multiple monoplane with the wings tandem in pairs. In early experiments tandem construction was found ungovernable, but the planes were rigid, the control by rudder. In fact all aeroplanes have been more or less ungovernable in puffs of wind. All types known have at times been bumped off their equilibrium by atmospheric disturbance. Hence the aeroplane of any type, individual or multiple, needs "springs" or "shock absorbers," even though it floats on air. On second thought it is indeed self-evident that a medium which smooth (that is, calm or steady) supports a half-ton as on asphalt or better, will be capable of jolting the same half ton when rough (that is, puffy). The multiple aeroplane must have "springs"; that is, its adjustable wings must have flexible elements in them. These much elongated structures which it is possible to foresee, if the aeroplane is to have a strong industrial future, will have a much improved stability, as the weight and the propeller shaft may be placed considerably below the level of the air resistance, by reason of the elongated shape, in the same manner as with dirigible balloons. And they can not fall endwise by gravitation; no more than a wooden stick can fall endwise unless it is loaded endwise or twirled.

A description of a multiple aeroplane on the plan indicated would be too long for this article, but it is already seen that a construction of this order is wanted for an industrial development and that it presents no difficulties which can not be surmounted the moment control by adjustable wings is realized in practice; in fact, that it is a simpler engineering problem to construct a multiple aeroplane which can be operated with safety than an individual aeroplane of equal merits. As soon as the combination of adjustable main planes with the required strength and the required weight limit shall have reached the practical solution upon which many engineers are working, the multiple aeroplane available for amusement resorts and as a common carrier should for all the reasons mentioned become one of the most conspicuous elements in aeroplane evolution, and the forces tending in this direction seem so strong as to render it reasonable to expect results in a very near future.

Short News From Everywhere

ITEMS CULLED HERE AND THERE FOR QUICK READING—TRADE AND GENERAL INFORMATION

—The Automobile Equipment Company is now handling the Kissel Kar in Baltimore. The firm is located at 2207 Madison avenue.

—The Woods Motor Vehicle Company has established a St. Louis branch, which will be housed in a new building at 425 North Euclid avenue.

—The Cole "30" is being marketed by the Hartford, Conn., Motor Car Company of which G. P. Barinard and W. N. Smith are the prime movers.

—F. Sheffield, of Shaniko, Ore., left for the Hawaiian Islands the past week, where he expects to handle the Winton car in Honolulu and vicinity.

—The Fisk Rubber Company has recently opened new direct factory branches in Providence, R. I.; Rochester, N. Y., and Oakland, Cal. This makes twenty Fisk branches.

—Formal announcement has been made that Will F. Lipman, of Lipman, Wolfe & Company, has bought the Portland Taxicab Company and will reorganize and enlarge the concern.

—The Detroit Auto Dealers' Association has decided on the time for next winter's annual show. The event will be held at the Wayne Gardens, as in the past, the dates being January 15-21.

—The H. W. Johns-Manville Company of New York has opened an office at Atlanta, Ga., which is in charge of W. F. Johns. Another branch office has been located at Rochester, N. Y., in charge of H. P. Domine.

—The Haynes Automobile Company, of New York, has opened a branch office in Newark, N. J., at 261 Halsey street. C. R. Schuyler, who for the past five years has been with the Buick Motor Company, of Newark, is manager.

—The Portland Livestock and Fair Exposition was opened the past week with a monster automobile parade headed by Acting Governor Bowerman and followed by the entire Portland Automobile Club in several hundred handsomely decorated cars.

—At a meeting of the executive committee of the National Gas and Gasoline Engine Trades Association, held at Racine, Wis., arrangements were completed for the next convention of the association to be held in that city, December 12 to 15.

—The Hudson Motor Car Company of Detroit has increased its capital stock from $100,000 to $1,000,000 and the announcement is made that it will divide the major portion of the new issues among the stockholders of record in the shape of a stock dividend.

—Between fifty and one hundred members of the Adcraft Club of Detroit are preparing to motor to Rochester next month, when the advertising affiliations made up from Detroit, Cleveland, Buffalo and Rochester will hold an adfest in the latter city.

—Under the management of Keith L. Goode, an American, who has resided in Paris, France, for 15 years, the Diamond Rubber Company has opened a branch in Paris for the supplying of Diamond tires to Americans motoring abroad and to the French trade.

—The American Locomotive Company has announced that a new model motor truck of five-ton capacity is to be added to the Alco line. The five-ton trucks are expected to be ready for delivery in a few months. The full 1911 Alco line will be announced shortly.

—Announcement has just been made that the Howard Automobile Company, which formerly distributed Buick cars in Oregon through the agency of the Northwest Buick Company, is to establish a branch in Portland for direct distribution. This branch will be under the management of Mel G. Johnson.

—It has been decided by the Pacific Coast Underwriters' Association to discontinue the requirement charging the building rate for automobile risks when it exceeds the automobile rate of 2 1-2 per cent., and to adopt in its place a flat rate of 2 1-2 per cent. for all models of the current calendar year and 3 per cent. for cars of other models.

—The Automatic Windshield Company, of Detroit, was consolidated recently with the Superior Mfg. Company, of Ann Arbor, Mich. This change is only nominal, for the two concerns have really been joined since the organization of the Windshield Company. The Superior Mfg. Co. has done the manufacturing, and the Automatic Windshield Company has been the selling organization.

—The Pope Manufacturing Company has been flooded with acceptances of the company's invitation to the Pope-Hartford owners to be its guests at the Vanderbilt cup race and judging from present indications there will be a big delegation in the Pope camp. Two large tents will be erected at the course for the comfort of those who come and a luncheon will be served by the company.

—The Leominster, Mass., Automobile Club was organized a few nights ago with a charter membership of 57. It has joined the Massachusetts State Association. The following officers were elected: W. H. Chase, president; A. H. Hall, vice-president; Murray C. Damon, secretary-treasurer; George P. Jones, Alfred M. Litch, Charles H. Howe and John Pickering, directors. President Chase was nominated as the representative of the club at the State and national meetings.

—The Worcester Licensed Automobile Dealers' Association, as a result of the recent success in the first out-door auto show held at the New England Fair, is planning to hold during the coming Winter the first indoor automobile show ever held in that city. The scene of the show will be in the new Worcester Auditorium building, now nearing completion and which will have the largest floor space of any hall or building for expositions in New England, with the exception of Mechanics' Hall, Boston.

—The following agencies for the Parry car have been installed recently: Austin Motor Car Company, Austin, Tex.; Auto Exchange, Vicksburg, Miss.; Auto Sales Company, Cleveland, Ohio; Bennett & Covington, Clio, S. C.; E. L. Cooper, Coates, Kan.; Ed. Dickinson, Shreveport, La.; Ellett & Nilson, Bartow, Fla.; Charles L. Fisk, Middletown, Conn.; Hobart Motor Company, Hobart, Okla.; Irving Garage Co., Washington, D. C.; L. S. Mitchell Auto Company, Chattanooga, Tenn.

—J. E. Levi & Company, who have until recently handled the Reo and Premier in Atlanta, have been succeeded by the Reo Motor Distributing Company. This organization has a larger territory, handling the Reo in all of Georgia and part of Alabama. Just how much territory they will handle for the Premier has not been decided as yet. R. C. Smith, vice-president of the company, may also handle the Oakland in some Atlantic Coast States. The officers of the new company are H. E. F. Jones, president; R. O. Smith, vice-president; G. F. Tumlin, secretary and treasurer.

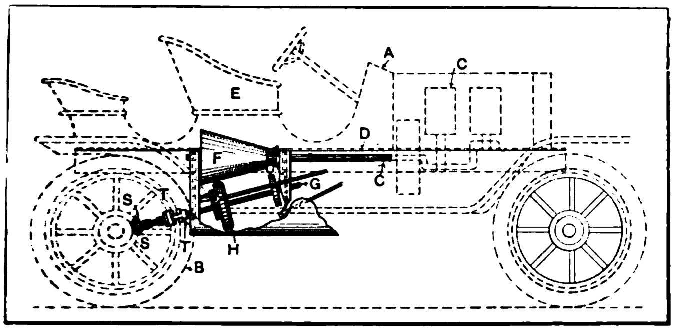
—The Rogers Motor Car Company of Omaha, which has recently begun making motor cars, announces that its plant will be enlarged to a capacity of 5,000 cars annually. The present output of the company is 900 cars a year. C. A. Ralston of Chicago, formerly vice-president, becomes general manager of the company in place of Ralph Rogers, who remains on the board of directors and will be special designer for the company. An addition of brick, three stories high, 300 feet long and 60 feet wide, will be built.

Patents Gone to Issue

DESCRIPTIONS OF A NEW DRIVING GEAR; NOVEL FORM OF WATER JACKET; A SPARK-PLUG—GIVING THE PRINCIPAL CLAIMS FILED IN THE PATENT OFFICE THEREFOR

968,521. DRIVING-GEAR FOR MOTOR VEHICLES. Walter Baird, Pittsburg, Kan. Filed Oct. 24, 1908. Serial No. 459,419 (six claims).

4. The combination, with a vehicle, having a seat, an engine mounted upon the vehicle body in front of said seat, and a conical drum extending into the space beneath said seat and having its smaller end nearest the engine, of means intermediate the engine and drum for driving the drum, a friction roller in contact with the under surface of the conical drum, a driven shaft on which said friction roller is splined, means for shifting said friction roller along said driven shaft, means for moving said shaft toward and from said drum, means for driving the rear wheels of the vehicle from said driven shaft, and a flexible connection in said driven shaft between the friction roller and the means for driving the rear wheels.



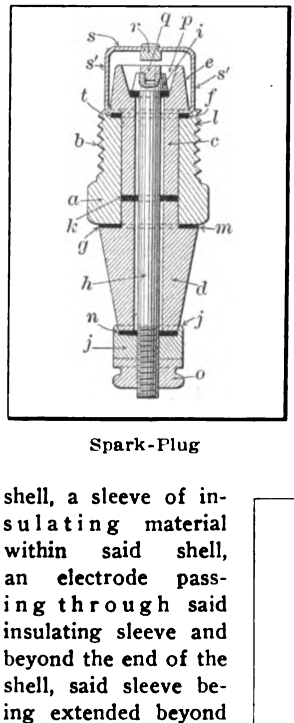
Driving gear for motor vehicles

968,545. WATER JACKET FOR EXPLOSIVE ENGINES. John F. Dodge and Horace E. Dodge, Detroit, Mich. Filed Sept. 1, 1905. Serial No. 276,693. Renewed June 3, 1910. Serial No. 564,854 (six claims).

2. The combination with a cylinder having a flanged head, of a relatively thin sheet metal water jacket embracing the cylinder and having a flat top portion lying upon the flanged head thereof forming a water space between said jacket and the outer wall of the cylinder, a cap having a water space therein and containing a combustion chamber, said cap also having a flat under face which rests upon that portion of the water jacket lying upon the flange of the cylinder head and forming a gasket between said parts, bolts passing through said cap and through the flanged head of the cylinder to clamp the gasket between said cap and flange, the flanged head of the cylinder, the interposed water jacket, and said cap having communicating openings to connect the water spaces of the cap and cylinder, the head of the cylinder and the cap having registering openings to connect the combustion chamber in the cap with the interior of the cylinder, said registering openings last mentioned being counterbored at the juncture of the cylinder head and cap, the gasket portion of the water jacket communicating with said counterbore, a stress ring lying in said counter-bore flush with the inner walls of said parts to close the joint between the cap and cylinder and relieve the gasket portion of the water jacket from strain, and means for detachably securing the lower end of the jacket to the cylinder wall.

5. In an explosive engine, the combination with a plurality of cylinders formed integral and spaced from one another, having a flanged head common to all of said cylinders and spaced from the ends thereof, a sheet-metal water jacket embracing the cylinders and common to all of them, said water jacket having a flanged top portion lying upon the flanged head of the cylinders and co-operating with said flanged head to form a water space at the ends of the cylinders and surrounding the same, said flanged head and top portion of the water jacket lying thereon being apertured to provide for openings communicating with the ends of the cylinders, an integral cap having a plurality of combustion chambers and a flat under face with a plurality of apertures therethrough communicating with said chambers, said cap supported upon the flanged head of the cylinders to confine the top portion of the water jacket between said parts in a manner to cause the apertures therein to register with the openings in the ends of the cylinders, said cap also having a water space therein, and the under face of said cap and the flanged head of the cylinders having registering openings to establish communication between the water spaces in said parts, and bolts passing through the cap and through the flanged head of the cylinders to clamp the top portion of the water jacket between said cap and head.

968,687. SPARK-PLUG. Herbert F. Provandie, Boston, Mass., assignor of one-half to The Randall-Faichney Company, Boston, Mass., a Corporation of Massachusetts. Filed May 18, 1909. Serial No. 496,735. (nine claims).

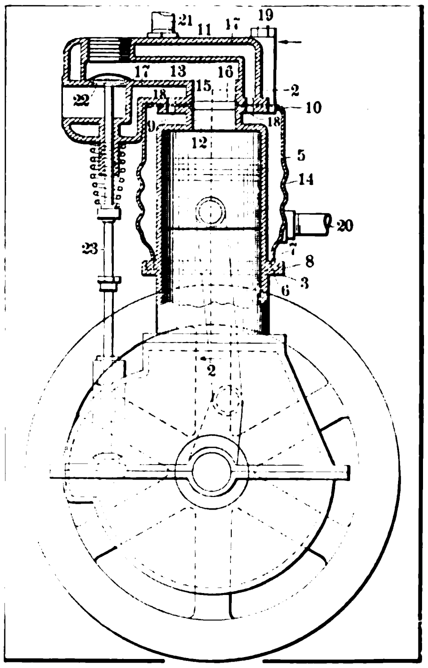


Spark-Plug

1. A spark-plug comprising a shell, a sleeve of insulating material within said shell, an electrode passing through said insulating sleeve and beyond the end of the shell, a head upon said sleeve extending beyond and over the end of the shell and having a recess or cavity containing the electrode end, a metal gasket between said head and the end of the shell, a bridge extending across the end of said head and connected at its ends with said gasket, and a complemental electrode attached to said bridge.

4. A spark plug comprising a shell, a sleeve of insulating material within said shell, an electrode passing through said insulating sleeve and beyond the end of the shell, said sleeve being extended beyond the end of the shell and having a shoulder overlapping the latter, and an electrode bridge crossing the end of the sleeve and having its ends bifurcated to form the halves of a divided ring or gasket and clamped between the said shoulder and the end of the shell.

5. An electrode bridge for spark plugs; a bar with forked ends made approximately as semi-circles.



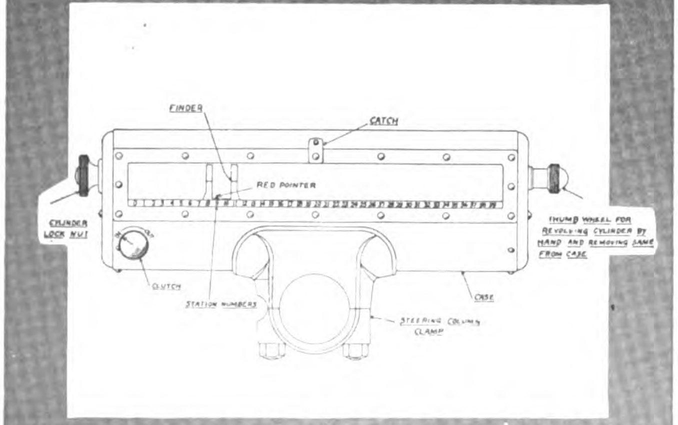
Water jacket for internal combustion engines

Mechanical Touring Guide

THE RHODES PATHFINDER, BASED UPON THE OFFICIAL AUTOMOBILE BLUE BOOK, SHOWS THE WAY BY DAY OR BY NIGHT

The Rhodes Pathfinder Complete

Showing Pathfinder and Cylinder



The Diagram of the Pathfinder

TOURING over unfamiliar roads, without explicit directions as to the course to be followed, detracts materially from the motorist's pleasure. Even the ordinary road-book, consulted under always unfavorable conditions of wind—and sometimes similar conditions of weather—and perhaps in the dark, does not provide the kind of guide that answers satisfactorily when most in demand. Just imagine how convenient it would be to have a native of the territory at the driver's side, giving ample warning of all approaching turns, danger points, exact mileage covered, and such interesting information as the tourists are constantly in need of! To all practical intents and purposes this is just what the Rhodes Pathfinder made by the J. B. Rhodes Co., Kalamazoo, Mich., does—a wonderful little device, contained in a cylinder six inches long and two in diameter!

Based upon the distances and information contained in the Automobile Blue Book, this little director of the movements of a touring party will perform even better than a flesh-and-blood guide—it is "on the job" all the time; never making a haphazard guess as to distances traveled or having its attention diverted by any of the thousand distractions inseparable from an automobile tour. By night or by day it automatically signals the driver, by means of a bell, to be on the lookout for the next turn or guide-mark, danger point or bit of bad going.

Before starting on a day's journey of, say, 150 miles or more—according to the number of directions in the Blue Book—the little instrument should be set for the route. The inner cylinder is removed from its case and the mileage and direction bands, which alternate thereon, arranged in proper order, each mileage band representing five miles and being divided into miles and tenths. Beginning with a direction band, the distance band is set exactly in line therewith, so as to indicate the distance of the first direction from the start. Then the next direction band, with its mating distance band, exactly set, is moved to its proper place on the cylinder, and so on. It takes but a comparatively short time to set the route for the coming day's trip, and replace the cylinder in the outer case, which may be attached either to the dash or on the steering column in easy eye-shot of the driver.

The Pathfinder can be attached to a car that is already equipped with a speedometer or odometer of any make in a very few minutes. Gearing, flexible shaft and full directions for attaching are furnished for cars not so equipped.

After being properly set and affixed to its place on the steering post the Pathfinder will signal the approach of each turn, the little red arrow on the finder pointing to the direction on the band and the mileage showing to the right. A turn of the small knob near the left end of the case throws the Pathfinder in and out of gear, so that side trips from the originally planned route may be taken, or in the event of an obstructed road ahead a detour may be taken and the route resumed farther on.

The key furnished with the instrument is an abbreviated form of the Official Automobile Blue Book, showing only necessary turns and mileages with the proper symbols corresponding to those on the cylinder rings. Many thousands of miles of road directions are thus condensed into a very small compass and the user is assured of every accuracy in view of the fact that all of the routes have been carefully checked by Blue Book cars.

Of course, side trips, optional routes, road descriptions, city and route maps, hotel and garage information and points of local and historic interest are left for the complete editions of the Blue Book, to which this instrument is destined to become an almost indispensable adjunct.

General Utility Electric Motor

HANDY FOR POLISHING AND GRINDING IN THE GARAGE; LIGHTENS WORK OF MISTRESS AND MAID; VENTILATES HOUSE

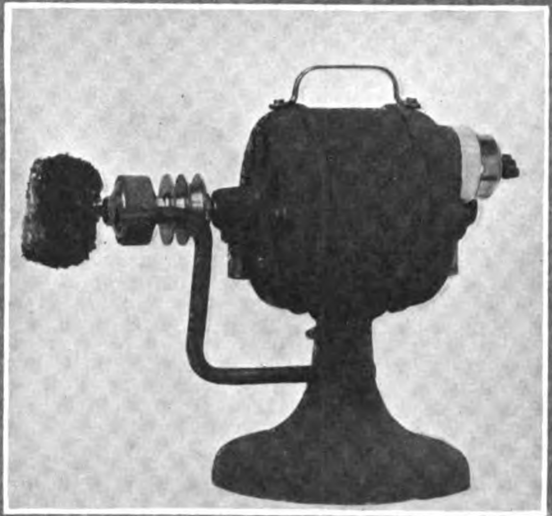
OWNERS of private garages and the "queen of the household"—in the plural number— will hail with delight the advent of the general utility motor now being placed upon the market by the Westinghouse Electric & Manufacturing Company. The numerous little jobs of grinding, buffing and polishing that bob up every day or two in the garage will be made easy of accomplishment through the medium of this compact little motor. The housewife's cares will be considerably lightened by it. It can be attached to the family sewing machine; geared up to a kitchen ventilating blower; it will turn a jeweler's lathe or other light machinery; operate moving window displays or mechanical toys—in short, the varieties of work to which it can be put are too manifold to enumerate.

As the motor takes but from 40 to 120 watts for its operation, it is essentially a day load. In any house fitted with electric lighting conveniences some sort of use can be found for it every day. All that is necessary is to unscrew a bulb and attach the plug to the motor. In the kitchen the polishing of silverware and cutlery will cease to be the *bête noir* of the maid; in the sewing room the mistress or her seamstress may be relieved of the labor of furnishing power for the sewing machine—a full set of attachments being provided by the company for every use to which it may be put. As a ventilating outfit it is especially serviceable. The small blower will remove the odor of cooking from the kitchen and supply fresh air, increase the draft of a furnace or freshen the air of a sick room; and by fitting the blower openings with suitable piping the air currents can be directed wherever desired.

These motors are made for operation on 115- and 230-volt direct-current circuits, and on 110- and 220-volt alternating circuits of 60 and 133 cycles. The direct-current motors are shunt-wound, while the alternating-current motors are of the induction type, single phase. The motors run at a speed of 1700 revolutions per minute. The motor is light and can be easily carried from place to place by means of a handle in the top of the frame. It is artistically finished in black enamel to harmonize with the other house decorations. The applications of the attachments are positive; it is impossible to put them on wrong.

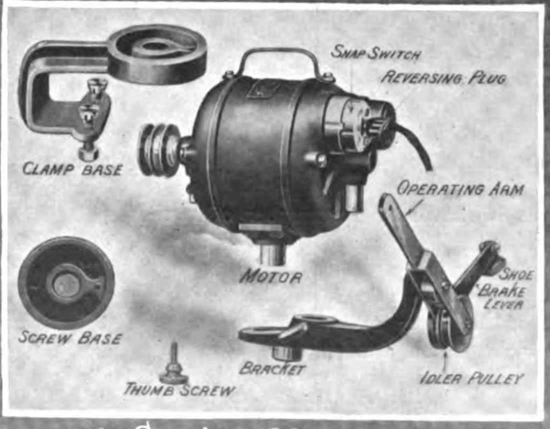
In the ordinary small garage, where the means of storing gasoline are frequently crude in the extreme, the necessity of proper ventilation cannot be too strongly insisted upon. Careless handling of the liquid fuel cannot fail to result in the accumulation of gas, which needs only the lighted match of the smoker or an exposed gas or lamp flame to bring about an explosion. One of these little motors geared up to a small ventilationg blower—providing, of course, the garage is equipped with means of securing the necessary electric current—will clear the air of the dangerous gases in a very few minutes.

The private garage owner whose work-bench is provided with one of these motors will find numerous tasks for the sturdy little engine—running a small lathe; operating, grinding, buffing and polishing wheels for completing home-made repairs on his car, etc.



For Polishing and Grinding

Operating Ventilating Blower



Motor with Sewing Machine Attachments

To Prevent the Loss of Wheel Caps

There are two methods of ensuring that the wheel cap will not come off once properly put on: (1) If the cap screws up flush with the meal ring of the hub a small center punch hole at the point of contact will prevent it coming unscrewed; (2) if the cap overlaps the ring, drill a hole in the ring and in the cap, tap out and place a small set screw that just comes flush with the cap. It will hardly be noticed, but may save trouble and expense later.

Prominent Automobile Accessories

A NEW ROTARY TIRE PUMP

The life of all tires is dependent upon the care with which correct pressures are maintained. It will be found that the majority of people neglect this owing to the physical exertion required, whereas if the labor was reduced they would be more inclined to look after the pressure.

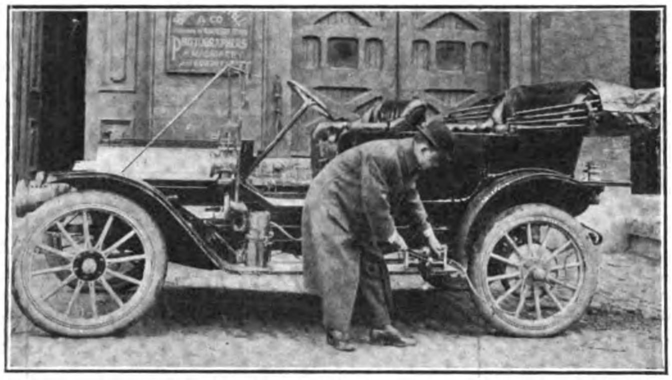


Fig. 1—Inflating a tire by means of the Haw-Man Pump

The accompanying illustrations show the Haw-Man pump recently placed on the market by the Hawthorne Manufacturing Company, of Bridgeport, Conn. It consists of a four-cylinder hand air inflator operated by a handle, the action of which is much less fatiguing than that of the up-and-down plunger variety. It can easily be attached to the running board, and as there is 6 feet of tubing, both rear and front tires can be inflated from the same position.

Fig. 1 shows the pump in position on the footboard, the operator being engaged in inflating the left rear tire. Fig. 2 gives a good idea of the appearance of the rotary pump and the method of its operation.

AUTOMATIC CLUTCH RELEASER FOR BUICKS

The F. B. automatic clutch releaser (Fig. 3), made by the F. B. Co., of Columbia, S. C., is a device to permit the Model 10 Buick being controlled entirely by the foot pedals, dispensing with the high-speed lever. It consists of a turn-buckle rod for interlocking the high-speed clutch and service brake of the high- and low-speed clutches. The method of fitting is very simple and when properly adjusted the device works well, as is shown by the number of testimonials the F. B. Company has received.

Quarter-inch holes are drilled in the low-speed and engine-brake levers as near the front of the lever as possible and about 1 1-4 inches below attachment of long coil spring. Rod 4 requires a little filing to accommodate loops 6, which are simply slipped over the yoke. The sheet-metal round lever 1 has to be cut away sufficiently to allow the two loops free movement.

A slight pressure on the brake pedal throws out the clutch and when the pressure is released the high engages. Heavy pressure on the brake pedal stops the car as when no releaser is used. Slight pressure on the low-speed pedal releases the high speed and operates the low, so that to come back to high all that is necessary is to release the low pedal.

The releaser never pulls the high-speed clutch out to the point where it locks, as does the regular equipment of the car, so that when the high is locked out by hand and the clutch releasers are in use the brake or low-speed clutch may be used independently.

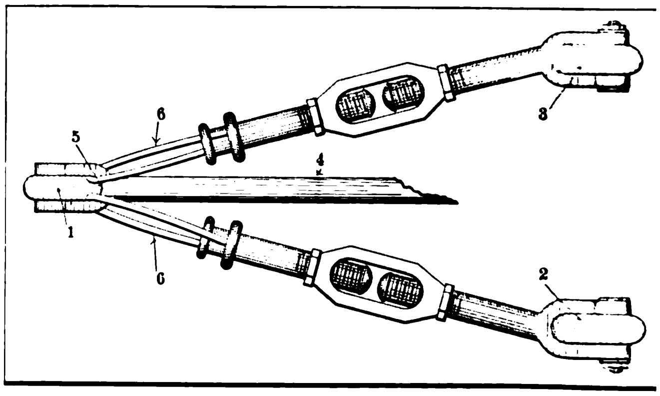


Fig. 3—The F. B. automatic clutch releaser

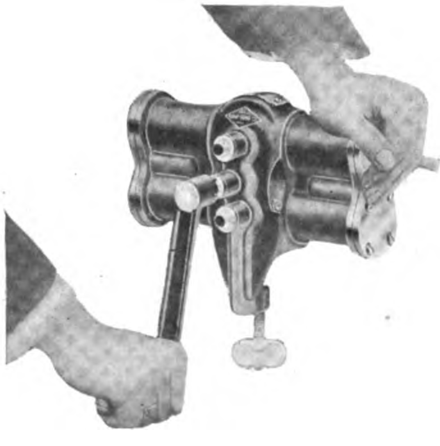


Fig. 2—View of Haw-Man rotary tire pump

LONG- AND SHORT-DISTANCE SIGNAL

The tendency of the times is to reduce the number of accessories necessary to the satisfactory operation of the automobile. The necessity of carrying two warning signals—one for long-distance or emergency warning, another for short-range use—has long been looked upon with disfavor. With the introduction of the "Combination Klaxon," the Lovell-McConnell Manufacturing Company not only effectually meets this objection but provides an instrument (see Fig. 4) which is entirely unique among automobile accessories, and one which will appeal to the motorist.

This signal unites the regular Klaxon with a reed horn of finest workmanship an highest quality.

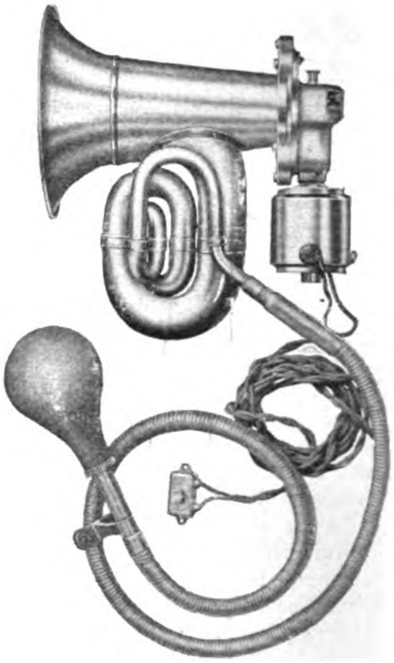


Fig. 4—The combination Klaxon horn

The ease by which either of the two signals may be operated is a distinct advantage. Button and bulb, side by side, enabl the motorist to choose the signal he prefer to use, with the least possible distractio from the operating of the car.

WATERPROOF AUTO GARMENTS

With the approach of the inclement sea son the autoist will be interested in th announcement of the Rubbinol Raincoa Company, 1777 Broadway, New York, th it is prepared to furnish Rubbinol coat capes, leg protectors, sleeve protectors, ca hoods, gloves, etc., and other garments de signed to make winter driving less of hardship, at its usual low rates.

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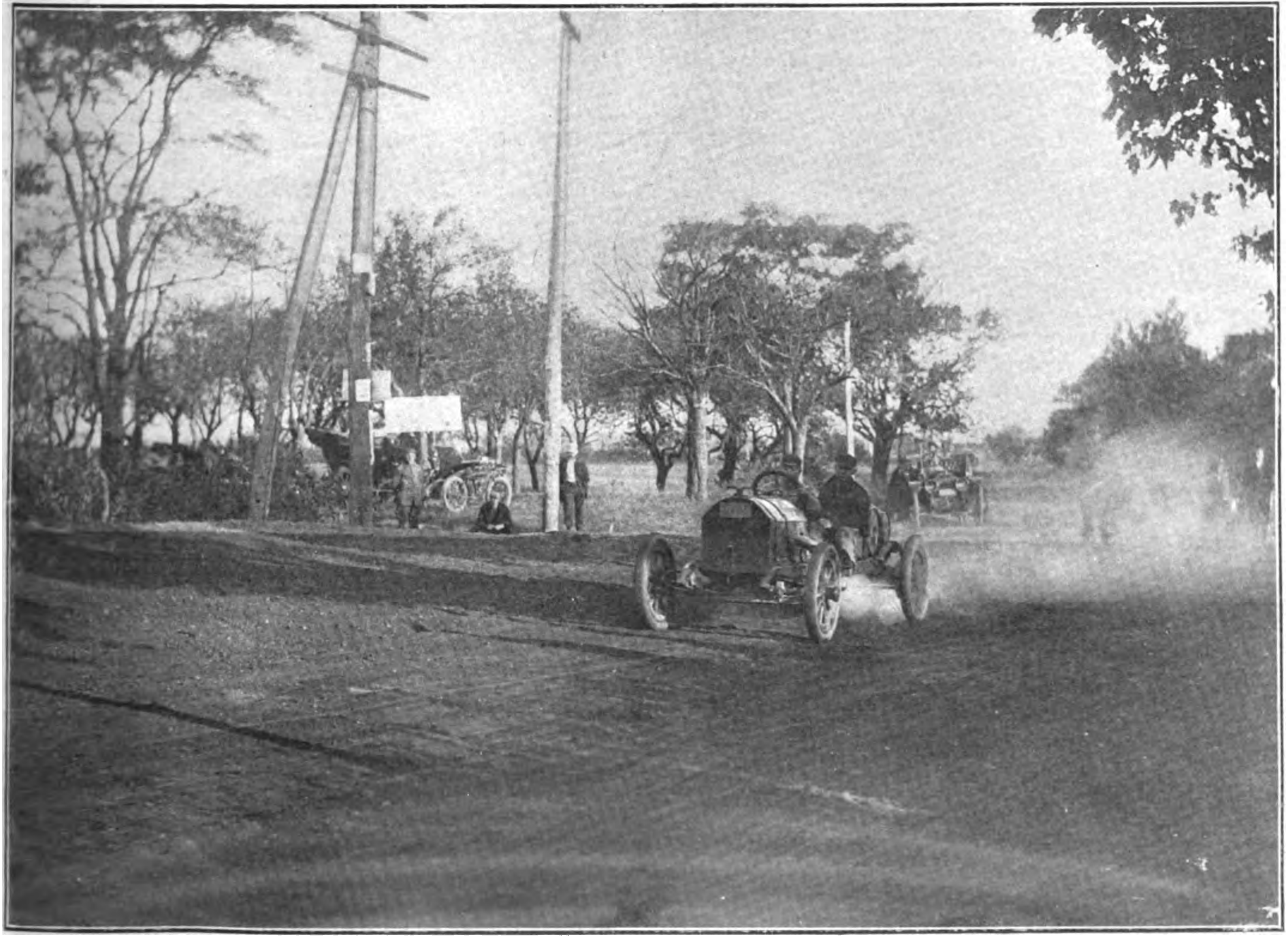
THE AUTOMOBILE

Await Starting Gun

LARGEST AND MOST VARIED FIELD IN HISTORY OF ROAD RACING READY FOR THE WORD IN VANDERBILT CUP AND ITS SHORTER AUXILIARIES

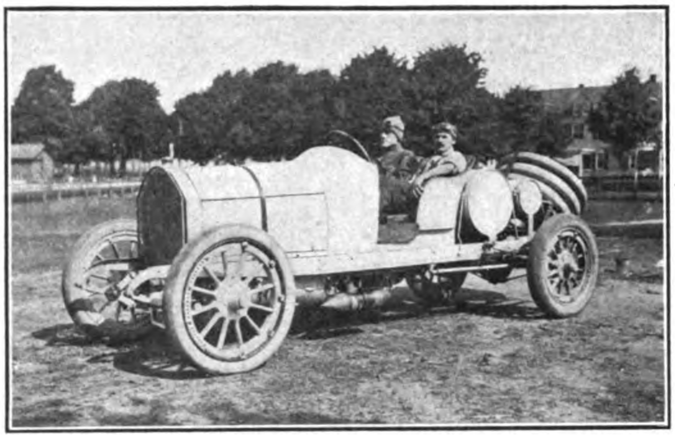
WITH an entry list never approached in point of size and variety, the Vanderbilt Cup race, the Wheatley Hills Sweepstakes and the Massapequa Sweepstakes closed Saturday night. At some stages of the running next Saturday over forty racing cars will be on the track at the same time.



CUP CONTESTANT PRACTICING ON THE WESTBURY TURN JUST BEFORE OPENING THE ROADS TO TRAFFIC

The entry lists contain the very cream and the rich milk of the American racing machines, and the Benz, Mercedes, Lancia and S. P. O. cars, which will represent foreign types in the contests, [illegible] well proven and rank with the speediest cars of the old [illegible] American automobiles are classy. The Alco entry won its spurs on the Vanderbilt course and has proved itself to be a worthy representative of the six-cylinder idea in racing. The Pope-Hartford cars entered for the cup are racy-looking automobiles with long white bodies of the torpedo type, but finished off with a pyramid-shaped dustguard, which reduces wind pressure to a minimum. The National trio are machines that have won time and again on track, road and hill and will undoubtedly give a good account of themselves. The Lozier entry is the same car that won the National Stock Car Championship at Elgin.

The Simplex pair are well known for past performances and either has sufficient speed to lower the existing record for the



Businesslike Benz Car 3 ready for morning trial

Where Vanderbilt and Grand Prize Benzes are quartered

race even though the fortunes of racing might decree that neither should prove to be first over the tape. The three Marquette-Buicks have giant motors and great strength. Piloted by three veterans these cars are certain to be prominent in some stages of the race and will have to be considered in making calculations on the probable winner. The Apperson has won so often on the Pacific Coast that the Western contingent hold high hopes of its performance in the premier race. The Marmon couple, handled by a pair of wizards, have a gallant flight of speed and great endurance and have shown both on many a hard fought field. At Indianapolis and Atlanta on the speedways there were no racing automobiles with a license to treat this pair without consideration. The Jackson entry is a fast car with plenty of bottom; the Corbin is rather an unknown quantity in events of this kind, but from the fact that it will be handled by a particularly skilled driver, the performance of the car will be watched intensely by thousands. The Amplex is another unfamiliar name in racing events of the Vanderbilt Cup type, but the car has shown unusual power and a clean pair of heels in its practice work. The Stoddard-Dayton pair, one of which is the car that swept the boards at the Galveston, Tex., beach meet, are qualified to try conclusions with any kind of automobile entered for the cup. The Knox entry is the same car that Mr. Belcher has driven in numerous hill climbs and races this year and is sturdily able to give a good account of itself. The Oldsmobile pair, entered at a late stage, are very long-rangy looking cars, equipped with big motors and possessing brilliant speed. It has been a long time since the Oldsmobile has tried conclusions in road racing, but, judging from the past, there is no apparent reason why these cars should not be there or thereabouts at the finish. The Houpt-Rockwell car is a big powerful automobile and has been seen in distance races around New York on frequent occasions during the past season.

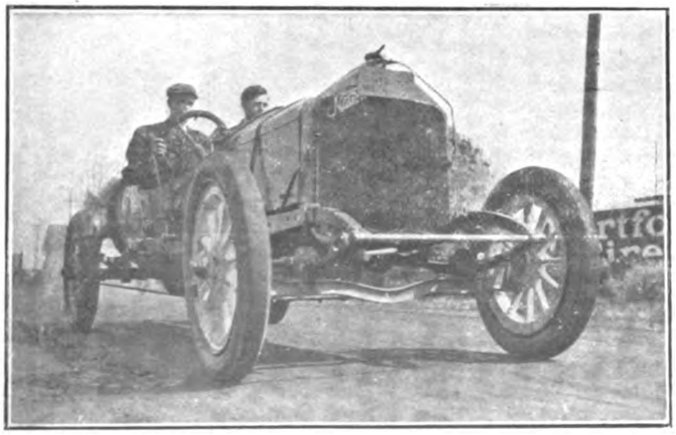
The Benz trio are built from the ground up. They have about as much power as the biggest machines entered for the contest and truly represent the last word of German construction. Their motors have a drumlike sound when in action that bespeaks power and their action is of watchlike precision and nicety. The Mercedes entered by Mr. Wishard is an old car, having been built in 1905. That it has power and speed and stability has been amply demonstrated this year in contests, and while it would seem unlikely that this car would win in such company, more unlikely things have happened in racing.

In the Massapequa trophy race the Cole "30" pair, to be driven by Bill and Harry Endicott, have been frequent contenders in racing events this year and are familiar to the public. The Lancia is a typical European racer qualified to enter this class.

The Abbott-Detroit trio which will make a determined bid for victory in this event are business-like looking cars with bodies painted respectively red, white and blue. This is the initial racing event of any moment that these cars have attempted and their progress will be watched with interest.

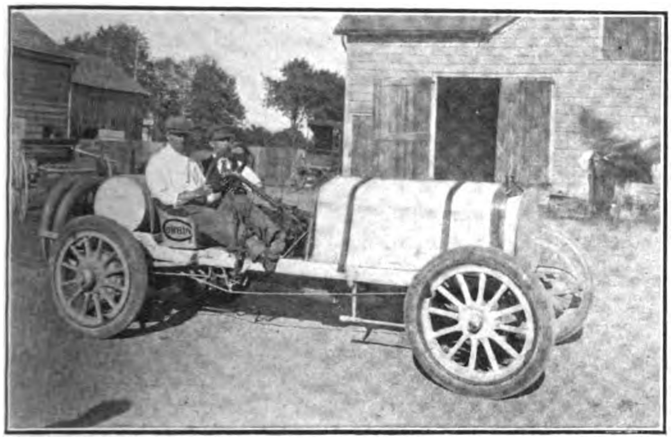
In the Wheatley Hills trophy race there is a Marmon, similar to those entered in the Vanderbilt. Naturally the motor is smaller in order to come within the requirements of the conditions, but otherwise the car is identical with its big racing brothers in the main event. The Marion entry has won dash races and has made a creditable showing in distance events on the track. The Mercer pair have won racing events and have a pretty turn of speed, but their performance on the road-racing field is an unknown factor. The Corbin has done well in reliability runs and has speed and endurance. The S. P. O. entry holds the hour record at Brighton Beach and is a sweet-running, speedy car of French make. The Correja has proved a winner on the hills and is trying the gruelling road race for the first time.

The practice so far has been fast, and of the record-breaking variety. On Friday morning the press representatives of

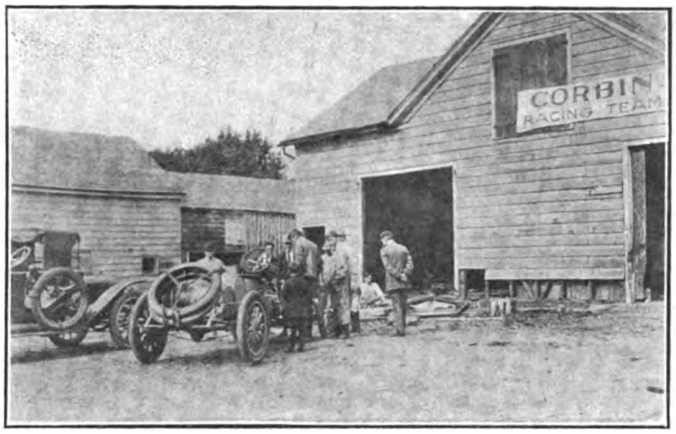


Graceful National Contestant coming head-on along Parkway

Headquarters of the National racing team, showing fast trio



Corbin Cup Car starting for its first spin on the course



Hicksville is the headquarters of the Corbin cars and drivers

New York were invited to be present to witness the first formal spins of the contesting cars. About a dozen were put through their paces. Dingley's Pope-Hartford made the circuit in 10:57.36, the fastest time of the morning. The Warner timing devices were installed Thursday night and the time made has some element of authenticity.

A damper was cast over the crowd by an accident by which it seemed likely that George Robertson, driver of the Benz car No. 1, and his passenger, Stephen Reynolds, of a New York daily newspaper, as well as the car, would be placed permanently out of commission. Robertson had consented to take the newspaperman around the course at speed. Approaching the Massapequa turn, where the course leaves the parkway and swings into the country road, the Benz was traveling at about 65 miles an hour. The turn is banked slightly, but Robertson steered too close to the top and as he realized the danger of going over with the momentum of the heavy car he shut down and tried desperately to stop the car but failed.

The car went over the edge just as Robertson yelled to Reynolds, "it's all off." Rolling over twice, the car righted itself while Reynolds was thrown thirty feet through the air. Witnesses say that Robertson rolled over with the car, but such a thing seems hardly possible. Both men were taken back to the grandstand and recovered consciousness in a few minutes when the driver was removed to the Nassau County Hospital. He was sorely bruised and cut about the face and his right side was jarred; it was feared that he might develop internal injuries. The latest reports from the hospital, however, indicate that his strong constitution and powerful muscular frame have been able to protect him from vital injury and he promises to be on hand for the big race. Mr. Reynolds was only severely shaken and jarred. The car looked to be a wreck, but close examination showed that a few hours' work would put it back in racing condition. After the accident Robertson at first announced that he would positively drive in the race, but later, at the request of his wife, he decided to withdraw. The car, which will be repaired, will probably be piloted by Franz Heim, a German, who formerly acted as a mechanician for Hemery and Hanriot.

The fastest time made in practice on Friday was by Burman in a Marquette-Buick, who turned the course in 10:52.20. Other speedy trials were those of the Pope-Hartford (Fleming), 11 minutes flat; Corbin (Matson), 11:20, on his first trial at the course; Simplex (Mitchell), 11:08; Pope-Hartford (Dingley), 11:14; Benz (Hearne), 13:05; Alco (Grant), 11:14; National (Aitken), 11:29; Marmon (Dawson), 12:18.

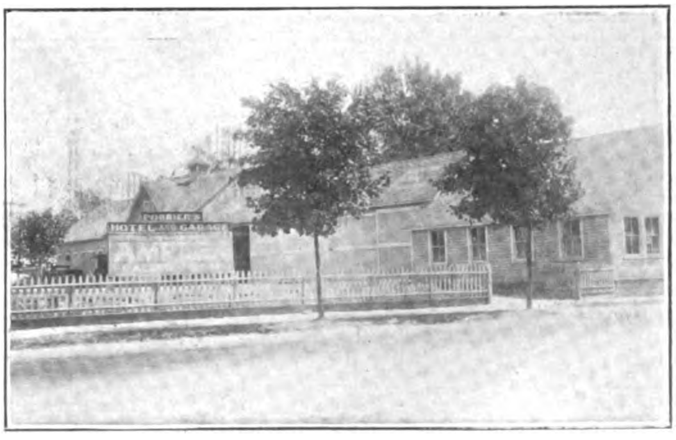
Marquette-Buick No. 14, driven by Burman, made the fastest lap ever made in practice over the course on Saturday, when it negotiated the circuit in 10:15, eighteen seconds faster than the best of last year's practice. A good rain has fallen upon the course, rendering it faster and better than ever before, and new record figures for the course seem assured.

The Lancia entry, driven by William Knipper, was wrecked on the Westbury turn Monday morning by collision with Burman's Marquette-Buick. Knipper was hurled into the air, as was his mechanician, but neither was seriously hurt. The car was considerably damaged, but may be repaired in time to take part in the Massapequa race. It is doubtful whether Knipper will be able to drive. The Marquette-Buick, which was in nowise responsible for the accident, was not damaged outside of the loss of a hub cap.

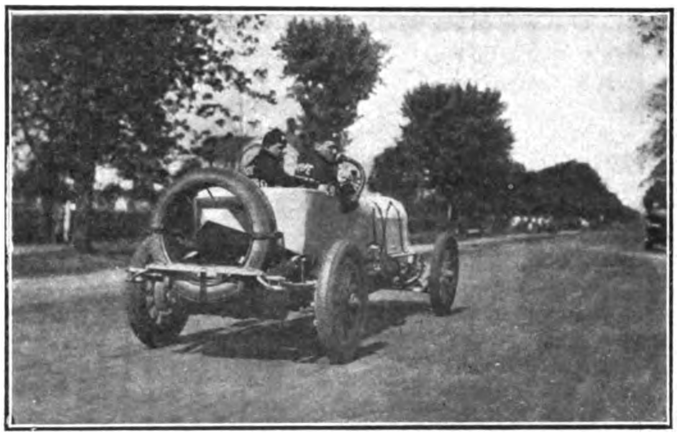
The weighing-in process this year is being conducted at Mineola under the supervision of A. L. McMurtry. The cars for the Vanderbilt only have to be passed upon as to their piston displacement and brakes, but the entries in the sweepstakes are being given a rigid examination.

The Bosch Magneto Company and the Remy Magneto Company have each offered a prize of $500 for the winner of the Vanderbilt Cup.

Amplex entry in Vanderbilt, whose pulsing motor will be a feature



Where the Amplex is quartered near the scene of battle

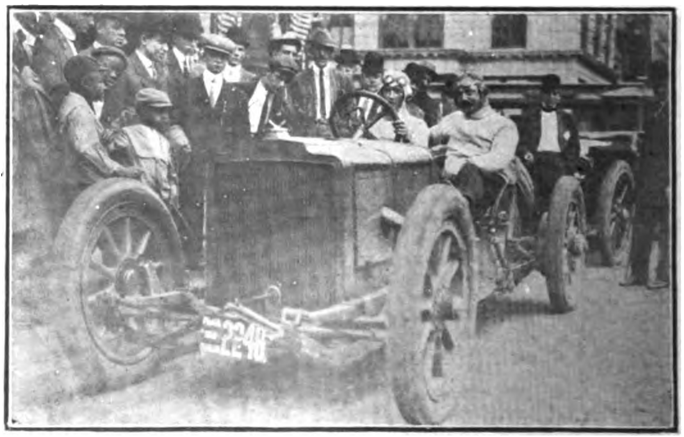

Long white Pope-Hartford flyer which has dazzling speed


Pope-Hartford garage, showing the racing pair on the lawn

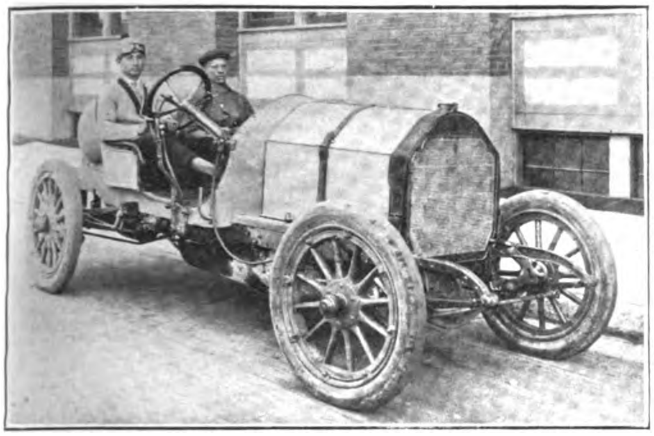
SPECIFICATIONS FOR THE CARS ENTERED

No.	Car	Entrant	Driver	Price	H. P.	BODY		MOTOR				COOLING	
						Type	Seats	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump
1	Benz	Benz Auto Import Co.	Heim	$6250	40	Racing	2	4	5	6	Pairs	Tubular	Centrifugal
2	Benz	Benz Auto Import Co.	Hearne	6250	40	Racing	2	4	5	6	Pairs	Tubular	Centrifugal
3	Benz	Benz Auto Import Co.	Bruce-Brown	6250	40	Racing	2	4	5	6	Pairs	Tubular	Centrifugal
4	Alco	Amer. Locomotive Co.	Grant	6000	54.1	Racing	2	6	4¾	5½	Pairs	H'comb.	Centrifugal
5	Pope-Hartford	Pope Mfg. Co.	Fleming	3000	36.1	Racing	2	4	4¾	5½	Pairs	Tubular	Centrifugal
6	Pope-Hartford	Pope Mfg. Co.	Dingley	3000	36.1	Racing	2	4	4¾	5½	Pairs	Tubular	Centrifugal
7	National	National Motor Vehicle Co.	Aitken	2500	40	Racing	2	4	5	5 11/16	Pairs	H'comb.	Centrifugal
8	National	National Motor Vehicle Co.	Livingston	2500	40	Racing	2	4	5	5 11/16	Pairs.	H'comb.	Centrifugal
9	Lozier	Lozier Motor Co.	Mulford	4600	46.2	Racing	2	4	5⅜	6	Pairs	H'comb.	Centrifugal
10	Simplex	Simplex Automobile Co.	Mitchell	4500	52.9	Racing	2	4	5¾	5¾	Pairs	H'comb.	Centrifugal
11	Simplex	Simplex Automobile Co.	Beardsley	4500	52.9	Racing	2	4	5¾	5¾	Pairs	H'comb.	Centrifugal
12	Marquette-Buick	Marquette Motor Co.	L. Chevrolet	3950	57.6	Racing	2	4	6	5½	Pairs	Tub. or Cel.	Gear driven
14	Marquette-Buick	Marquette Motor Co.	Burman	3950	57.6	Racing	2	4	6	5½	Pairs	Tub. or Cel.	Gear driven
15	Marquette-Buick	Marquette Motor Co.	A. Chevrolet	3950	57.6	Racing	2	4	6	5½	Pairs	Tub. or Cel.	Gear driven
16	Apperson	Apperson Bros. AutoCo.	Hanshue	4250	52.9	Racing	2	4	5¾	5¾	Single	Tubular	Centrifugal
17	Marmon	Nordyke & Marmon Co.	Dawson	2750	32.4	Racing	2	4	4½	5	Pairs	Cellular	Centrifugal
18	Marmon	Nordyke & Marmon Co.	Harroun	2750	32.4	Racing	2	4	4½	5	Pairs	Cellular	Centrifugal
19	Jackson	Jackson Automobile Co.	Schiefler	2000	38	Racing	2	4	4⅞	4¾	Single	Cellular	Syphon
20	Corbin	CorbinMotor Vehicle Corp'n	Matson	4000	48.6	Racing	2	6	4½	4½	Single	H'comb.	Centrifugal
21	Amplex	S. J. Wise & Co.	Jones	4500	41	Racing	2	4	5 1/16	5	Pairs	Cellular	Centrifugal
22	National	Poertner Motor Car Co.	Disbrow	2500	40	Racing	2	4	5	5 11/16	Pairs	H'comb.	Centrifugal
23	Stoddard-Dayton	U. S. Motor Co.	De Hymel	3000	40	Sp'str.	2	4	5	5½	Pairs	Tubular	Centrifugal
24	Stoddard-Dayton	U. S. Motor Co.	Harding	3000	40	Sp'str	2	4	5	5½	Pairs	Tubular	Centrifugal
25	Knox	Knox Automobile Co.	Belcher	4700	40	Racing	2	4	5	4¾	Pairs	Cellular	Centrifugal
26	Mercedes	Spencer E. Wishard	Wishard		57.6	Racing	2	4	6	6¼	Pairs	H.comb.	Centrifugal
27	Oldsmobile	Olds Motor Works	Stillman	3500	40	Racing	2	4	5	6	Pairs	H'comb.	Centrifugal
28	Oldsmobile	Olds Motor Works	Nolson	3500	40	Racing	2	4	5	6	Pair	H'comb.	Centrifugal
29	Houpt-Rockwell	H. S. Harkness	Limberg	5000	48.4	Racing	2	4	5½	6	Pairs	H'comb.	Centrifugal
30	American	American Motor Car Co.	Wallace	5000	52.9	R'ster.	2	4	5¾	5½	Pairs	Tubular	Centrifugal
49	Columbia	U. S. Motor Co.	Stone	3300	38	Racing	2	4	4⅞	5½	Pairs	Cellular	Centrifugal
SPECIFICATIONS FOR THE CARS ENTERED													
31	Marmon	Nordyke & Marmon Co.		2750	32.4	Racing	2	4	4½	5	Pairs	Cellular	Cent'fl.
32	Mercer	Mercer Automobile Co.	Sherwood	2250	27.2	Racing	2	4	4⅛	5	Pairs	H'comb.	Cent'fl.
33	S. P. O.	S. P. O. Automobile Co.	Juhasz	3250	24	Racing	2	4	3⅞	5⅛	Pairs	H'comb.	Cent'fl.
34	Correja	J. Mora Boyle	Mont. Roberts.	1450	28.9	Racing	2	[illegible]	4¼	5	Pairs	Cellular	Cent'fl.
35	Corbin	Corbin Motor Vehicle Corp'	Maisonville	2750	32.4	Racing	2	4	4½	4½	Single	H'comb.	Gear
36	Mercer	Mercer Automobile Co.	Bigelow	2250	27.2	Racing	2	4	4⅛	5	Pairs	H'comb.	Cent'fl.
37	Marion	Marion Motor Car Co.	Monson	1600	28.9	Racing	2	4	4¼	4½	Pairs	Tubular	Cent'fl.
38	F. A. L. Car	W. H. Pearce	W. H. Pearce	1750	27.2	Racing	2	4	4⅛	5½	Pairs	Tubular	Cent'fl.
39	F. A. L. Car	J. F. Gilmore	J. F. Gilmore	1750	27.2	Racing	2	4	4⅛	5½	Pairs	Tubular	Cent'fl.
SPECIFICATIONS FOR THE CARS ENTERED													
40	Cole "30"	Cole Motor Car Co.	Bill Endicott	1500	25.6	Racing	2	4	4	4	Pairs	Tubular	Sphon
41	Cole "30"	Cole Motor Car Co.	Harry Endicott	1500	25.6	Racing	2	4	4	4	Pairs	Tubular	Syhpon
42	Lancia	Hol-Tan Co.	Knipper	3500	25.6	Racing	2	4	4	4½	Block	H'comb.	Cent'fl.
43	Abbott-Detroit	Abbott Motor Co.	Lee Oldfield	1500	32.4	Racing	2	4	4	4½	Pairs	H'comb.	Cent'fl.
44	Abbott-Detroit	Abbott Motor Co.	Morty Roberts	1500	32.4	Racing	2	4	4	4½	Pairs	H'comb.	Cent'fl.
45	Abbott-Detroit	Abbott Motor Co.	Padula	1500	32.4	Racing	2	4	4	4½	Pairs	H'comb.	Cent'fl.

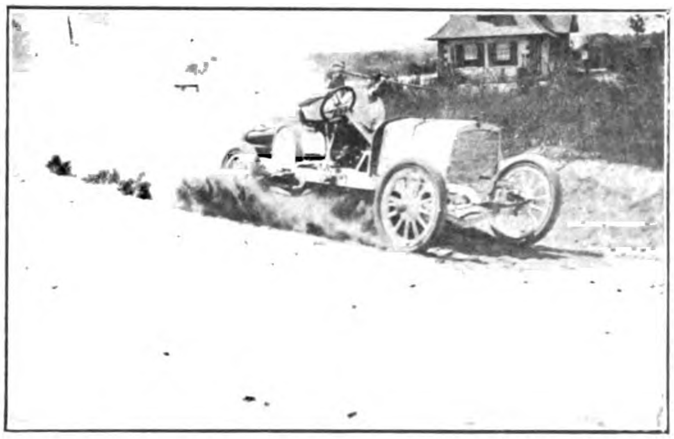

One of the Simplex cars in full flight on the county road



American Speedster, easily identified by square radiator



Stoddard-Dayton, champion of the Texas beach, and Indian pilot



Lozier, stock car championship winner at Elgin meet recently

FOR THE 1910 VANDERBILT CUP RACE

IGNITION				TRANSMISSION							BEARINGS				TIRES	
Magneto	Battery	Lubrication	Clutch	Type	Speeds	Location	Drive	Wheel-base	Tread	Frame	Crank-shaft	Trans-mis'on	Axle	Wght.	Front	Rear
	Storage	Pump	Cone	Selecti'e.	4	Amid'p.	Shaft	123	56	P. Steel	Plain	Ball	Ball	......	35x5	34x4
	Storage	Pump	Cone	Selecti'e.	4	Amid'p.	Shaft	123	56	P. Steel	Plain	Ball	Ball	......	35x5	34x4
	Storage	Pump	Cone	Selecti'e.	4	Amid'p.	Shaft	123	56	P. Steel	Plain	Ball	Ball	......	35x5	34x4
	Storage	Pump	Mul. disc.	Selecti'e.	4	Amid'p.	2 Chain.	126	55	Chan. st.	Plain	Ball	Ball	2730	36x4	36x4¾
	Storage	Pump	Cone	Selecti'e.	4	Amid'p.	Shaft	124	56	St. & wood.	Plain	Plain.	Roller	......	35x4	35x5
	Storage	Pump	Cone	Selecti'e.	4	Amid'p.	Shaft	124	56	St. & wood.	Plain	Plain.	Roller	......	35x4	35x5
	Storage	Pump	Cone	Selecti'e.	3	Motor	Shaft	124	56	P. Steel	Plain	Ball	Roller	2650	34x4½	34x4½
	Storage	Pump	Cone	Selecti'e.	3	Motor	Shaft	124	56	P. Steel	Plain	Ball	Roller	2650	34x4½	34x4½
	Storage	Splash	Mul. disc.	Selecti'e.	4	Amid'p.	Shaft	124	56	Alloy Steel	Ball	Ball	Ball	3400	36x4	36x5
	None	Pump	Mul. disc.	Selecti'e.	4	Amid'p.	2 Chain.	124	56	P. Steel	2 pl. & b.	Ball	Ball	3000	36x4	36x5
	None	Pump	Mul. disc.	Selecti'e.	4	Amid'p.	2 Chain.	124	56	P. Steel	2 pl. & b.	Ball	Ball	3000	36x4	36x5
	Dry	Pump	Disc.	Selecti'e.	4	Amid'p.	Shaft	110	56	P. Steel	2 pl. & r.	Ball	Ball	......	34½x4½	34½x4¾
	Dry.	Pump	Disc.	Selecti'e.	4	Amid'p.	Shaft	110	56	P. Steel	2 pl. & r.	Ball	Ball	......	34½x4½	34½x4¾
	Dry	Pump	Disc.	Selecti'e.	4	Amid'p.	Shaft	110	56	P. Steel	2 pl. & r.	Ball	Ball	......	34½x4½	34½x4¾
	Storage	Pump	Con. bd.	Selecti'e.	4	Motor	Chain	105	56	P. Steel	Plain	Ball	Ball	2700	34x4	35x4½
	Dry	Pump	Cone	Selecti'e.	3	Axle	Shaft	120	56½	P. Steel	Plain	Ball	Roller	2300	34x4	34x4
	Dry	Pump	Cone	Selecti'e.	3	Axle	Shaft	120	56½	P. Steel	Plain	Ball	Roller	2300	34x4	34x4
	Dry	Splash	Mul. disc.	Selecti'e.	3	Motor	Shaft	105	56	P. Steel	Plain	Ball	Roller	......	34x4	34x4
	Storage	Pump	Cone	Selecti'e.	3	Amid'p.	Shaft	109	56	C.n. Steel	Pl. & b.	Ball	Ball	2500	34x4	34x4
	Storage	Pump	Disc.	Selecti'e.	3	Axle	Shaft	128	56½	C.n. Steel	5 Plain	Ball	Ball	2500	36x4	36x5
	Storage	Pump	Cone	Selecti'e.	3	Motor	Shaft	124	56½	P. Steel	Plain	Ball	Roller	2700	36x4	36x4
	Storage	Pump	Cone	Selecti'e.	3	Amid'p.	Shaft	106	56	P. Steel	3 Plain	Roller.	Roller	......	36x4	36x4
	Storage	Pump	Cone	Selecti'e.	3	Amid'p.	Shaft	106	56	P. Steel	3 Plain	Roller	Roller	......	36x4	36x4
	Storage	Pump	3 Plate	Selecti'e.	3	Amid'p.	Shaft	106	56	P. Steel	5 Plain	Ball	Roller	2920	36x5	36x5
	Storage	Pressure	Coil	Selecti'e.	4	Axle	2 Chain.	108	56	Krupp	Plain	Ball,	Ball	2700	36½x3¾	36¾x5
	Dry	Pump	Cone	Selecti'e.	4	Motor	Shaft	124	56	P. Steel	Plain	Roller	Ball	......	36x5	36½x5½
	Dry	Pump	Cone	Selecti'e.	4	Motor	Shaft	124	56	P. Steel	Plain	Roller	Ball	......	36x5	36½x5½
	Storage	Pump	Mul. disc.	Selecti'e.	4	Motor	Shaft	127	56	P. Steel	Plain	Ball	Ball	3000	36x4	36x5
	Storage	Pump	Cone	Selecti'e.	4	Frame	Shaft	112	56	P. Steel	3 Plain	Ball	Ball	2600	36x4½	36x4½
	Exide	Pump	Cone	Selecti'e.	3	Unit	Shaft	120	56	P. Steel	Plain	Ball	Roller	......	36x4	36x4

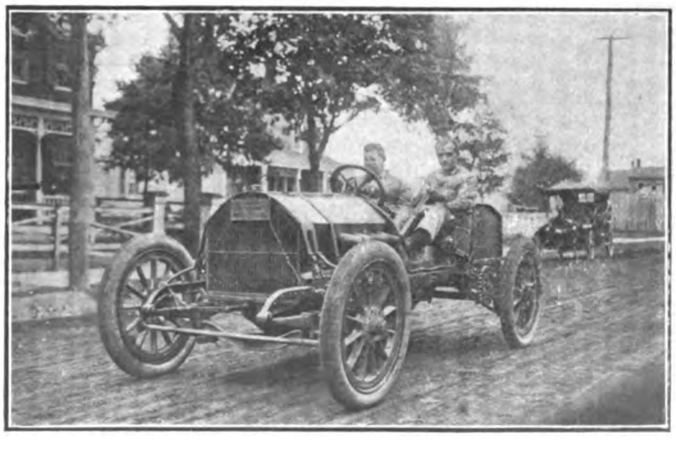
OR THE WHEATLEY HILLS SWEEPSTAKES

Magneto	Battery	Lubrication	Clutch	Type	Speeds	Location	Drive	Wheel-base	Tread	Frame	Crank-shaft	Trans-mis'on	Axle	Wght.	Front	Rear
	Storage	Pump	Cone	Sel.	3	Axle	Shaft	120	56½	P. steel	Plain	Ball	Roller	2300	34x4	34x4
	None	Pump	Mul. disc.	Sel.	3	S. frame	Shaft	108	56	P. steel	Plain	Ball	Ball	1900	32x3½	32x4
	None	Pump	Cone	Sel.	3	Amid'p.	Shaft	103	56	P. steel	Plain	Ball	Ball	1800	32x4	32x4
	None	Pump	Cone	Sel.	3	Axle	Shaft	105	56	P. steel	Plain	Roller	Roller	1900	34x3½	34x3½
	Dry	Pump	Cone	Sel.	3	Amid'p.	Shaft	108	56	Nick. st.	Pl & b.	Ball	Ball	2250	34x4	34x4
	None	Pump	Mul. disc.	Sel.	3	S. frame.	Shaft	108	56	P. steel	Plain	Ball	Ball	1900	32x3½	32x4
	Dry	Pump	Mul. disc.	Sel.	3	Axle	Shaft	102	56	P. steel	Plain	Ball	Roller	1800	32x4	32x4
	Battery	Pmup	Cone	Sel.	3	Frame	Shaft	116	56	P. steel	3 Plain	Ball	Ball	......	34x3½	34x4
	Battery	Pump	Cone	Sel.	3	Frame	Shaft	116	56	P. steel	3 Plain	Ball	Ball	......	34x3½	34x4

OR THE MASSAPEQUA SWEEPSTAKES

Magneto	Battery	Lubrication	Clutch	Type	Speeds	Location	Drive	Wheel-base	Tread	Frame	Crank-shaft	Trans-mis'on	Axle	Wght.	Front	Rear
	Dry	**Pump**	Cone	Sel.	3	Motor	Shaft	108	56	P. steel	3pl	......	Roller	2000	34x3½	34x3½
	Dry	**Pump**	Cone	Sel.	3	Motor	Shaft	108	56	P. steel	3pl	......	Roller	2000	34x3½	34x3½
	None	**Pump**	Mul. disc	Sel.	4	Motor	Shaft	105	53	P. steel	3pl	Ball	Ball	1920	32x4	32x4
	Dry	**Pump**	Mul. disc.	Sel.	3	Amid'p.	Shaft	110	56	dr. st	Plain	Ball	Ball	2000	34x3½	34x3½
	Dry	**Pump**	Mul. disc.	Sel.	3	Amid'p.	Shaft	110	56	dr. st	Plain	Ball	Ball	2000	34x3½	34x3½
	Dry	**Pump**	Mul. disc.	Sel.	3	Amid'p.	Shaft	110	56	dr. st	Plain	Ball	Ball	2000	34x3½	34x3½

Long-hooded, black Alco; winner of last year's Vanderbilt



Hope of the Pacific Slope is centered on Apperson Jack-Rabbit

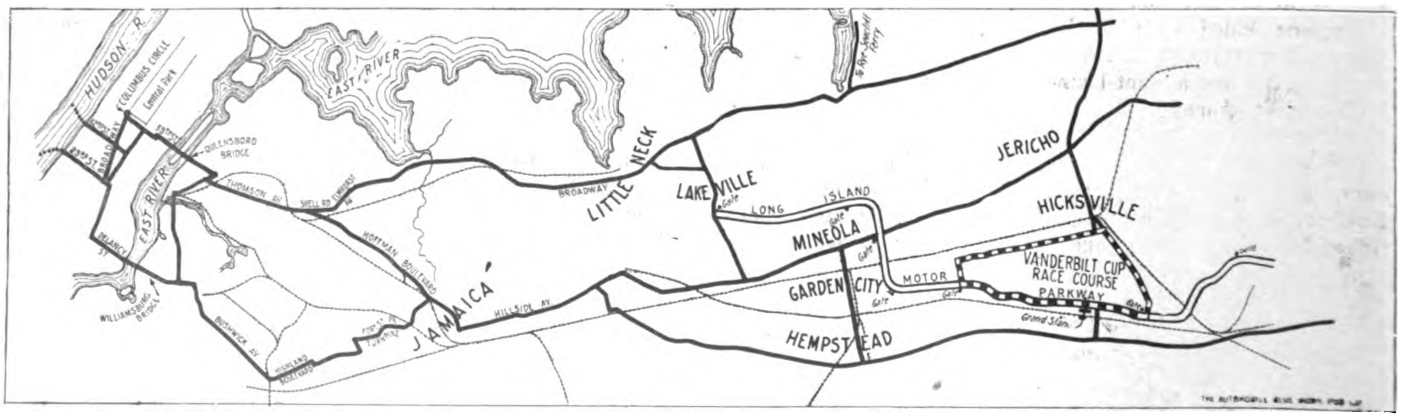
TABLE SHOWING THE SPEED IN MILES PER HOUR OF AN AUTOMOBILE GOING AROUND THE COURSE OF THE VANDERBILT CUP RACE IN FROM 9 TO 13 MINUTES

(Course is 12.64 miles long—5.15 miles cemented parkway; 7.49 miles oiled macadamized roads. Fastest time made on it, 9 minutes 56½ seconds, on October 30th, 1909)

Min.	M.P.H.	Min.	M.P.H.	Min.	M.P.H.	Min.	M.P.H.	Min.	M.P.H.	Min.	M.P.H.	Min.	M.P.H.
9:00	84.27	9:35	79.14	10:09	74.72	10:43	70.77	11:18	67.11	11:52	63.91	12:26	61.00
9:01	84.11	9:36	79.00	10:10	74.60	10:44	70.66	11:19	67.01	11:53	63.82	12:27	60.92
9:02	83.95	9:37	78.86	10:11	74.47	10:45	70.55	11:20	66.91	11:54	63.73	12:28	60.83
9:03	83.80	9:38	78.73	10:12	74.35	10:46	70.44	11:21	66.82	11:55	63.64	12:29	60.75
9:04	83.65	9:39	78.59	10:13	74.23	10:47	70.33	11:22	66.72	11:56	63.55	12:30	60.67
9:05	83.49	9:40	78.45	10:14	74.11	10:48	70.22	11:23	66.62	11:57	63.46	12:31	60.59
9:06	83.34	9:41	78.32	10:15	73.99	10:49	70.11	11:24	66.53	11:58	63.38	12:32	60.51
9:07	83.19	9:42	78.19	10:16	73.87	10:50	70.00	11:25	66.43	11:59	63.29	12:33	60.43
9:08	83.04	9:43	78.05	10:17	73.75	10:51	69.90	11:26	66.33	12:00	63.20	12:34	60.35
9:09	82.89	9:44	77.92	10:18	73.63	10:52	69.79	11:27	66.24	12:01	63.11	12:35	60.27
9:10	82.73	9:45	77.78	10:19	73.51	10:53	69.68	11:28	66.14	12:02	63.02	12:36	60.19
9:11	82.58	9:46	77.65	10:20	73.39	10:54	69.58	11:29	66.04	12:03	62.94	12:37	60.11
9:12	82.43	9:47	77.52	10:21	73.27	10:55	69.47	11:30	65.95	12:04	62.85	12:38	60.03
9:13	82.28	9:48	77.39	10:22	73.16	10:56	69.37	11:31	65.85	12:05	62.76	12:39	59.95
9:14	82.14	9:49	77.26	10:23	73.04	10:57	69.26	11:32	65.76	12:06	62.68	12:40	59.87
9:15	81.99	9:50	77.13	10:24	72.92	10:58	69.15	11:33	65.66	12:07	62.59	12:41	59.80
9:16	81.84	9:51	76.99	10:25	82.81	10:59	69.05	11:34	65.57	12:08	62.51	12:42	59.72
9:17	81.69	9:52	76.86	10:26	72.69	11:00	68.94	11:35	65.47	12:09	62.42	12:43	59.64
9:18	81.54	9:53	76.73	10:27	72.57	11:01	68.84	11:36	65.38	12:10	62.33	12:44	59.56
9:19	81.40	9:54	76.60	10:28	72.46	11:02	68.74	11:37	65.29	12:11	62.25	12:45	59.48
9:20	81.26	9:55	76.48	10:29	72.34	11:03	68.63	11:38	65.19	12:12	62.16	12:46	59.40
9:21	81.12	9:56	76.35	10:30	72.23	11:04	68.53	11:39	65.10	12:13	62.08	12:47	59.33
9:22	80.97	9:57	76.22	10:31	72.11	11:05	68.43	11:40	65.01	12:14	61.99	12:48	59.25
9:23	80.82	9:58	76.09	10:32	72.00	11:06	68.33	11:41	64.91	12:15	61.91	12:49	59.17
9:24	80.68	9:59	75.97	10:33	71.89	11:07	68.22	11:42	64.82	12:16	61.83	12:50	59.10
9:25	80.54	10:00	75.84	10:34	71.77	11:08	68.12	11:43	64.73	12:17	61.74	12:51	59.02
9:26	80.39	10:01	75.71	10:35	71.66	11:09	68.02	11:44	64.64	12:18	61.66	12:52	58.94
9:27	80.25	10:02	75.59	10:36	71.55	11:10	67.92	11:45	65.54	12:19	61.58	12:53	58.87
9:28	80.11	10:03	75.46	10:37	71.43	11:11	67.81	11:46	64.45	12:20	61.49	12:54	58.79
9:29	79.97	10:04	75.34	10:38	71.32	11:12	67.71	11:47	64.36	12:21	61.41	12:55	58.71
9:30	79.83	10:05	75.21	10:39	71.21	11:13	67.61	11:48	64.27	12:22	61.33	12:56	58.64
9:31	79.69	10:06	75.09	10:40	71.10	11:14	67.51	11:49	64.18	12:23	61.24	12:57	58.56
9:32	79.55	10:07	74.96	10:41	70.99	11:15	67.41	11:50	64.09	12:24	61.16	12:58	58.49
9:33	79.42	10:08	74.84	10:42	70.88	11:16	67.31	11:51	64.00	12:25	61.08	12:59	58.41
9:34	79.28					11:17	67.21					13:00	58.34

The Vanderbilt Cup race this year will be decided in large measure by the driving and such a galaxy of talent in that line has seldom been assembled in a single contest. There is not a single man who will handle the wheel in the cup race and the two sweepstakes who is not an artist. Most of them are veterans who have been in competition for years. Some of them are pioneers of the automobile racing profession and all have served their apprenticeship of hard, conscientious work to master the details of contest work. Robertson, Louis Chevrolet, Burman, Harroun, Matson, Montague, Roberts, Bill Endicott and Disbrow are in the front rank among the veterans, despite the fact that several of the above-named are smooth of brow and youthful, judged by the mere standard of years. Hearne, Grant, Fleming, Dingley, Aitken, Livingston, Dawson, Hanshue, Basle, and Knipper, are all masterly drivers whose names are associated with winners and whose knowledge of cars and speeds is intuitive. Bruce-Brown, Beardsley, and Wishard, have been amateurs so recently that one is almost obliged to class them together. In fact, Mr. Wishard's amateur standing is still debatable, despite the money prizes that await the winner of this contest. However, it would be difficult to pick out three more skillful drivers than this trio. Mitchell, Mulford, Arthur Chevrolet, Schiefler, Belcher, Juhasz, and Stillman, represent everything that goes to make up first-rate drivers. They all have strength, daring, and knowledge of track, road and the automobile, and if the winning of the race depends upon nerve and skill of the driver, any of them may win. De Hymel, the Aztec Indian; Jones, the 19-year-old youth, who will pilot the Amplex; Maisonville, the Corbin pilot in the Wheatley Hills; Sherwood of the Mercer; Oldfield, Abbott-Detroit, and his associates in the Massapequa, Mortimer Roberts and V. Padula, and Harry Endicott, and Limberg, are not so well known in the metropolitan racing field. De Hymel proved a world beater in Texas and the South. He is said to be as cool as Chevrolet and as easy as Lancia and to be as ready to take chances as Robertson or Harroun. Oldfield has driven in many races and is a strong, masterful youth with a keen knowledge of racing and contest work. The others have frequently driven in contests of various sorts and are competent men in the widest sense of the word.

Vanderbilt Cup cars and several others entered in the two minor sweepstake events were given moderately fast work Wednesday morning. There was nothing sensational about the time



MAP SHOWING THE BEST ROUTES BETWEEN GREATER NEW YORK AND VARIOUS POINTS ON THE COURSE
(Reproduced by permission of The Automobile Blue Book)

made except that the Pope-Hartford (Fleming) was sent around the course in 10:20 again. The principal other trials were as follows: National (Disbrow) 11:19; National (Aitken) 11:07; National (Livingston) 10:31; Marquette-Buick (Burman) 11:13; Benz (Heim) 11:14; Mercedes (Wishart) 11:21; Jackson (Scheifler) 12:03; Marquette-Buick (A. Chevrolet) 11:10; Marmon (Harroun) 13:15; Columbia (Stone) 11:07; Oldsmobile (Stillman) 11:56; Corbin (Matson) 17:11.

The Amplex (Jones) met with a mishap that may prevent the competition of the car. While going at a lively clip on the backstretch, the driver sought to avoid a motorcycle just at the close of practice and was obliged to make such a sudden turn that he dropped a torsion tube which resulted in some damage to the car. A hurry order has been sent to the factory for repair parts and the announcement has been made that a determined effort will be made to have the car on the starting line.

The official weighing-in will be completed Thursday night, after which the drawing for official race numbers will be held.

The officials of the race are as follows: Referee, William K. Vanderbilt, Jr.; judges, Henry Sanderson, Colgate Hoyt, Dave Hennen Morris, Robert Lee Morrell, and Samuel M. Butler; technical committee, A. L. McMurtry, Henry Souther and Alexander Churchward; A. A. A. representative, Frank G. Webb; assistant to the president, A. R. Pardington.

How to Reach the Grand Stand

Starting from Broadway, run east on Fifty-seventh street; turn left on Second avenue and right across Queensboro Bridge (toll 10 cents). At end of bridge turn right into Crescent street and at end of street turn sharp left into Nott avenue, crossing Jackson avenue. Curve slightly left over Thompson avenue railroad viaduct; then straight on into Hoffman Boulevard. At four-corners garage on left turn left into Hillside avenue direct through Jamaica. At iron sign post (four-corners) turn right on Queens road and left at end of road (15.0 miles). Take next diagonal right through Queens and Hempstead, straight road. Turn left (33.4 miles) to Grand Stand Long Island Motor Parkway (33.6 miles).

Coupe des Voiturettes

REMARKABLE TIME MADE OVER THE 282.4-MILE COURSE BY SMALL CARS, SOME OF WHICH DID 84 MILES AN HOUR ON THE STRAIGHTAWAY

BOULOGNE-SUR-MER, Sept. 17—An average speed of 55.7 miles an hour for a distance of 282.4 miles of hilly, winding road; one round of 23 1-2 miles officially covered at the rate of 58.7 miles an hour; an unofficial record of 66.4 miles an hour for another round; a speed of not less than 84 miles an hour on the straightaway—all this sounds like going fast. And it is not a revival of the Grand Prix race with 160-horsepower monsters that is under discussion, but merely the officially controlled speeds of the fastest cars in the Coupe des Voiturettes, where the bore of the little four-cylinder cars was not allowed to exceed 2 1-2 inches, or if you like to have it in accurate decimals, 2.559 inches.

If these little cars had been possible six years ago George Heath would certainly not have won the race for the Vanderbilt Cup. It is doubtful even if Louis Wagner would have held the trophy for the Darracq company, for 55.7 miles at hilly Boulogne is equal to more than 61.43 miles on level Long Island; it is equally doubtful if Sisz could have held his own on the straightaway Sarthe course against these terrible pigmies.

The race for the sixth annual Coupe des Voiturettes was one of the finest exhibitions of speed ever seen in France, and was particularly welcome after a monotonous series of aviation meetings. The seventeen entrants were reduced to fourteen almost at the last moment, the most serious loss being that of Giuppone, killed while practicing on a Lion-Peugeot only two days before the race; a Tribet smashed its clutch coming to the starting line, and a Saint-Lanne-Martinet, with a De Dion motor, quietly disappeared.

From the outset it was evident that the interest of the race lay between the Spanish Hispano-Suiza team of three four-cylinder cars, and the French Lion-Peugeot pair driven by Goux and Boillot. The Frenchmen were believed to be the faster, but the Spaniards had the advantage of being remarkably well prepared, their cars having been on the road for almost six months before the race. The others, although doing interesting work, were forgotten in the excitement of the Franco-Spanish duel.

A morning fog that rolled in from the sea held the start back from 7 to 8 o'clock. Then the cars were sent away at intervals of one minute, the course to be covered being one of 23 1-2 miles, comprising several 10 per cent. grades and numerous sharp turns, three of them being hairpins. Starting second, Zuccarelli finished first on the initial round in 25 minutes 35 seconds, easily beating last year's record of 29.28 over the same course. There was a surprise when the next car to roar by was Boillot's four-cylinder Lion-Peugeot which had started twelfth and passed the Hispano-Suiza, a Calthorpe, a D. S. P. L., a Corre La Licorne and a De Bazelaire. With a standing start Boillot had averaged 57 miles an hour. But there was still faster work, Goux coming round the course on his two-cylinder Lion-Peugeot in 24 minutes 33 seconds, or 17 seconds faster than his team mate.

All interest was now centered on the Lion-Peugeot and the Hispano-Suiza cars. Boillot led at the end of the second round, time 49 minutes 26 seconds, compared with 58.38, last year's record. At the end of the third round Goux was ahead, with Boillot 15 seconds behind him, and the whole Spanish team clinging on with grim determination. Goux made a desperate effort to shake the foreigners off, accomplishing his third round in 25 minutes 2 3-5 seconds, or an average of 58.7 miles an hour, this remaining the official record for the day. It was soon evident that Boillot could not get first place, for after two rounds his motor began to heat, necessitating a stoppage at the end of each round to take on water. But this did not make him spare his car; as he came down the gentle slope to the stands he drew up quickly and quietly without the least skidding of the wheels; in a fraction of a second the mechanic had the cap off the radiator, a cloud of steam shot out, more water was poured in, and almost before it was realized he was hurdling down the course to the graveyard turn, three-quarters of a mile away. Making allowance for the stoppage to take on water, he covered one of his rounds at the rate of 66.4 miles an hour, and his official time, including the stoppage, was faster than that realized by the winner Zuccarelli on any single round of the course.

From the third round onward the real struggle lay between Goux's two-cylinder Lion-Peugeot and Zuccarelli's four-cylinder Hispano-Suiza, with Chassaigne as a dangerous runner-up, and Boillot a violent sprinter unable to make up the time lost through his frequent but brief stops. At the end of six rounds, half distance, Goux had a lead of nearly two minutes on the Spaniard Zuccarelli, but it was not sufficient to assure him the victory, for on the next round he punctured twice, had to change with fixed rims and allowed Zuccarelli to get a lead of six minutes. On the eighth round the lead was pulled down to five minutes; on the ninth round it had been dropped to four minutes; on the tenth round it was still four minutes, and there remained two rounds to be covered, on each of which the Frenchman must gain two minutes in order to beat the Spaniard. Goux might have done it had he had ordinary luck with its tires, but on the eleventh round he punctured three times and occupied 38 minutes 5 seconds on the course which he had previously been covering in an average of 24 1-2 minutes. This lost him the race, for although Zuccarelli, who never once punctured, was held up by reason of a leak in his petrol tank, he got round the course in 29 minutes 3 seconds. Goux went for all he was worth on the last lap, but another puncture, the breakage of a shock absorber and the jumping of one of his driving chains from its sprocket held him down to 29 minutes 8 seconds for the round. Zuccarelli had won the race with a margin of exactly 17 minutes, had beaten last year's record established by Giuppone on a single-cylinder Lion-Peugeot by almost an hour, and had shown an average speed of 55.7 miles an hour.

With Boillot going lame, Chassaigne had not much difficulty in bringing his Hispano-Suiza home third with a margin of seven minutes. Collomb, who had run a very even course, brought his Corre La Licorne home fifth, but would certainly have been beaten by his teammate Levy had this car not been held back by frequent punctures, so frequent indeed that on one occasion it was necessary to wait an hour until fresh inner tubes were brought from the tire station. Pilliverde finished sixth on the Hispano-Suiza, thus securing the team prize for his firm. Levy on the Corre La Licorne came home too late to be timed.

One of the surprises of the meeting was the failure of the English team to get a single car home. Fred Burgess skidded on a turn, buckled a wheel, skidded again a few minutes later and broke his front axle. Garfield, also on a Calthorpe, lost the oil plug out of the base of his crankcase and was not long in seizing up. Frank Lewis, after covering half the distance, had the oil tank in the base of his crank chamber cracked by a flying stone, lost his lubricant and eventually seized. No. 1 Tribet car broke its crankshaft, an accident that was not unexpected, for it was known that a mistake had been made in the material supplied. Vallee on the four-cylinder D. S. P. L. overturned after covering one round; a companion car, after holding the road badly for nine rounds, withdrew from the fray. De Bazelaire, who had started with a stripped runabout, his racer having been wrecked a few days previously, averaged 40 miles an hour for half a dozen rounds, then made for home.

The feature of the cars entered for the race was the proportion of four-cylinder motors. In all the previous races single-cylinder cars have predominated, and have never been beaten. On this occasion there was 13 four-cylinder cars, one two-cylinder-motor, and three one lungers. Hispano-Suiza presented three four-cylinder models with the maximum bore of 2 1-2 inches and a stroke of 7 8-10 inches; this gives a ratio of stroke to bore of practically 3.07. The Spanish engineers had been satisfied to develop their motor on standard lines. Thus the four cylinders were a single casting, with valves on opposite sides, the diameter of the valves being considerable, but the valve chambers reduced to the smallest possible area. Timing gears were enclosed at the forward end of the motor, the high-tension Bosch magneto being driven off the right-hand side, and the water pump off the left-hand side. The head of the cylinders was dome shaped, the steel pistons had flat heads, were of unusual length and fitted with three compression rings. Tubular connecting-rods were employed. The crankshaft was carried in three ball-bearings. B. N. D. steel was employed for crankshafts, camshafts, connecting-rods, etc. The motor did its best work at 2,300 revolutions a minute, when it developed 45 horsepower, with an average lineal piston speed of 15 meters a second, or almost 3,000 feet a minute. Lubrication was of the forced feed type by a pump worked off the extremity of the intake camshaft, and the pressure on the gasoline was also maintained by an air pump worked off the motor. The drive was taken through a multiple disc clutch to a three-speed gear box, and by propeller shaft to the rear live axle, the number of teeth in the rear axle being 17 and 47. Rudge-Whitworth dismountable wire wheels were used, in conjunction with Michelin tires of 880 by 90. Total weight of each of the three cars, without oil or gasoline, was 1,455 pounds.

No attempt was made by the Hispano-Suiza engineers to gain speed by reducing head resistance. The cars carried large square honeycomb radiators, the bonnet stopped dead at the dash, and the rear of the two seats was a sloping platform on which a spare wheel was mounted.

The Lion-Peugeot people, who previously have run with two single-cylinder cars and one twin-cylinder V motor, this year produced entirely new models having the defect of not being thoroughly tuned up. Detail information regarding the motors is most jealously guarded. The cars were brought to Boulogne at night, while they were being weighed in a big screen was placed round them, and before the mechanics would dismount the cylinders the hall had to be cleared of all but officials. During the race Boillot had to lift his bonnet twice in the presence of the crowd in order to flood his carbureter, but he had it on again in a fraction of a second. When the race was over he placed a man in charge of the car with orders that the bonnet should not be raised, and to be doubly sure, ate his lunch in such a position that he could watch the machine all the time.

Goux's two-cylinder Lion-Peugeot motor was half exposed through the cut-away bonnet, and as this covering was abandoned during the race, a fair opportunity was given of examining the mechanical features. The two cylinders are cast separately and mounted in V-shape, with only a slight inclination from the vertical on an aluminum crankcase. Cylinder bore is the maximum of 80 millimeters (3.1 inches) and stroke is 11 inches. This gives a ratio of 3 1-2 to 1 stroke to bore. This motor, which has been designed by the firm's chief engineer, M. Michaud, differs considerably from the previous racing models produced for the firm by Boudreau-Vernet. There are three valves per cylinder, the intake being mounted vertically in the head of the cylinder, having a diameter of 2.4 inches and a flat seat, while the two exhausts are carried horizontally, one stem projecting toward the radiator, and the other toward the dashboard.

The second Lion-Peugeot, driven by Boillot, had four cylinders in V forming a single casting, their dimensions being 2 1-2 inches bore by 10.2 inches stroke; this is a ratio of 4 to 1, the highest employed for any motor yet produced in Europe. Theoretically this motor ought to have won the race, for it developed 45 horsepower on the bench, and was undoubtedly the fastest on the straightaway. Boillot lost a certain amount of time through the breakage of his gasoline feed pipe and the disarrangement of his foot brake. But the real cause of his defeat was overheating

TABULATED RESULT OF COUPE DES VOITURETTES RACE

Total distance 282.4 miles

Average 55.7 miles an hour.

		h.	m.	s.
1.	Zuccarelli, Hispano-Suiza	5	04	50
2.	Goux, Lion-Peugot	5	21	50
3.	Chassaigne, Hispano-Suiza	5	30	45
4.	Boillot, Lion-Peugeot	5	37	36
5.	Collomb, Corre La Licorne	6	28	16
6.	Pilliverde, Hispano-Suiza	6	37	[illegible]
7.	Levy, Corre La Licorne	not timed		

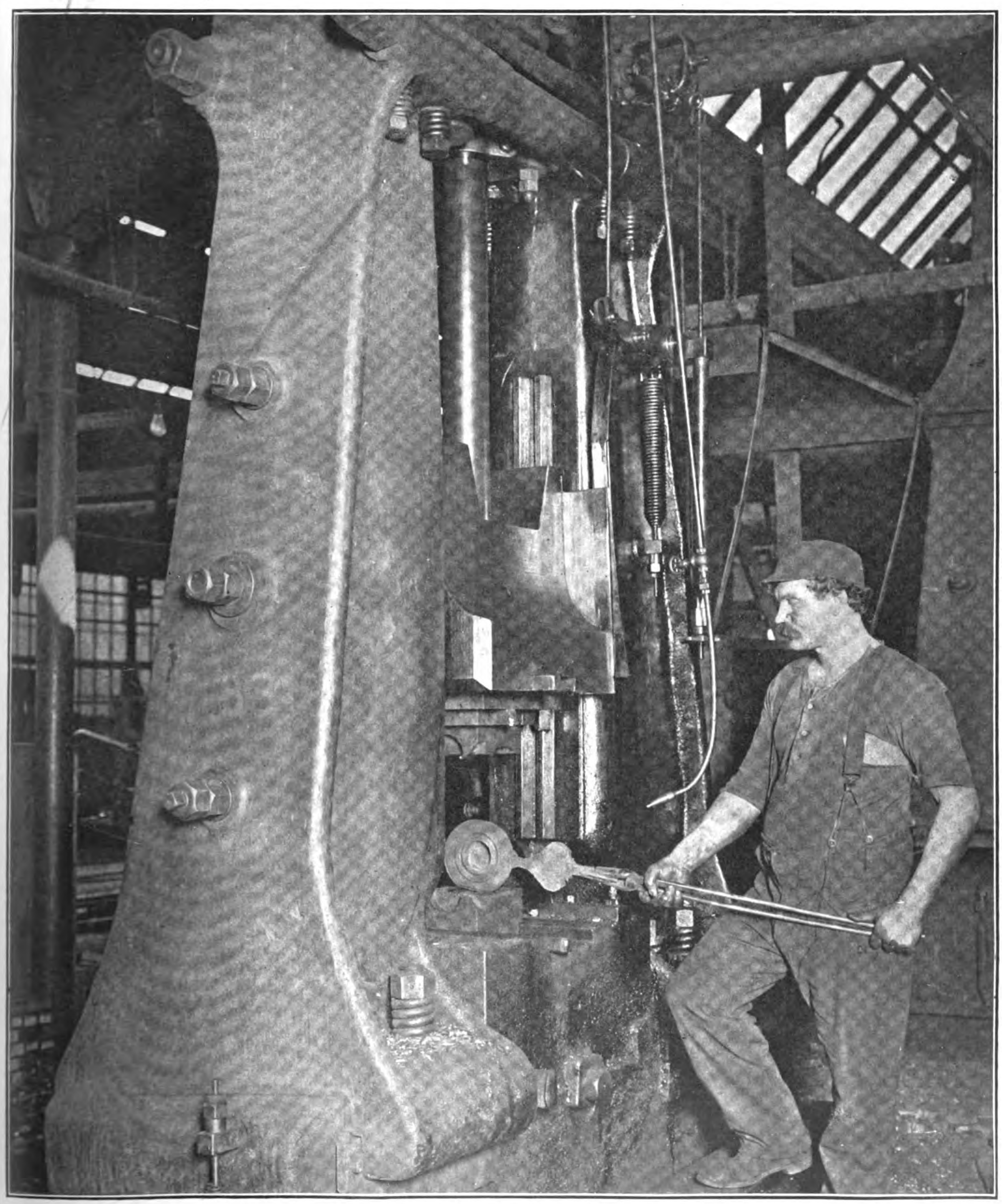
Fastest round, Goux, Lion-Peugeot, average 58.7 miles.

CHARACTERISTICS OF CARS

Car	Cylinder	Bore & Stroke	H. P.	Clutch	Drive	Transmission	Ignition	Carbureter	Tires
Hispano-Suiza	4	2½ x 6½	40	Disc	Shaft	4 Selective	Magneto	Claudel	810 x 90
Lion-Peugot	2	3.1 x 10.2	38	Cone	Chain	4 Selective	2 Magnetos	Claudel	810 x 90
Lion-Peugeot	4	2½ x 11	45	Cone	Chain	4 Selective	Magneto	Claudel	810 x 90
Corre La Licorne	1	3.9 x 11.8	38	Cone	Shaft	3 Progressive	Magneto	Zenith	810 x 90
Corre La Licorne	1	3.9 x 1	34	Cone	Shaft	4 Selective	Magneto	Zenith	810 x 90
Calthorpe	4	2½ x 6.6	38	Disc	Shaft	3 Selective	Magneto	Zenith	810 x 90
De Bazelaire	4	2½ x 6.2	30	Disc	Shaft	3 Selective	Magneto	Zenith	810 x 90
Tribet	4	2½ x 7	35	Cone	Shaft	3 Selective	Magneto	Zenith	810 x 90
D. S. P. L.	4	2½ x 5.5	36	Disc	Shaft	3 Selective	Magneto	Zenith	810 x 90

Engineering Section

DEVOTED TO THE DISCUSSION OF ENGINEERING PHASES OF AUTOMOBILING, INCLUDING DESIGNING AND CONSTRUCTION FEATURES OF PRODUCTS, AND INFORMATION TO AUTOISTS



TO AVOID USING INFERIOR CASTINGS ENORMOUS HAMMERS ARE NECESSARY—SCENE AT RAMBLER PLANT

Auto as Locomotive

WILLIAM D. ENNIS, M.E., OF BROOKLYN POLYTECHNIC INSTITUTE, CONSIDERS THE MOTOR CAR FROM THE STANDPOINT OF THE LOCOMOTIVE DESIGNER

INTRODUCTORY.—The automobile is a train comprising a single self-propelled car running on the ground instead of on rails. It is the purpose of this paper to consider the motor car from the standpoint of the locomotive designer, rather than as a vehicle or a power engine, and to discuss the proportions of a typical example from this standpoint.

The specific automobile to which reference will be made is a 1907 Stoddard-Dayton, Model F, having a four-cylinder, four-cycle motor rated at 30 to 35 horsepower, with selective type transmission, three speeds forward and one reverse. The cylinders are 4 5-8 by 5-inch, tires nominally 34 by 4-inch, weight of empty car 3,025 pounds (54 per cent. on rear wheels), and gear ratios between engine and rear wheels of 11, 5 and 3 to 1 running forward and 14 to 1 reversed. This car was in 1909 subjected to a series of interesting power measurements by Messrs. C. Hidalgo and J. Harold McCreery on the testing floor of the Automobile Club of America. It has been the writer's privilege to examine the data obtained by these gentlemen.

Tractive Force

The ability of any locomotive to propel depends not upon its horsepower, but on the *tractive* or pulling force which it can exert. Work, or horsepower, is a formation both of the tractive force and the speed. A motor might have almost unlimited horsepower without sufficient tractive force to meet ordinary road conditions. To be satisfactory, it must exert the proper amounts both of tractive force and horsepower, the latter depending (after the former is fixed) solely on the speed. In Fig. 1 we have the simple case of one single-acting cylinder directly cranked to a wheel without intermediate gearing. The wheel makes the same number of revolutions per minute as the piston. Let

s = stroke of piston in inches,
P = average pressure continuously maintained on the piston in pounds per square inch,
d = diameter of piston in inches,
D = diameter of wheel in inches,
F = tractive or pulling force that could be exerted at the wheel rim, in pounds; the force that would be measured by a spring balance connected tangentially at the rim of the wheel.

Remembering that work is equal to force times distance through which the force is applied, we proceed:

$$\text{Area of piston} = \frac{\pi}{4} d^2 \text{ square inches,}$$

$$\text{Total average pressure on piston} = \frac{\pi}{4} d^2 P \text{ pounds,}$$

$$\text{Work at piston per revolution} = 2s \times \frac{\pi}{4} d^2 P = \frac{\pi}{2} d^2 sP \text{ inch-pounds.}$$

Let W be the work done at the wheel surface per revolution $= \pi DF$. Then, if there is no friction loss between piston and wheel,

$$W = \pi DF = \frac{\pi}{2} d^2 sP \text{ and } F = \frac{d^2 sP}{2D}.$$

Suppose the speeds of wheel and piston to be different, because of intermediate gearing: let N denote the revolutions per minute of the wheel, and n those of the piston. We then have,

$$\text{Work at piston per minute} = \frac{\pi}{2} d^2 nsP \text{ inch-pounds,}$$

$$\text{Work at wheel per minute} = NW = N\pi DF = \frac{\pi}{2} d^2 nsP \text{ and}$$

$$F = \frac{d^2 nsP}{2ND}.$$

In this connection, P denotes the average pressure continuously maintained. In a four-cycle engine there is perceptible pressure on the piston during one stroke only in the four; this when averaged over a single stroke is called the mean effective pressure; it is the average height of the indicator diagram, and its value is four times that of P. But if the engine has four cylinders we may obtain four times the value of F that is given by our formula, or P may be put equal to the mean effective pressure, the maximum of which for gasoline automobile engines will be not far from 100 pounds. For the car under consideration $d = 4\frac{5}{8}$, $s = 5$, D (diameter of wheels) $= 34$; letting $P = 100$ and taking $\frac{n}{N} = 11$ (first gear), we have

$$F = \frac{(4\frac{5}{8})^2 \times 11 \times 5 \times 100}{2 \times 34} = 1730 \text{ pounds.}$$

For second and third gears, respectively, we obtain

$$F_2 = \frac{(4\frac{5}{8})^2 \times 5 \times 5 \times 100}{2 \times 34} = 786 \text{ pounds,}$$

$$F_3 = \frac{(4\frac{5}{8})^2 \times 3 \times 5 \times 100}{2 \times 34} = 472 \text{ pounds.}$$

These are maximum theoretical values, assuming a perfect spark adjustment and no throttling, and are not realized in practice. Assuming them to be realized, however, what are the corresponding limits of speed? At 100 pounds mean effective pressure the horsepower at the pistons is

$$\frac{100 \times \pi \frac{d^2}{4} \times 2sn}{12 \times 33{,}000} = \frac{100 \times 3.1416 \times 4\frac{5}{8} \times 4\frac{5}{8} \times 2 \times 5 \times n}{4 \times 12 \times 33{,}000} = 0.0424\, n.$$

Suppose the maximum speed of the pistons at which full mean effective pressure is attainable to be 900 r.p.m. The horsepower for this value of n is

$$0.0424 \times 900 = 38.16.$$

The horsepower at the wheel rim is

$$\frac{34 \times \pi \times F \times N}{12 \times 33{,}000} = 0.00027\, FN.$$

The values of N for the three gears are:

$$\begin{aligned} N_1 &= 900 \div 11 = 81.8 \\ N_2 &= 900 \div 5 = 180. \\ N_3 &= 900 \div 3 = 300. \end{aligned}$$

Introducing the proper values of F, we have as the wheel rim horsepowers,

$$\left.\begin{aligned} HP_1 &= 0.00027 \times 1730 \times 81.8 \\ HP_2 &= 0.00027 \times 786 \times 180 \\ HP_3 &= 0.00027 \times 472 \times 300 \end{aligned}\right\} = 38.16.$$

If we put horsepower at wheel rim $= 38.16$, we have

$$38.16 = 0.00027\, FN,$$

$$\begin{aligned} N_1 &= 38.16 \div (0.00027 \times 1730) = 81.7 \\ N_2 &= 38.16 \div (0.00027 \times 786) = 179.7 \\ N_3 &= 38.16 \div (0.00027 \times 472) = 299.6 \end{aligned}$$

Under running conditions the circumference of the rear wheels of the car was 8.96 feet. The speed in miles per hour is then

$$M = \frac{8.96 \times N \times 60}{5280} = 0.1018\, N, \text{ which becomes}$$

$$\begin{aligned} M_1 &= 0.1018 \times 81.7 = 8.317 \\ M_2 &= 0.1018 \times 179.7 = 18.297 \\ M_3 &= 0.1018 \times 299.6 = 30.496 \end{aligned}$$

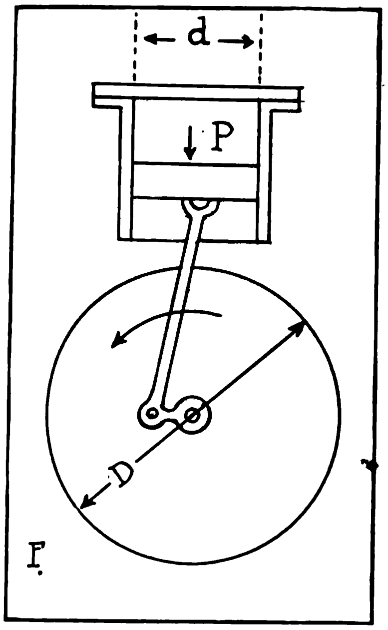


Fig. 1—Tractive power illustrated by a traction wheel directly connected to one single-acting cylinder

These are the maximum speeds that could be obtained theoretically with the respective gears and when developing the stated tractive powers.

Transmission Losses

In Fig. 2, suppose this car A to be set upon an immense hinged plan roadway B, the free end of the roadway being raised by the hyrdaulic jack C. The gears are in mesh and the car free to move. When the roadway is stationary or only slightly inclined, the car will stand still. When the free end has reached a certain elevation, the grade will become such that the car will start to run down the hill. If, immediately after the car starts, the elevation of the free end of the roadway is *slightly* decreased, the car may continue to move at a speed which will be found to vary with the amount of elevation.

The force which moves the car is the vertical component of its own weight, which may be readily compiled when we know that weight and the amount of elevation of the roadway. This force, then, may be used to measure the resistance to motion due to the internal friction of the automobile mechanism at rest or at whatever speed is desired. When once we thus know the amount of this internal friction we may reduce our values of F by these amounts so as to obtain the actual tractive force which, with the given mean effective pressure, could be exerted at the wheel rim or (more correctly) upon a spring balance restraining the car. The resistance due to friction is excessively high at starting, but this is ordinarily of little consequence.

In the experiments of Messrs. McCreery and Hidalgo the car was mounted on rollers and power was applied to the rear wheels from an electric motor. The amount of power consumed in driving the mechanism of the car at various speeds was estimated from the motor input. The results were as follows:

Gears	Speed in Miles per Hour	Horse Power Applied to Wheel Rim	Corresponding Traction Force, Lbs.
none	10.	1.18	44.31
none	18.2	2.4	49.51
none	30.8	4.05	49.38
none	40.4	5.38	50.01
none	48.8	6.81	52.40
first	4.	0.871	81.77
first	8.8	3.34	142.52
second	13.2	2.73	77.66
second	24.8	6.75	102.20
third	28.4	4.55	60.16
third	39.6	7.52	71.31

The first five results, of course, represent resistances due to the shaft and differential. The tractive forces corresponding to the measured horsepowers are thus derived:

$$HP = \text{force} \times \text{distance} = \frac{896\,FN}{33{,}000};$$

$$M = \text{miles per hour} = \frac{8.96\,N \times 60}{5280}, \quad N = \frac{5280\,M}{8.96 \times 60} = 9.82\ M;$$

$$HP = \frac{8.96\,F \times 9.82\,M}{33{,}000}, \quad F = \frac{33{,}000 \times HP}{8.96 \times 9.82\,M} = \frac{375.5\,HP}{M}$$

The deductions to be made from these figures are of considerable importance. The tractive force consumed in overcoming shaft and differential friction is practically constant showing a tendency to increase very slightly only as the speed increases. The horsepower lost in this part of the mechanism is consequently almost directly proportional to the speed. At a given speed, with gears meshed, the whole horsepower lost in the mechanism is apparently increased as the gear ratio is increased; so also, of course, does the loss of tractive force increase. Both losses increase rapidly as the speed increases, within the limits of the observations, the horsepower loss, of course, showing the more rapid increase. It must be remembered, however, that the measurements were made over trials of extremely brief duration.

Fig. 3 shows the results graphically. The economical advantage of using the high gear, from this standpoint, is obvious. Mechanical friction becomes a factor of no little importance in connection with high speeds.

Actual Pulling Power

The tests made on the car under discussion gave the following results:

Gear	Speed, Miles per Hour	Traction Force, Indicated, Lbs.	Horse Power Corresponding to Speed	Estimated Horse Power Exerted at Cylinder
3	41.4	180	27.3	19.7
3	42.8	200	30.7	22.7
3	49.2	160	29.0	21.
3	36.8	240	27.7	23.7
3	26.6	250	21.8	17.8
3	28.4	240	22.7	18.2
2	4.8	370	23.	19.
2	6.4	320	29.	22.
2	7.1	260	30.	19.5
1	2.8	740	...	....

The horsepower corresponding to the speed is, of course, MF ÷ 375.5, as already derived. The last column of the table gives the sum of this quantity and the friction horsepower, as estimated from Fig. 3. The following results may be derived from those just tabulated:

Gear	Speed, Miles per Hour	Horse Power at Cylinder	Friction Horse Power	Percentage of Horse Power Lost in Friction	Tractive Force Referred to Cylinder, Lbs.	Tractive Force to Ov'rc'me Friction, Lbs.
3	41.4	27.8	7.6	27.7	253	73
3	42.8	30.7	8.	26.1	325	75
3	49.2	29.0	8.	34.4	241.5	81.5
3	36.8	27.7	4.	14.4	308.5	68.5
3	26.6	21.8	4.	18.3	309.5	59.5
3	28.4	22.7	4.5	19.8	300.5	60.5
2	4.8	23.	4.	17.4	434.	64.
2	6.4	29.	7.	24.1	387.	67.
2	7.1	30.	10.5	35.	329.	69.

The power lost in overcoming friction is thus from 15 to 35 per cent. Of the total power developed, its proportion steadily increases with the speed and as steadily with the horsepower as could be expected with variable conditions in the cylinder. On third gear the tractive force falls off rapidly when the speed is something in excess of 40 miles per hour, or when 30 horsepower is taken out of the cylinder. A similar falling off in tractive force occurs on second gear at about 30 horsepower or a little less. As with the latter the piston speed at 30 horsepower is well below 1 000 feet per minute, it is difficult to explain the decrease in tractive force. With the third gear it is no doubt due to throttling and other vagaries of cylinder action to be expected with high piston speeds. The average tractive forces referred to the cylinder are, on third gear, 290 pounds, and

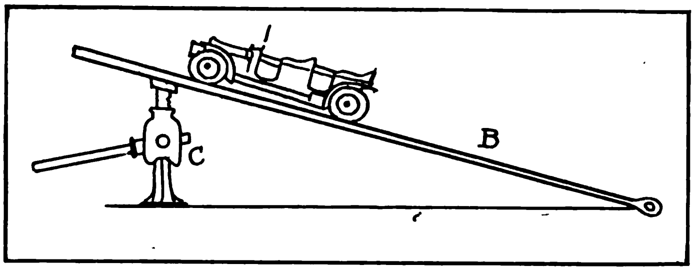


Fig. 2—Illustrating friction of machinery by the movement of an automobile on an inclined plane

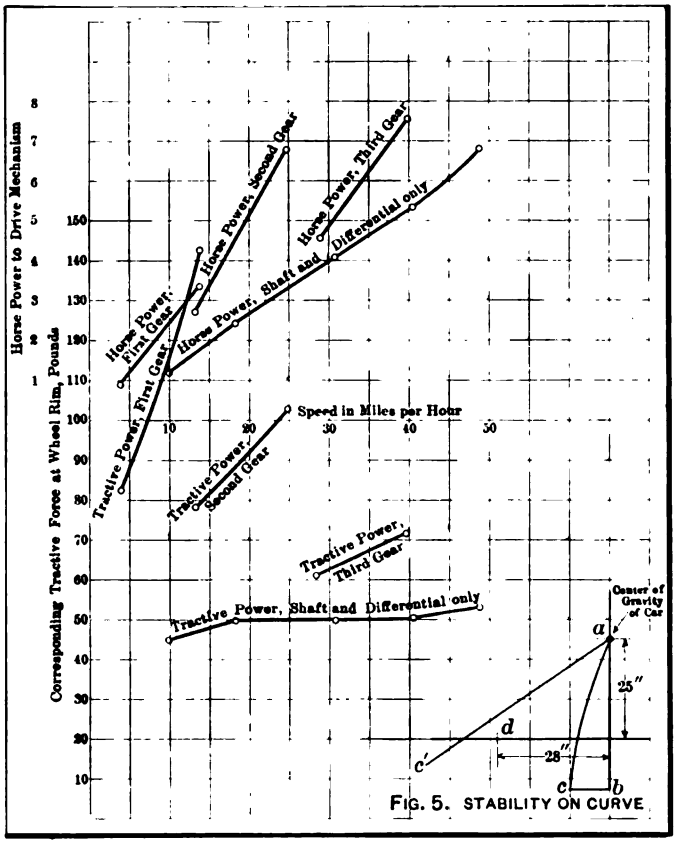


FIG. 5. STABILITY ON CURVE

Fig. 3 (Left)—Diagram illustrating the loss of horsepower and tractive force in automobile mechanism. Fig. 5 (Right)—Showing stability on curve.

on second gear 383 pounds, or 61 and 49 per cent, respectively, of those theoretically computed for 100 pounds mean effective pressure. A bad condition at the carbureter, spark or throttle might account for these apparently low tractive forces and mean effective pressures.

Propulsion Resistances—Wind

When a body bounded by a plane surface is subjected to a normal current of air, or moves normally in still air, a pressure is produced on the plane amounting in pounds per square foot of surface to

$$0.0025\ V^2;$$

in which V is the velocity in miles per hour. The total pressure over an area of A square feet is then

$$0.0025\ AV^2.$$

In a locomotive or automobile the value of A may be taken as the sum of the areas of the approximately normal surface, since a body partially protected by a wind shield may still be subjected to some resistance as the air eddies around the latter. For the car in question we may then perhaps take A at 28 square feet, whence the resistance is

$$0.0025 \times 28 \times V^2 = 0.07\ V^2 \text{ pound.}$$

No provision is made for measuring this in testing cars by the method referred to; for, although a large fan blows air against the front of the radiator for cooling, the car does not move against this current of air nor does the presence of the latter influence the amount of power exerted by the motor. The tractive forces necessary to overcome wind resistance alone are then about as follows:

Speed in miles per hour	Resistance due to velocity in still air, pounds
10	7
20	28
30	63
40	112
50	175
60	252
70	343
80	448
100	700

If there is a head wind, the velocity of the wind must be added to that of the car to obtain the equivalent speed. Thus, a car running at 40 miles per hour against a head wind of 20 miles per hour experiences a wind resistance of 252 pounds. It appears that, as in railroad locomotives, wind resistance is of little importance at low speeds (say, below 20 miles per hour), but of serious effect at high speeds. Based on the figures given, a racing car at 70 miles per hour would experience an extra resistance of 3.06 pounds from an extra normal surface 6 inches square—say, a man's head—and this would sacrifice more than half a horsepower.

Grade Resistance

The principle of grade resistance is illustrated in Fig. 4. A is a body free to move only on the inclined plane. Its weight acts downward along the line W. This downward force may be resolved into the components N, normal to the plane, and R in line with it. The component R retards the car. Since $R : W :: Q : L$, $R = \frac{Q}{L} W$, or the resistance due to a grade is equal, in pounds, to the weight of the car multiplied by the proportion of rise in the grade: Roughly, 20 pounds per ton of car weight per 1 per cent of grade. For the car in question, which, when loaded, weighs, say, 3,800 pounds, the resistance due to grade only, on a 1 per cent. grade, is 38 pounds; on a 4 per cent. grade 152 pounds, and so on. A car must have tractive force sufficient to overcome the resistance of the steepest grade it is likely to encounter, otherwise no amount of horsepower will make it mount the hill. This is to be accomplished by using large cylinders, six cylinders rather than four, small wheels, or a high gear ratio, or by a combination of these methods; and, after all, the operating conditions at the motor will affect the tractive force more than any other factor.

Speed on Grades—Curves

The highest tractive force is developed on the first gear, and this gear must, therefore, be used on the worst grades. This means a comparatively slow speed, since at 10 or 12 miles per hour the piston speed will have reached 1,000 feet per minute. It is desirable to use second or even third gear unless the grade is such as to stall the motor, and greater economy, of course follows the use of the higher gear. When a car is stalled on a grade, even because of a bad throttle or spark position, it may be necessary to drop to a lower gear (higher ratio) in order to start again, because the friction of a motionless machine exceeds that of one in motion (see explanation of Fig. 2).

In locomotive practice attention must be given the resistance due to pressure of wheel flanges against rail heads resulting from grades or side winds. Side winds have been known to overthrow trains on account of the large surface exposed. The side surface of a motor car rarely exceeds 35 square feet, and a wind velocity of 60 miles per hour would then give a pressure of only $0.0025 \times 35 \times 3600 = 315$ pounds. This produces no perceptible resistance to propulsion. In rounding a curve the centrifugal force, in pounds, is

$$\frac{Wv^2}{32.2\, r},$$

in which W is the weight of the car, v its velocity in feet per second, and r the radius of the curve which it is rounding, in feet. For $W = 3800$, $v = 60$, $r = 600$, this becomes

$$\frac{3800 \times 3600}{32.2 \times 600} = 707 \text{ pounds.}$$

For $v = 60$, the speed in miles per hour is $\frac{60 \times 3600}{5280} = 41.2.$ At this speed, when rounding a curve of 600 feet radius, the car would develop a centrifugal force tending to push it toward the outside of the curve amounting to 707 pounds. Suppose this to be coupled with a side wind pressure in the same direction of 315 pounds, making a total side pressure of 1,022 pounds. In Fig. 5 we have the condition of stability on a road without superelevation, the center of gravity of the car being assumed to be 25 inches above the ground and the tread being 56 inches. The vertical line a b represents the weight of the car (to any scale), c d represents the side force of 1,022 pounds to the same scale, and the straight line a c represents their resultant. If a c fell beyond d, like a c the car would overturn. In this case it is amply stable. The centrifugal force would have to be about 4,000 pounds to overturn it. This would involve a curve of 100 feet radius at about 41 miles per hour, or a curve of 200 feet radius at 58 miles per hour. The following would be the limiting speeds on various curves with no side wind pressure:

Radius of curve, feet	Limit of speed, miles per hour
100	41.
150	50.2
200	58.
250	64.9
300	71.
400	82.
500	91.8

The possibility of reaching unsafe speeds under road racing conditions is widest. A low center of gravity or a wide tread leads to stability.

Acceleration

It is seldom that any close calculation of acceleration resistances need be made. The basic formulæ are, however, as follows:

$$F_0 = 95.6\frac{V_2 - V_1}{t} + \frac{0.125}{T} \cdot \frac{V_2^3 - V_1^3}{V_2 - V_1},$$

$$F_1 = \frac{V_2^3 - V_1^3}{V_2 - V_1} \cdot \left(\frac{23.33}{s} + \frac{0.125}{T}\right),$$

in which F_0 is the net constant amount of tractive force required to accelerate and overcome wind resistance in bringing a car weighing T tons from a speed V_1 to V_2 (miles per hour) in t seconds, and F_1 is the force similarly necessary to produce the same increase of velocity in the distance s feet. Additional tractive force must be provided to overcome grade and frictional resistances.

Total Tractive Power and Adhesion

In designing an automobile it is necessary to give the motor the required tractive force to meet any probable combination of resistances and to then make the horsepower such as the speed requires. For example, with a gear arrangement and weight of car such as have been described, suppose (*a*) a speed of 60 miles per hour to be required on a straight, level road, (*b*) a speed of 30 miles per hour on second gear to be demanded on a 6 per cent. grade, and let it be necessary (*c*) that the car should attain a speed of 40 miles per hour, starting from rest, in 19.65 seconds when on a level road.

For condition (*a*) the frictional resistance on third gear appears likely, from Fig. 3, to be about 90 pounds. The air resistance is

$$0.07 \times 60 \times 60 = 252 \text{ pounds,}$$

making a total resistance of $252 + 90 = 342$ pounds.

For condition (*b*) the grade resistance is

$$6 \times 3800 \div 100 = 228 \text{ pounds,}$$

the air resistance is $0.07 \times 30 \times 30 = 63$ pounds, and the frictional resistance, from Fig. 3, is 115 pounds, making a total resistance of

$$228 + 63 + 115 = 406 \text{ pounds.}$$

To meet condition (*c*) we must overcome friction corresponding to mean speed of not far from 20 miles per hour—say 55 pounds on third gear or 92 pounds on second (Fig. 3). The combined wind and acceleration resistances are, from the formula given,

$$F_0 = 95.6\left(\frac{40}{19.65}\right) + \frac{0.125}{1.9} \cdot \frac{40^3}{40} = 300 \text{ pounds.}$$

The total resistance for this condition is then, with third gear, 355 pounds, and with the second gear, 302 pounds. Considering all three conditions, the machine must be capable of exerting a tractive force of 355 pounds on third gear and of 406 pounds on second gear. Taking the formula given

$$F = \frac{d^2nsP}{2ND},$$

and making $\frac{n}{N} = 5$ or 3, as the case may be, $D = 34$, $P = 100$, we have, for third gear,

$$355 = \frac{3 \times 100\, d^2s}{68} \text{ whence } d^2s = 80.3,$$

and for second gear

$$406 = \frac{5 \times 100\, d^2s}{68} \text{ whence } d^2s = 55.3.$$

We must adopt the higher value: and even this is based on $P = 100$, whereas the trials considered warrant values of P of only 61 for third gear and 49 for second. If we introduce these, the governing combination is $d^2s = 132$.

Now let us consider horsepower, using the formula $\frac{MF}{375.5}$.

For condition (*a*),

$$HP = \frac{60 \times 342}{375.5} = 54.3. \text{ For condition } (b),$$

$$HP = \frac{406 \times 30}{375.5} = 32.5, \text{ and for condition } (c),$$

$HP = \frac{355 \times 40}{375.5} = 37.6$ on third gear and $\frac{392 \times 40}{375.5} = 41.5$ on second—both maximum values after the attainment of the stated speed. The conditions are not harmonious as to power; but with the extreme flexibility due to gears it is quite possible for the designer to meet any assigned grade, speed and acceleration conditions with a reasonably uniform size of cylinder as computed for each. If we take the empirical formula for horsepower, for a four-cylinder machine,

$$\frac{4d^2}{2.5}$$

our maximum condition requires that

$$d^2 = 2.5 \times 54.3 \div 4 = 33.9 \text{ and } d = 5.83 \text{ inches,}$$

whence

$$s = 132 \div 33.9 = 3.9 \text{ inches.}$$

This would give a badly proportioned motor, and the empirical formula used should be one which includes both d and s, leading to an equation in the form

$$ds = a, \text{ a constant,}$$

$$s = \frac{a}{d},$$

$$da = 132,$$

$$\left\{\begin{array}{l} d = \dfrac{132}{a}, \\ s = \dfrac{a^2}{132}, \end{array}\right\}$$

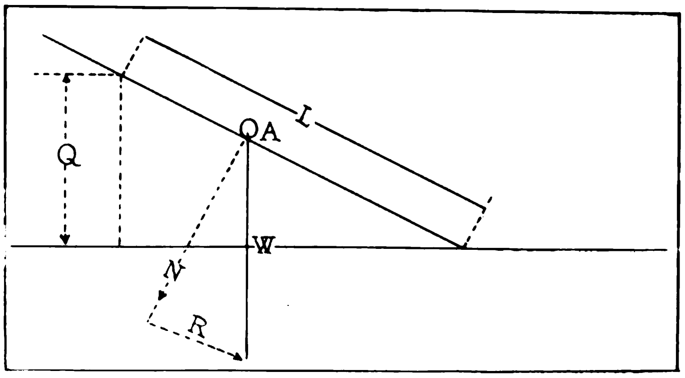


Fig. 4—Illustration of the principle of grade resistance

Novel Air Compressor

DESCRIPTION OF A NEW MECHANICAL MOVEMENT SHOWN AT THE BRITISH ENGINEERING EXHIBITION WHICH CAN BE APPLIED TO THE MOTORING FIELD

ONE of the most interesting exhibits at the Engineering Exhibition held at Olympia, says the *Commercial Motor,* London, was the air compressor shown by Lamplough & Son, Ltd. Its designer appears to have evolved an entirely new mechanical movement—one which has many practical applications in the field of commercial motoring. The same principle of construction is not limited to air compressors and exhausters, but it may be applied to pumps for oil or water, and, perhaps, we are not overestimating its probabilities if we predict that, in a modified form, it may ultimately be employed as a rotary internal-combustion engine of unique characteristics.

The design has been developed from well-known devices in which segmental pistons are employed to divide an eccentric chamber into a number of pockets whose volumes are constantly varied as the segmental pistons are driven round a circular path within the eccentric chamber. A working drawing, which shows the general arrangement of Mr. Lamplough's beautifully conceived device, is reproduced herewith (Fig. 2). This illustration shows that all the parts may be machined cheaply on a lathe; no piece, in fact, presents the slightest difficulty either in the making or the fitting stages of its production.

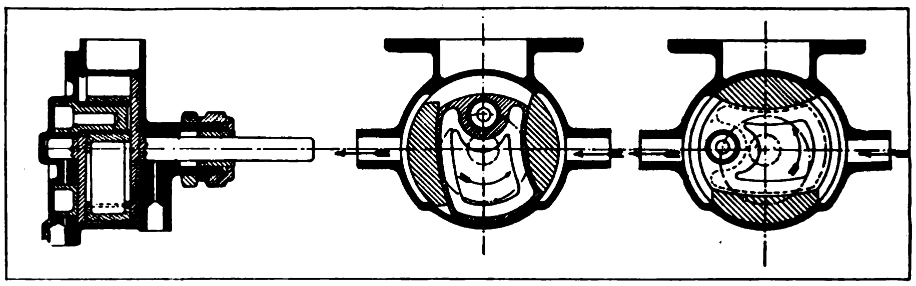


Fig. 1—Sectional views of a Lamplough double-acting positive pump

The driving shaft (A) is mounted on ball bearings in a casing which consists of two end chambers (B), which are concentric with the shaft, and an eccentrically-disposed barrel (C). Two driving discs (D) are keyed on to the shaft, and each of these has four equally-spaced counter-bored recesses in which oscillating cylinders (E) are fitted. Each of the oscillating cylinders has a crankpin (F) which engages in a journal in one end of one of the segmental pistons (G). All the oscillating cylinders, their crankpins and the segmental pistons are hollow, and, in the drawing, are shown in solid black sections. The segmental pistons may be cooled by the circulation of water or oil through them; midway of their length, they are provided with grooves (H) which permit of the passage of air or gas to or from the inlet or outlet ports and the pockets (J1, J2, J3, and J4) between adjacent pairs of pistons. The outer circumference of each segmental piston is kept up against the bored barrel (C) by means of a floating sleeve (K), while scoring of the barrel by the pistons, by reason of the centrifugal force, is prevented by the introduction of two external floating rings (L). The adjacent surfaces of the pistons and the bore of the barrel, therefore, are not in actual contact with each other, but are separated by a film of oil (the lubricating medium) which is relied upon to form a seal for the prevention or the minimization of leakage from one pocket to another.

The operation of the device is as follows: When the shaft is driven round in the direction of the arrow, it carries with it the two discs (D) and the oscillating cylinders (E); the power is thence transmitted, through the crankpins (F), to the segmental pistons (G), and these then travel round in a circle prescribed by the bore of the barrel and the outer circumference of the floating sleeve. As the path of the pistons is prescribed, so also is the path of the crankpins, but, as the latter path does not coincide with that of the centers of the cylinders (E), the cylinders are compelled to oscillate in their sockets; the effect of this oscillation is alternately to accelerate and retard the segmental pistons during their circular progress within the barrel, and the capacities of the pockets is thereby constantly varied. When used as an air pump or compressor, this alteration of the capacities of the pockets is employed, first, to draw in air through the inlet port; second, to compress the indrawn air and, finally, to discharge it through the outlet port. Reference to the transverse section will show that: the pocket J4 is open for the admission of air; the pocket J3 contains an imprisoned charge of air at the same pressure as that at which it was admitted; the pocket J2 contains a fully-compressed charge about to be delivered through the outlet port; and the pocket J1, having squeezed out one charge, is about to open again for the admission of air for a fresh cycle of operations. In this manner, there are four deliveries of compressed air per complete revolution.

Two photographs of one of the demonstration models which are exhibited are reproduced herewith (Fig. 3); the first shows the pocket J1 just opening for the admission of air—the pocket J4 has opened earlier for the escape of its charge; the other view shows that the pocket J2 has just closed, and that the charge in the pocket J3 has been compressed into about one-half of its original volume. It should be noted that this pump's action is positive, and that there are no valves or reciprocating parts. It is understood that one of these pumps, when used as an exhauster, reduced the pressure inside a chamber to within one inch of a complete vacuum.

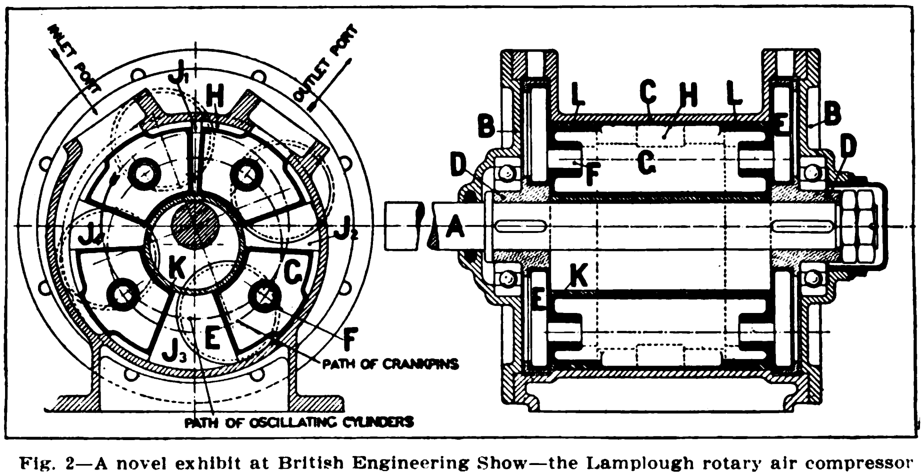


Fig. 2—A novel exhibit at British Engineering Show—the Lamplough rotary air compressor

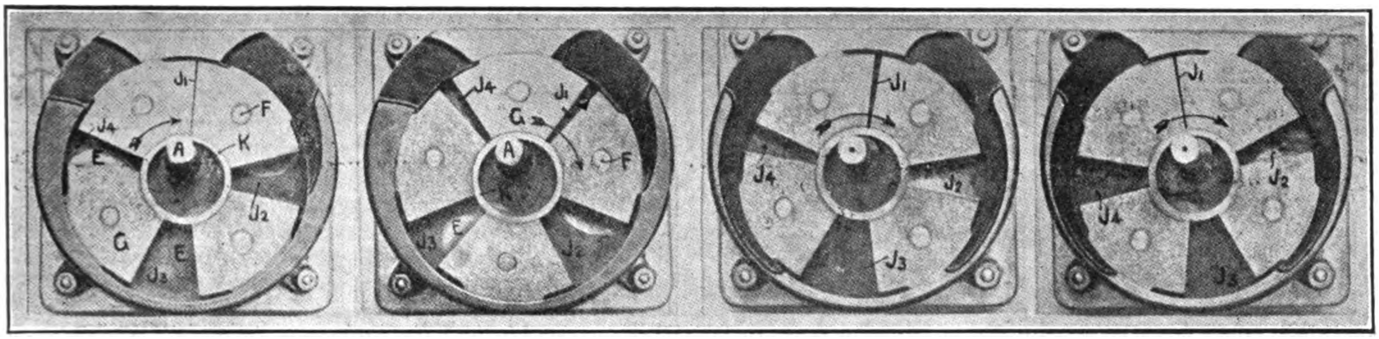


Fig. 3—First and second views show various stages in the cycle of a Lamplough air compressor. The other two views are of a blower constructed on the same principle

A model of an alternative form of blower, in which the charge is delivered against pressure but is not compressed internally, was also mounted on Lamplough's stand, and two photographs of the latter model are also reproduced herewith. A reference to those views—the third and fourth at the top of this page—will show that the inlet and outlet ports are both longer than those in the pump already described.

The latter form of construction has been employed for the purpose of forcing a charge into the cylinders on a two-cycle petrol engine, and such an engine was exhibited. Its two pistons operate on the same crank, and the charge is admitted through a port which is uncovered by the piston in No. 1 cylinder immediately after the exhaust port is uncovered by No. 2 piston. There are no valves, and the inrushing partly-compressed charge is relied upon to scavenge the previously-exploded charge. Speeds up to 3,000 r.p.m. have been obtained.

A large range of Lamplough patent double-acting positive rotary pumps for oil or water was also exhibited and sectional views of this type of pump are given on the opposite page. This pump comprises but three working parts: a curved plunger path which is cast integral with the driving spindle; a curved plunger; and a crankpin which engages in a bushed hole in the plunger and a slot in the plunger guide. The crankpin travels round the driving spindle at the same speed as the latter, but is eccentric to it; it, therefore, imparts a reciprocating motion to the plunger. Three views are given (Fig. 1): the first shows the plunger in the middle position of its stroke; in the second one, the plunger is shown just about to start sucking in water at the top and delivering from the bottom of the plunger; the remaining view is a longitudinal section through the complete pump.

One of these pumps was exhibited at the stand connected to a small cylinder into which it delivered oil against a pressure of 300 pounds per square inch.

Airships and the Navy

SOME OBSERVATIONS BY DR. ROBERT GRIMSHAW ON THE PART THAT DIRIGIBLE AIR CRAFT WILL PLAY IN FUTURE CONFLICTS ON THE OCEAN

WHEN one says "airships," the accompanying or suggested thought is immediately "military reconnoitering and attack." This is notwithstanding the fact that the airship in its various forms of motor-aeroplane, dirigible and captive balloon, etc., is destined to play eventually an important rôle in suppressing all purely military operations by making it almost impossible to fortify a country in advance in such manner that the plans for defence cannot be discovered by photography from above on the part of investigators posing as peaceful aerial commercial voyagers or tourists—as in times of peace the air must of course be considered free to all.

The attention of the public is, however, now attracted to the fact that the dirigible airship, the motor-driven balloon and other aerial vessels have as much interest and value for the navy as for the army; although the former has evinced a seeming indifference to all that appertains to the navigation of the upper regions.

In fact, however, the admiral has just as much need of information concerning the enemy's position as has the general. The Russo-Japanese war showed the importance of obtaining and communicating such information. A balloon or other airship can pass unhindered over an obstacle, as a high mountain, photograph or sketch the position, and observe each movement of every ship of an inimical fleet, and communicate this in great detail by wireless telegraphy or telephone—even by visual signal or by the ordinary electric methods—to an attacking squadron.

But the work of aerial craft in aiding the navy is not confined to reconnaissance; they can also be used to inflict injury upon land or marine forces or defences. So in considering this topic we can divide the service into harbor and high-sea work, and each of these classes into reconnaissance and attack; under the latter being understood active defence, also.

The craft available for aerial navigation are either heavier or lighter than air, and either class may be self-propelled, towed, or merely steered; but the merely steerable non-propelled aeroplane is as yet comparatively undeveloped. Towing may be either by automobile or by a water craft.

As far as the navy is concerned, the use of aerial craft will in the first place be that of observing fortified or other harbors. These represent the entrenched or otherwise strengthened positions of the army. The aerial observer records and reports the position and character of defending forts, the number and class of war vessels stationed in the harbor, the operations of torpedo-laying forces, the path of maneuvering vessels—including sub merged submarines—and the torpedoless and mineless channels open to the attacking squadron. Where the water is clear, the position of ground mines can often be observed from an airship; and naturally that of floating mines may be mapped without difficulty, even without the aid of photography.

The general advantages of reconnaissances made from any one of the principal classes of airships are that the view is unobstructed by laterally intervening dust or smoke, to say nothing of woods, buildings and hills; and that the field of view embraces a complete circle. This is seldom or never the case where the observer is stationed upon a hill or mountain, however high. Naturally, too, the greater elevation attained the greater the field of sight. Further, there is the advantage of the overhead observer's being able not only to choose, but also to attain, the desired place of observation, and to return uninjured to the security of his own lines.

Each of the above-mentioned methods of reaching the desired station has its advantages and its partially corresponding disadvantages. In all, however, the advantages are much greater than, as a rule, the public and even the military and naval authorities have been inclined to state or even believe. This is largely because they have failed to put themselves in proper communication with those statisticians who accurately observe, record and tabulate meteorological conditions.

In reconnaissance the cellular kite towed by a motor boat is of course comparatively useless; but its value can be readily seen when one contemplates the other branches of reconnaissance, attack and defence.

The ordinary captive balloon has long ago been repeatedly tried for reconnaissance, but has as often proved unsatisfactory, on account of being so largely dependent upon the direction of the wind, which may either carry it so far over the enemy's lines as to endanger its occupants' safety, or refuse entirely to drive it in the desired direction. In addition, the height to which such mediums of observation can rise is limited.

The motor balloon or motor aeroplane would find its work in the neighborhood of the coast, in or before fortified ports. Its duties in war-time would be like those of reconnoitering parties at present. The defending party, which is supposed to be blockaded in its own port, would use it to observe, and transmit information concerning, the position, number, character and movements of the blockading fleet; further, to note and report upon the results of its own fire, with the object of correcting errors and improving or altering the aim, in case the target was moved to avoid the missiles.

On the other hand, the attacking or blockading fleet would use such overhead craft to report upon the fortifications, so long as their position had not been made known by previous aerial scouts, either during or before the war in question; or to state whether they were fully manned or gunned, and well served. If the water were clear, the actual location of ground mines could be compared with their supposed position, and any movements of submarines could be noted, with details as to ease and completeness of submergence, speed on and under water, degree of controllability, etc.

It must be understood at the outset that the towed balloon or aeroplane, whether the towing medium be an automobile or a motorboat of any kind, can be used, for observation at least, in many places where the configuration of land or water would not at first seem to render such operations possible. For while the angle at which a towed waterboat stands, and the course which it takes, as regards the towing medium, are comparatively limited, yet where there is a peninsula partially surrounding a harbor, an automobile may take charge of a captive balloon or aeroplane, and after taking such course as the configuration of the land permits, brings its "tow" to a position from which the wind will sweep it directly over the enemy's forces; and what is of equal importance, bring it back again to a convenient height from the ground by winding in, and then return with it to headquarters. Similarly, a motor boat may take a balloon or plane to a point from which it may ascend to the desired height, and then get a better view than could have been obtained from the starting-point.

The self-propelled aeroplane—and in using this term the writer does not confine himself to monoplanes, but includes the cellular kite type—would with proper motive power and good management be able to get good snapshots of the fleet attacking a harbor.

Reconnaissance by self-propelled balloon would have vast advantages over that by self-propelled planes; as the former with a very small expenditure of motive power could stay for hours or even days in the air, above the enemy's forces, moving only sufficiently to get out of danger when shots from below showed that the line of aim was getting dangerously near the right one; or by dropping ballast from time to time, remaining at a height just sufficient to keep out of shot.

Considered as attacking mediums, as for instance for dropping explosives upon the deck of an opposing fleet, or into a convenient place—say the powder magazine, in case the position of this latter should be known as the result of previous or other balloon reconnaissance or through land spies—the motor balloon or the aeroplane, whether self-propelled or towed by either automobile or boat, has at present great advantages, as up to date no modern war vessel is equipped with howitzers or other cannon capable of firing at a very high angle. The only manner of destroying a reconnoitering or attacking balloon or aeroplane would be to reach it with a sure shot from some point far enough from the threatened point to enable the attainment of the requisite elevation for the gun. This, however, would usually be at such a distance that the aim would be very much impaired.

In case of a blockade the motor airship, or with favorable wind even a captive balloon or cellular kite, would be of immense service; as the former would have facilities for convenient and repeated filling, and either would be capable of returning to its station on land—the former by its own motive power, the latter by hauling in the tow-line with a windlass, or even with an automobile.

Hauling in would also be of service in case a dirigible should adopt the precaution of taking with it a fine steel tow-line capable of being rapidly paid out and hauled in; so that if the motor of an airship were crippled there would still be a means of return to a place of safety.

The captive kite rises with increasing ease and to a greater height, with increased velocity of the propelling wind; but has the disadvantage that, should the current not be in the right direction, or should the towing vessel not be able to draw it in the general direction of the scene of observation, it cannot be used at all, as tacking—so long unknown to ocean navigators, at first thoroughly at the mercy of the winds and currents or tides—has not been successfully applied with either non-dirigble or self-propelled airships. But the towed cellular kite and its congeners are useful up to the point where the wind's velocity is over 20 meters per second, or say 45 miles an hour.* Meteorologists have, however, shown that this rate—that of a good railway train—is exceeded only about ten days in every hundred—at least in Germany.

The motor-propelled airship is independent of the wind up to that point where the latter has a velocity equal to that with which the aerial craft can propel itself where there is no wind. The airship "Zeppelin IV" traveled 15 meters a second, or say 35 miles per hour; and that fixes the point up to which it is serviceable; but there is no doubt that with improvements in motors, transmission, propellers and form of hull this speed will be greatly exceeded in the very near future. And the same statistics which aeronauts should have consulted before constructing their vessels and which the military and naval authorities should keep in mind when estimating the value of aerial craft, and expressing their opinion thereof, show that in only 12 days in a hundred is this speed of 35 miles an hour exceeded.

A motor airship designed for a long range of action, whether as accompaniment for the regular fleet, or for action on its own initiative, must be especially constructed so that it shall be entirely independent of the latter as regards supplies of food, motive fluid and material of war; although these could be carried on the airship merely as reserves for independent action, and all supplies for daily consumption and use received from the fleet convoys (or even the war vessels), so long as the airship remained in touch therewith.

The airship which takes the place of a steam pinnace must have a place therefor arranged on the deck of some war vessel, or at least of some convoy. Here comes the problem which is most difficult of safe and convenient solution—as there is already too little room on board the modern war vessel. The motive engineering department of every navy complains that when a vessel is designed the positions of armament and armor, and of coal bunkers considered as defensive armor, are deter-

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* One meter per second is very nearly exactly 2.25 miles an hour.

mined beforehand by the designers; and that any space which may happen to be left over, no matter what may be its size, form or position, is graciously given up for boilers, engines and accessories. Under this state of affairs the "aerial" department would naturally be the last to be considered in the design of a new vessel; and in the case of a ship already afloat, the chance of finding proper quarters thereon for balloons and their appurtenances would be rather slim.

An advantage of airships for coast defence would be that there would always be room in or near the harbor for a large number thereof, which could be used either together for a sudden or other combined attack, or consecutively for long-continued harassing of the attacking fleet. The further advantage of numbers in this particular would be, that no one such aerial vessel would have to carry a very great weight of explosive material, or of gasoline or other propelling liquid.

There is at present no nation for which the question of aerial vessels for defence is of more importance than the United Kingdom—as once the war balloon and its congeners attain any degree of practical utility in attack, Great Britain and Ireland cease to be islands! "The wooden walls of Old England" have long ago been replaced by steel; but as against an energetic, well-commanded Continental power equipped with a good fleet of properly-manned aerial war vessels, a balloonless England would find its boasted floating and other defences, in the words of Prospero, "melted into air, into thin air."

When it comes to the matter of aerial war craft on the high seas, the problem to be solved assumes a very different aspect from that for coast attack or defence. Here the use of a self-propelled balloon or motor aeroplane is out of the question, as either of these requires to be landed from time to time for repairing, avoiding dangerous air currents, etc.; and the former for re-filling. There must be special arrangements for generating gas, and for filling captive or dirigible balloons with hydrogen, or an equivalent or substitute generated on board, as often and in such quantities as might be required; or else highly compressed gas must be stored in strong steel cylinders to be used when needed; or both methods must be available, so that either of these modes of filling the balloons could be used under normal conditions, and the other only in an emergency.

The use of captive balloons without towing calls for appliances for winding them in, which, however, would add but little to the great difficulties above enumerated. The use of special balloon-carrying ships would remedy many of the before-mentioned evils; but these would have to be well enough engined to enable them to keep on with the rest of the fleet; and while they might receive coal or other fuel from transports, they still would require to start with and maintain a considerable supply.

In all, one sees even at a hasty glance that aerial craft present interesting and difficult problems for solution, before they can render much assistance to the navy in the present set of conditions. The same could, however, have been urged of torpedoes and of submarine boats; yet no one will deny the importance of the influence which both of these have exerted upon naval warfare and construction; an influence which is increasing in variety and amount from year to year.

How to Care for the Automobile Top

A good formula for renovating a black rubber or leather top from which the enamel has largely disappeared consists of liquid asphaltum, 1-8 gallon; outside finishing varnish, 1-4 gallon; boiled linseed oil, 1-8 gallon; castor oil, 1-16 gallon; coach japan, 1-8 gallon; ivory drop black, 3-4 pound. Mix these ingredients thoroughly together in a closed vessel to permit active shaking. After agitating the contents sharply for a time, add refined or pure turpentine in a quantity sufficient to bring the mass to a good brushing consistency.

A formula including beeswax is made of asphaltum, liquid form, 1-8 gallon; outside finishing varnish, 1-8 gallon; beeswax, 1 ounce; castor oil, 1-8 gallon. Bring to an intense black by the addition of a little drop black. Mix thoroughly and thin out to a brushing consistency with turpentine.

For a straight leather top with a worn and travel-stained appearance, but sustaining no fractures in its enamel, the following mixture will serve a good turn: Neatsfoot oil, 1-4 gallon; beef suet, 3 ounces; melted beeswax, 1 tablespoonful. Melt the oil and suet together, after which add the beeswax. Confine in an air-tight vessel, agitating same until a complete mixture of the contents is secured. Apply sparingly with a soft cloth and follow up with a clean piece of woolen, wiping clean and dry.

By way of information, it may be stated that all of the above dressings should be applied thinly and worked out smooth and uniform. With the exception of the last formula, all the materials should be brushed on, using for the work a flat bristle brush of soft joint and of a No. 1 quality.

For tops other than rubber or leather the use of tepid water and castle top mixture is recommended, applied with a soft, sheep's wool sponge, wiped dry with a wash leather, and then given an application of some good transparent renovator to render the fabric soft and pliable and fortify it against the ravages of service.

In case such renovators are not at hand the mixture of oil, suet and beeswax, already referred to, wiped on with a soft fabric of some kind and dried off carefully with a clean wad of woolen, will do very nicely. This dressing and the ready prepared renovators are particularly adapted for use upon the rubber-covered cloth top finished in a dull brown effect, and known to the trade as vulcanized carriage cloth.

The lining of the automobile top should also be cared for diligently. It needs frequent brushing with a whisk broom to flick out the dust and enliven the nap of the goods. These are small matters in themselves, but they prolong the life of the top.

Bavarian Government Using Motor Postal Wagons

The Bavarian Postal Department (which, as is not generally known, is entirely distinct from the Imperial German Postal Service) has a number of motor wagons for carrying packages from the railway station to the postoffice or *vice versa*. The frames of some of these are of the Daimler 1.5-ton type, the rear wheels being driven by gears. The motor is of 28 horsepower; has four cylinders, and is arranged for either benzine or benzol. The maximum speed with load is 11 miles per hour. The "box" holds more packages than that of the usual horse-drawn wagon. There are also similar and lighter wagons of the same type, with 1-ton frames, with motors delivering 16 horsepower, with either benzine or benzol. These wagons have chain drive and can make 17 1-2 miles an hour. Both types are supplied with solid rubber tires. The carbureter has piston type throttle regulation, delivering, according to the load, the requisite amount of air. In addition to benzine and benzol, the motor can also use heavy benzine. The circulation of the cooling water is effected by a centrifugal pump; the warmed water being cooled by a bee-hive cooler, aided by a fan. Lubrication takes place automatically by means of a pump forcing oil through channels cast in the three main bearings of the crankshaft. From these points it flows through the hollow crankshaft to the piston-rod bearings. The piston is also constantly lubricated, and the oil therefrom drops on the piston wristpin. The latter is hollow, so that the oil which is not used therein is led laterally to the cylinder walls. This system of lubrication does away with oil-tubes, and lessens the probability of choking. The oil consumption is said to be about four pounds per 100 miles.

The reduction gear is connected with the motor by a friction coupling; there are four speeds forward and one backward. The gears on the hind wheels are protected from mud and dust. The driving wheels are steel castings with the tires directly pressed thereon. The differential gear is also a steel casting; but all the other parts are drop forged.

Letters

COMMUNICATIONS FROM READERS MAINLY ALONG TECHNICAL LINES—THE NECESSITY OF TORQUE RODS; STEEL BALL IN CYLINDER TO PULVERIZE CARBON DEPOSITS; THE TESTING OF TIMERS, ETC.

Are Torque Rods Necessary?

Editor The Automobile:

[2,374]—I have an automobile of foreign manufacture and have constant trouble with the gear-box bearings and the universal joint behind the gear box. There are no radii or torque rods fitted to the car. Could you suggest a method of overcoming the default. F. E. D.

Larchmont, N. Y.

The fact that your car is not fitted with torque rods is sufficient to cause the trouble you experience. We should suggest your studying the accompanying diagrams and fitting rods that seems best adapted to your particular car.

Fig. 1 shows a back axle without any torque rods at all. The action of starting, stopping and going over inequalities of roads tends to push the axle forward, throwing all the strain on the pins of the spring shackles. If a rod were fitted to each side of the frame and attached at the rear end to clips on the rear axle this push or torque would be absorbed therein instead of in the pins. An easy method of fitting torque rods to cars that are manufactured without them is shown in Fig. 2 (the two top rods, however, are not absolutely necessary).

A method favored by quite a few manufacturers is shown in Fig. 3 here, it will be seen that the axle is held in tension forward near the gear box by tie-rods made from steel tubes; the axle in this case is allowed a small amount of movement backward and forward, but all harshness of shock is taken up in the springs above and below the rod. Another method of attachment of the torque rod to the frame is shown in Fig. 4. The same effect is obtained as in Fig. 3, the difference being that the attachment is held perpendicularly rigid with the frame instead of oscillating.

A substantial method of attachment is shown in Fig. 5; this type can easily be fitted to a car that is without rods. If necessary an extra cross member to the frame can be fitted to accommodate the front bracket.

Some cars use three rods to take the torque and thrust. Two rods are fitted from the axle casing to gusset plates hung from the frame at points in line with the universal joint behind the gear box, as shown in Fig. 6. A third tie-rod is attached preferably on the top of the axle casing to a point equidistant to the bottom rods. This will form a parallelogram of the rear construction suspension, allowing the bevel wheels to work always in the same plane, while with the other types shown the plane of the working of the axle in relation to the drive constantly alters.

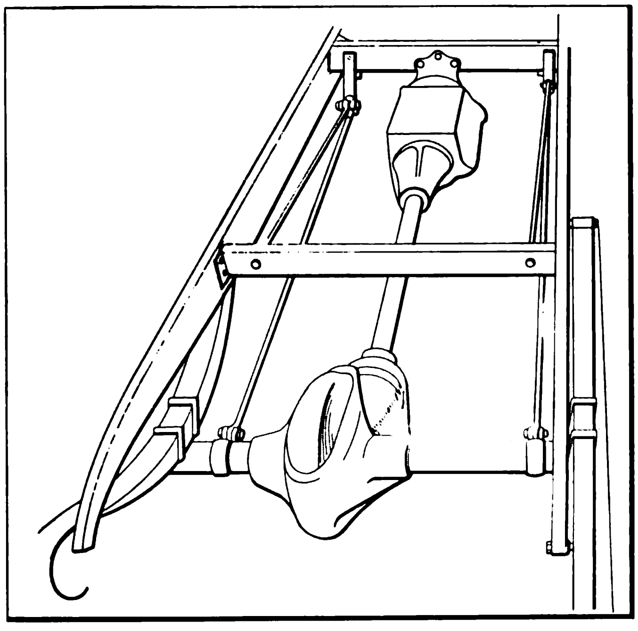


Fig. 2—Simple torque rods that can be fitted to cars that are built without any

A Sparrow Is Not Shocked When on Telegraph Wire

Editor The Automobile:

[2,375]—Please answer in the next issue of your paper why a person will not receive a shock when placing the hand on an engine after the current has passed through a spark plug?

2. Of what use is the compression chamber in a spark plug?

3. About what is the average difference in piston displacement to compression chamber in gasoline engines? L. S. Tuttle.

Eastport, L. I.

(1) The reason why a sparrow is not shocked when he perches upon a telegraph wire is because our feathery friend does not help to complete the circuit. Were the sparrow to put one foot upon the telegraph wire and the other upon the ground he would then be in shunt relation and would be shocked. The same is true of man and his relation to the spark plug. He must become a part of the circuit either in series or in shunt ere it will be possible for him to realize that the electromotive force delivered from a high-tension coil is sufficient to make him take notice.

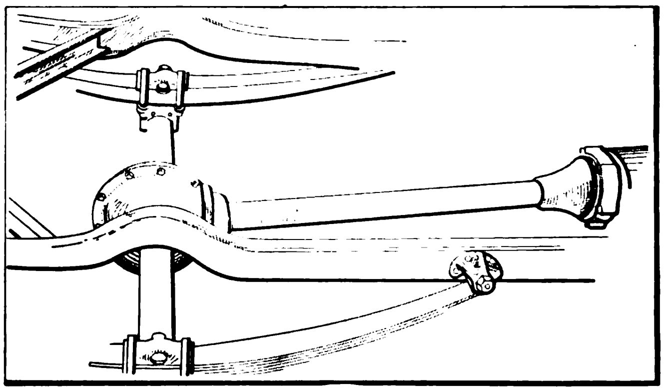


Fig. 1—Torque taken up in spring shackles and on tubular covering of driving shaft

(2) The compression chamber in a spark plug is the residence of pure mixture, and the same being pure it is ignited more readily, and the ignited mass shoots out of the chamber into the body of mixture in the combustion chamber, thus affording a wide distribution of flame, which, of course, adds materially to the value of the spark.

(3) This question is not sufficiently clear to permit one to say anything. The clearance space in the average motor is not far from 23 per cent. In racing types of motors it is higher; in "soft" motors it is somewhat lower. Perhaps you refer to the clearance space.

Suggests a Steel Ball to Pulverize the Carbon

Editor The Automobile:

[2,376]—Some time ago I wrote an article for your columns suggesting a steel ball in the combustion chamber as a remedy for

carbon deposits. A little later you wrote me that two parties had condemned the idea after using it. The idea was taken up in England, and if you care to look at the *Motor Car*, of London, of March 26 last, you will see what they have to say, and this is followed by a letter from a prominent user of an English car in the issue of the same journal of May 7 giving extended experience with the idea. I have also given the plan a severe trial and am sure that the steel ball, if not too small, will not get wedged in and injure the walls of the cylinder at all. It does the work and does no harm. I enclose you a recent letter from a party who has used it, but he did not know that by running the motor with one spark plug out for a minute he can blow out the ball easily. A. D. Hard, M. D.

Marshall, Minn.

The idea suggested has for its basis the use of a steel ball such as is ordinarily employed in ball-bearing work. The spark plug is taken out of one of the cylinders, and the steel ball is dropped in so that when the motor is standing still the ball rests on the head of the piston. When the motor is started and run, through the good office of the remaining cylinders, the ball is bounced around, bombarding the surfaces, with the result that carbon deposit is reduced to powder. After the process is conducted in this way the carbon powder is blown out through the spark plug hole, and if the motor is of the type that will permit of fishing the ball out the process may then be considered completed.

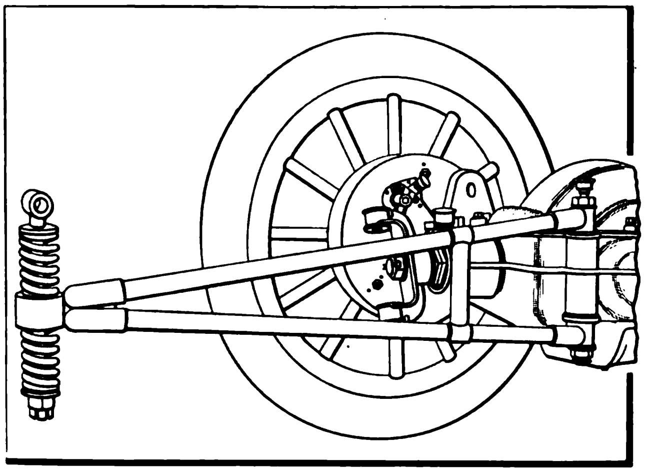


Fig. 3—The most usual type of torque rod used on early types of French cars

Wants to Know Why Timers Are Not Better Tested

Editor The Automobile:

[2,377]—My experience, which extends over three or four years, confined, to be sure, to substantially the two models of cars that I have owned and maintained, leads me to believe that the makers busy themselves with the more important matters to the detriment of the details. I am willing to concede that in the early days of automobile building there were so many kinds of trouble that it was necessary for the men who did the work to work on a basis of first come first served, and this applied to the troubles that arose as well as to the every-day matters. But the time should soon be here when the little things be given the attention they deserve. I would suggest that the wiring be better done, and that the battery installation be afforded a little discriminating care. Then, there is the timer. I have had a good deal of trouble with timers. Were the makers to test these little pests they would probably find that some of them are scarcely worth attaching to good motors. Reader.

Philadelphia, Pa.

This particular autoist has probably been so busy with his own trouble that he had very little opportunity for individual research beyond the limit of his own relatively restricted zone, nor did he go about among the makers sufficiently to find out just what they are doing. A visit to the various plants will probably show that the makers who expect to survive are testing out pretty much everything from raw material to accessories and with sufficient care to enable them to decide with some certainty as to the expediency of employing the materials and accessories that will come nearest to serving their purpose. It would be impossible to take sufficient space here to furnish all the evidence of activity that is available, but the following test of a timer as made in the Thomas laboratory at Buffalo will suffice to cover the point to be made:

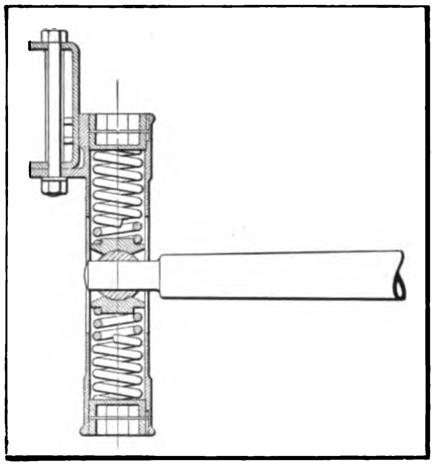


Fig. 4—Ball thrust at end of torque rod

This timer consists of both a primary timer and a high-tension distributor. The timer proper consists of a beveled wheel running in a V-groove cut in six hardened steel contacts, equally spaced in a fiber ring. The space between the contacts is touched only by the very edge of the beveled wheel. The wheel is held in contact by a lever or spring. The high-tension distributor is insulated from the timer by a fiber plate, and consists of a small ball mounted at the end of a light helical spring. The casing is of black fiber and equally spaced are six tool steel pieces flush with the bore of the fibers.

The small ball sweeps over each in turn, thus distributing the high-tension current to the proper plug. The shaft of the timer is mounted in two small ball-bearings. The advantage claimed by this timer is the large contact surface and long life.

The form of the wheel and bevel groove (both having the same angle) causes a certain relative slip, which is supposed to keep surfaces clean. The fact that the edge of the wheel only is in external contact with the case is supposed to prevent the picking up of dust and oil and depositing them on the contacts.

The timer was driven in a horizontal position by means of a small shaft journaled in two brass bushings. Two small universals connected the shaft to the 5-horsepower motor. The timer mounting was very rigid, and lined up so as to keep down vibration. The continuous counter on the ball-bearing testing machine was used to record the number of revolutions of the timer.

A Connecticut single-unit coil and six spark plugs were wired up as used in practice. Gould six-volt storage battery formed source of ignition.

Electric motor speed, 1,250 revolutions per minute, corresponding to 2,500 revolutions per minute on motor.

Reading on ball-bearing testing machine at end.........	2,936,000
Reading on ball-bearing testing machine at start........	1,500,000
	1,436,000

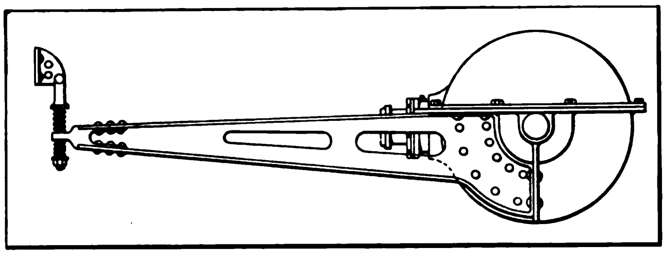


Fig. 5—Steel plate used instead of tube where a cross member of the frame prevents using a triangular type, as in Fig. 3

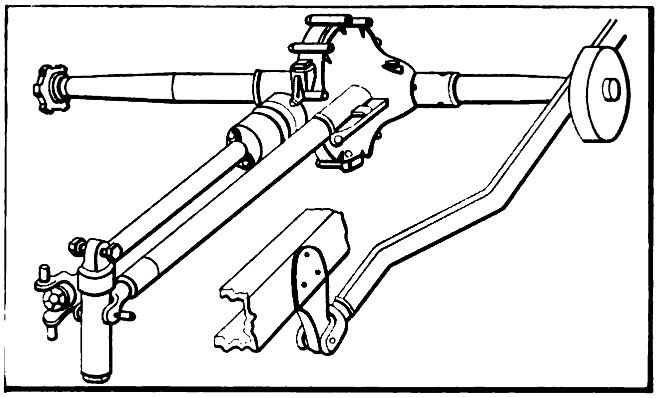


Fig. 6—Parallelogram formed by the three rods preventing any forward thrust

Ratio of speeds of motor and ball-bearing shaft practically 1 to 2.

Total revolutions per minute of timer = 718,000.

At 2,936,000 the lever holding the wedge-shaped wheel against the contacts broke and test was stopped. During running it was found next to impossible to get good, even sparking at speed of 1,250 revolutions per minute. Several different coils were used, but all with the same result. As speed decreased when circuit of motor was broken the contact would greatly improve. The timer cover was removed while the timer was being driven at 1,250, and a perfect shower of sparks was noticed; also bad arcing. The timer wabbled very badly and had considerable drag.

Upon examination the primary contacts were found to be worn badly in spots where it seemed as if the wheel had continually jumped and clattered. The high-tension ball and contacts were pitted, but not seriously.

The timer was lubricated well, but the results do not show it up as well as could be desired.

Wants Information of a Varied Character

Editor THE AUTOMOBILE:

[2,378]—I shall esteem it a favor if you will answer me the following questions through the columns of your paper:

1. What is good to remove tarnish on brass?

2. Is 31 teeth in the rear sprocket and 8 teeth in front sprocket the best gear ratio on an auto that has a two-cylinder opposed 4 1-2 inch x 4 1-2 inch, 12 horsepower engine fitted lengthwise in the machine and 28-inch wheels?

3. Is an automatic compression feed good to feed oil in crankshaft bearings to keep plenty of oil to splash, or is constant level either fed by a tank, the tank being airtight and oil flowing to a certain level in the crankcase from tank only as fast as needed.

4. Do you think that a radiator that has 28 tubes 5-8-inch diameter and 19 inches long, together with a three-gallon tank, will cool a two-cylinder engine 4 1-4 x 4 1-2; has a gear pump run by chain from crankshaft?

INQUIRER.

Galva, Ill.

(1) See page 536, this issue.

(2) The ratio of 8:31 should answer very well on your car for give-and-take roads, but there should be at least 13 teeth in the pinion.

(3) We do not understand what you mean by automatic compression feed lubrication. Whatever method you employ to keep a constant level in the base chamber should answer.

Feeding the base chamber through the bearings is better than direct to the crankcase. If the tank you use is airtight you must use pressure either furnished by hand or by the engine with a relief valve. If, however, you desire to use a gravity drip feed system you must have a vent in the top of the tank to allow the air in, otherwise the oil will not flow.

(4) Provided your radiator is in a position that the rush of air can strike it and the speed of the pump is fast enough, the amount of water and size of piping should give good results.

Questions That Arise

CONCERNING THE EFFECT OF HIGH VOLTAGE BATTERIES ON HORSEPOWER; PROPER METHOD OF OILING; SOME REASONS WHY METAL CLUTCHES SLIP, AND THE REMEDIES

[233]—Does the use of higher voltage batteries increase the horsepower of a gasoline motor?

This query can best be answered by publishing the following analysis of a test in which the engine used was a 40-horsepower, six-cylinder Napier, fitted with the maker's standard synchronized battery and coil ignition, the battery showing 4.8 volts. The engine was started up and allowed to run for some time so that an even temperature might be obtained.

The engine was first run and the horsepower taken for a period of two minutes, the average output shown being 40.9 horsepower for the period. A special coil was then installed, but the same accumulator used. The engine then gave 42.5 brake horsepower. The same coil was again employed, but the voltage was increased to six, and the conditions were otherwise unaltered. The power fell to 42 brake horsepower.

The same coil was again used with six volts, but the trembler blade was adjusted lighter than before. The same brake horsepower was registered. The trembler blade was then adjusted a little more heavily, and 8 volts used. The result showed 42.6 brake horsepower. The voltage was increased to 10 volts, the adjustment of the trembler blade remaining the same. The brake horsepower fell to 42.

The voltage was then reduced to 4, but the trembler blade was unadjusted. The brake horsepower rose to 42.2. The trembler blade was then adjusted a little more lightly and four volts used. The brake horsepower fell again to 42. The standard

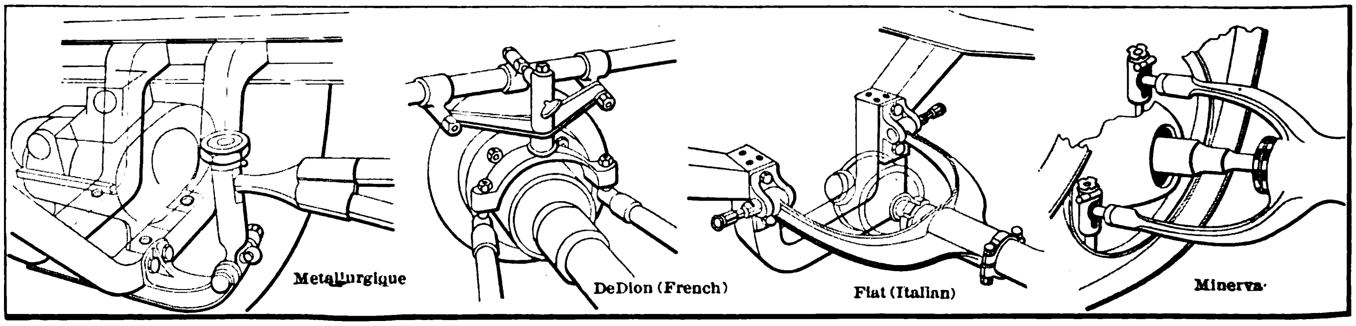


Fig. 7—Showing various foreign methods of attachment of torque rods, all intended to accomplish the same result

coil was replaced and an accumulator showing 4.2 volts fixed up. The brake horsepower registered was 42. The idea in going back to the standard coil with small voltage and special coil with small voltage again was to see whether any alteration had taken place in the engine itself. As the result showed, the brake horsepower still remained approximately 42.

The sum of the tests showed that the horsepower varied slightly from 42 brake horsepower, irrespective of the voltage rate, or whether the trembler blade was adjusted lightly or heavily. A main point, however, noticed was that at the lower voltage the engine ran with the spark very much advanced; in other words, for a given engine speed it commenced to knock with a less advance when using a higher voltage sooner than with the lower voltage.

This phenomenon suggests that nothing is gained by having a fiercer spark than that obtained from a fully charged battery showing 4 volts and means of varying the timing.

[234]—How much oil does a magneto require?

The accompanying sketch shows clearly the absurdity of pouring oil *on* oil holes instead of pressing the spout of the can into the hole and giving a drop or two. Besides, pouring oil all around the mouth of the orifice has the effect of coating the surrounding parts, so that they catch particles of dirt and dust which will eventually find their way into the bearing. Particular care should be taken in oiling such engine parts as valve rockers, pins and guides.

[235]—What is the customary rating of tires for various degrees of inflation?

The following tabulation is a near approach to average conditions:

INFLATION PRESSURE TABLE PER TIRE

Size Tire		Pound Load									
		200	300	400	500	600	700	800	900	1000	1100
		Pound Pressure Inflation									
3	inch	45	55	65							
3 1-2	"		50	60	70	80					
4	"				65	75	85	95	105		
4 1-2	"					70	80	90	100	110	
5	"						75	85	95	105	115

The following table has been compiled by a well-known tire concern and represents about average practice:

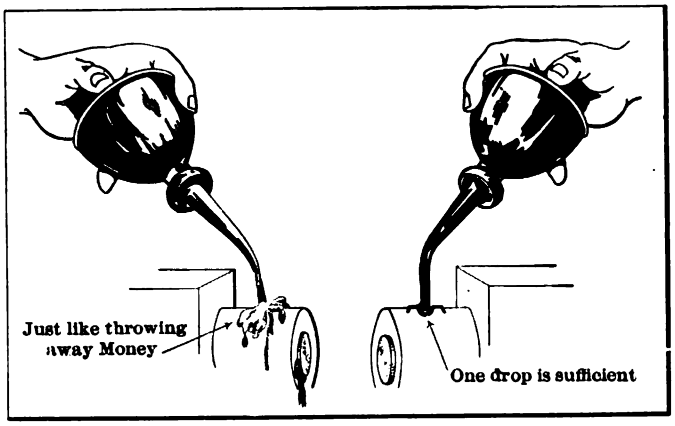
Size Tire		Front Lbs. Pressure	Rear Lbs. Pressure
3	inch	70	70
3 1-2	"	60	70
4	"	70	80
4 1-2	"	80	90
5	"	100	110
6	"	120	130

[236]—What are the different causes of metal clutches slipping?

(1) Incorrect lubrication causes slipping, or abrupt engagement. To remedy this, empty the clutch of all lubricant and fill with one pint of kerosene, screw up vent plug, start engine and run for two or three minutes, letting the clutch in and out several times so that the kerosene can clean the interior faces of the plates. Thoroughly empty and wash out with a small quantity of gasoline. An excellent lubricant that will be found to give good results is a mixture of two-thirds medium engine oil and kerosene. To mix these together take a vessel and pour the oil in first and the kerosene afterwards and with the use of a syringe work the two together for a minute or so before injecting.

(2) Plates worn too shiny and thin. Replace the very thin ones by new ones and rough the others up slightly with emery paper. The cause of a new plate clutch being harsh is that the surface of the plates is too rough; this should soon wear off. Wear on the plates sometimes allows the inside nuts to bottom against the case, completely counteracting the action of the spring; filling the heads of the nuts will sometimes remedy this temporarily, but as soon as new plates can be obtained they should be inserted.

(3) Deposit of metal particles secreted between the plates, preventing proper adhesion. Remedy same as No. 1.



There is a wrong way and a right way of oiling—both are here shown

(4) After an adjustment the pedal arm touches against the groove in the floor boards, preventing the clutch from getting its full thrust.

(5) Some makers do not put a universal joint between the clutch and the gear box; the whip in the frame going over bad roads has a tendency to make the clutch slip. The same applies if the alignment of the above-mentioned organs is not correct. A universal joint between them will remedy this.

(6) The thrust bearing on the clutch fork should be kept well lubricated, otherwise the operation of the clutch will be uneven. Unless this operation is effected automatically it should be attended to at least once every 100 miles, and oftener for traffic driving.

[237]—Is loss of compression ever caused by rotary motion of piston rings?

After an engine has been run for some time it may be found that it loses compression and one naturally looks to the valves for the trouble. After all the carbon has been removed from these and they have been carefully ground in, there is still a falling off in power. Providing the gasket-joints are tight the cause of the trouble can be expected to lay in the piston rings. Upon dismantling the cylinders the pistons and rings will be found to be scored in places, which indicates that the compression has been leaking past the rings. The only remedy for this trouble is new rings. Great care should be taken to make these a good fit in the slots and the utmost distance between the ends when compressed should not exceed 1-64-inch. It has been found that this does not always stop the leakage. It is thought that the force of the explosion gives a slight rotary action to the rings so that the slots come into a line, allowing the gases to escape.

If the slots are cut step-fashion no amount of rotary action will affect the loss of compression through the position of the rings, provided these fit well in their grooves and join well together.

As piston rings are made from hard cast-iron, great care should be exercised taking them off and replacing them. To insert the piston into the cylinder it is necessary to compress the rings by hand and unless the cylinder is lowered slowly one is liable to pinch the fingers between the knife-like edge of the ring and the cylinder base.

[238]—What is the correct way to stand to start a car?

Stand perfectly square, facing the radiator; to accustom yourself to this position take the left side of the frame in the left hand, the starting handle in the right; pull *up* smartly if coil is used; when the handle is at the topmost point pull it towards you so that it disengages from the jaws or pin on the engine. Be sure that the elbow is kept well out when swinging the handle for starting on the magneto; if not a backfire may force the arm between the upcoming handle and the side member of the frame, causing either a broken or dislocated thumb, wrist or elbow. Practice this position with the current off several times after watching an experienced man start the car.

Keeping the Bright Work Up

M. C. HILLICK TELLS HOW TO KEEP THE METAL PARTS OF A CAR UP TO STANDARD: GIVES OTHER ADVICE

TO maintain the brass and nickel furnishings of the automobile in a bright, clean condition constitutes no small share of the caretaking of the car. There are plenty of simple formulas and ways for brightening up the brass fixtures, but some are more or less ineffective and others are harmful to the metal, especially after the lacquer becomes worn away. Following are some good and effective ones: To remove dirt, tarnish and corrosive accumulations from the metal parts while the lacquer remains in a good state of preservation use a mixture of 5 parts of whiting and 3 parts mutton tallow. Another formula consists of dissolving 8 parts refined soap in 10 parts of warm water, after which add 30 parts of whiting.

Again, add to every 2 parts of sulphuric acid 1 part pulverized bichromate of potash. Mix the two ingredients thoroughly and dilute with water equal in weight to the acid and potash. To use this polish wet over the brass with it, wash at once in clean water and wipe dry immediately, then giving the brass a light polish with rotten stone under a piece of chamois skin.

Another formula is made up with 60 parts carbonate of magnesia and 1 part ferric oxide, mixing well together. Moisten a soft woolen cloth with denatured alcohol, dip in the powder, rub the metal smartly and dry off with a soft leather or clean woolen cloth.

In case the brass or metal is to be refinished it will first be necessary to remove the old lacquer completely, which may be accomplished as follows: Mix 4 parts denatured alcohol with 1 part ammonia. Dip a woolen cloth in this fluid and then dip the cloth in tripoli, rubbing hard and firm. After removal of the lacquer, polish and clean with a mixture consisting of 4 parts of refined soap and 3 parts rotten stone. Dissolve the soap to a thick glue consistency, stir in the rotten stone and then reduce to a heavy liquid consistency with turpentine.

Another formula for this work is made up by mixing 5 parts pulverized chalk and 4 parts tripoli powder mixed to a rather stiff paste in melted beef and mutton tallow, equal parts.

For large garage or paint shop work where a considerable amount of brass and other metal parts are to be cleaned it will be necessary to provide for handling the work with greater expedition. To accomplish this, arrange two tanks of wood, copper lined, with a coil of steam pipe in each and each tank of 60 gallons capacity. Into tank No. 1 pour 50 gallons of water, to which add 6 pounds of lye or caustic soda.

In tank No. 2 pour a like quantity of water, to which add 1 1-2 pounds oxalic acid. Before placing the brass in the lye or caustic soda solution turn the steam into the pipe long enough to heat the water close to the boiling point. Let the brass parts remain in tank No. 1 sufficiently long to remove the lacquer, whereupon proceed to transfer the brass to tank No. 2, into which the steam has previously been turned until the solution is very hot. This solution after a short immersion will serve to remove the tarnish from the brass and to neutralize the effect of the lye or caustic soda. Upon removal of the brass from tank No. 2 it should be at once wiped dry with clean woolen cloths and either polished to a high luster with some one of the polishing preparations named above or put upon a buffing wheel and buffed to a high polished condition. In lieu of the lye or caustic soda solution a dip may be provided by mixing 2 parts of sulphuric acid with 1 part nitric acid by volume or liquid measure. A tank lined with heavy sheets of lead will be necessary to hold this acid mixture in confinement. A room specially equipped and set apart for this work will be found essential in order to dispose of the brass and metal equipment on a large scale.

As soon as the brass is polished or buffed, as the case may be, it should be dusted off carefully and in a clean warm room coated with lacquer made and sold expressly for this purpose. If this lacquer is not at hand a substitute lacquer may be provided by letting down white shellac to a very thin state with denatured alcohol. A thin crystal white varnish also makes a very good substitute in emergency cases.

Statuary Bronze Finish for Brass

In connection with the above it appears that a considerable following of automobile owners and users is taken up with the statuary bronze finish for brass parts. This style of brass finish has proved exceedingly popular with railway companies and their patrons throughout the country and the manufacturer of automobiles and automobile accessories may even incline to its use. To work out the statuary bronze on smooth highly polished brass prepare a No. 1 solution consisting of 1-2 ounce of liver of sulphur, or, in the language of the chemist, sulphuret of potassium, added to 1 gallon of water. Maintain this solution in a hot state by confining in an earthen crock set into a vat of hot water to within a couple of inches of the top of the crock.

Solution No. 2 is made of 1-8 gallon sulphuric acid and 10 gallons of water, cold. First, clean the brass parts in a potash solution. Then rinse in clean cold water, from which bath it is transferred to the No. 1 solution and then on to the No. 2 solution. In case of yellow brass this dipping first in solution No. 1 and then in solution No. 2 will have to be repeated several times or at least often enough to develop the desired bronze effect.

A sand blast operated by a compressed air or a stiff wire wheel brush should be operated, upon which the oxidized brass may be used to bring out the color uniformly over all the surface of the brass. In the case of yellow brass, of smooth finish, after giving it an acid dip it should be put on the wire wheel brush to give it the desired mat. Yellow brass having less copper in its composition than the brighter, lighter brass, is acted upon slower than the latter and it therefore oxidizes slowly. Dip in No. 1 solution, then at once in No. 2 solution, then rinsed, first, in cold and, second, in hot water and finally dried in sawdust. Next it is worked upon the scratch brush, after which it is for a second time put through the entire operation, thus furnishing an attractive bronze finish.

In brass finish there are apparently different compositions of metal such as, for example, high yellow brass, old brass, red brass and so on. To overcome the disadvantages incident to working out a uniform color and finish on these various styles of brass many railway companies copper plate all the brass parts, thus giving them a uniform color to oxidize upon. The brass parts having a dead finish need only to be acid dipped to make them conform to the color of the remaining brass and give them the statuary bronze finish.

A single immersion in the No. 1 and No. 2 solution will suffice, as a rule, to give red brass or any brass or other metal low in its proportion of zinc its proper degree of oxidized effect.

With either kind of brass when the fixtures are taken from the No. 1 solution they should be taken on through the No. 2 solution, this latter being necessary to bring out the desired oxidized bronze effect.

This exceedingly popular green effect is developed by using, for work to be handled on a large scale, 30 gallons of water, 3-8 gallon stale beer, 1-8 gallon acetic acid, 1 1-3 quarts vinegar, 4 1-2 pounds rock salt, 9 1-2 pounds sulphate of copper and 2 1-2 pounds sal ammoniac. Dissolve these ingredients completely and mix thoroughly, using in a cold state. Clean carefully the copper or brass surface, then immerse in the solution for 10 or 15 minutes or long enough, in fact, for the dark corrosion to show itself. Then remove from the dip and with a stiff bristle brush proceed to stipple the surface by tapping softly with the point of the brush not only to produce the mottled green effect, but to prevent the runs which might otherwise show in the finish. Avoid using the green too strong. The proper surface condition should be a dark field with the beautiful green showing through in the form of a mottled effect.

After dipping and stippling the brass should be exposed to the air for, say, half an hour, during which time the wonderfully soft, lustrous green will come forth.

Permit the surface after this treatment to dry thoroughly, at the expiration of which time apply a very thin coat of lacquer or some practically transparent substitute for lacquer. This thin protective coating serves the double and indispensable purpose of protecting the finish from change at the same time yielding the greenish yellow shade, which, on the dark ground work, is esteemed the truly fashionable and quite the most correct and best antique.

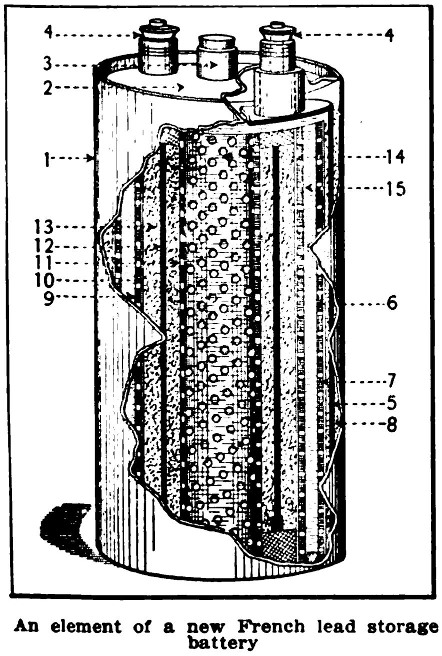
By way of a concluding word, it may be said that these formulas will necessarily have to be worked out with the explicit understanding that materials do not always act the same, being very sensitive to prevailing conditions and to methods of handling.

Digest

BRIEF RESUME FROM FIFTY FOREIGN JOURNALS—NEW FRENCH STORAGE BATTERY GIVING INCREASED LIFE AND CONSTANT CAPACITY—"CONGRESS OF THE CHILL" IN VIENNA—DIRECTIONS FOR QUICKLY DETECTING VANADIUM IN STEEL

Each element of a new French electric storage battery, called the Phoenix, weighs 4.545 kilograms and a vehicle battery composed of 44 cells in a rectangular tray weighs 200 kilograms, plus the weight of the tray, which varies according to the requirements. According to trials the useful capacity of a battery of this size reaches 36 watt-hours per kilogram of total weight, or 7,200 watt-hours for the battery. An estimate of the cost of operating and maintaining a taxicab equipped with this battery is based on 120 kilometers of travel for each charge and is placed at 18.40 francs per day, as compared with a cost of 28.43 francs for operating a gasoline cab the same distance each day, under conditions of city traffic. The component parts of a cell are enumerated as follows:

(1) A cylindrical casing usually made of ebonite of special quality and somewhat elastic, marked 1 in the accompanying illustration. (2) A conductive grid 5, made of lead or a non-corrosive alloy and formed of a lower ring provided with thin bars of the same metal extending vertically upon the circumference of another ring which serves for support. (3) A cylindrical vessel of ebonite, perforated with holes 6. This vessel is covered exteriorly with a layer 7 of cellulose capable of absorbing liquids and offering only small electric resistance while preventing active matter from penetrating to the vessel. Between this perforated vessel and the exterior layer there is a cylindrical space in which the conductive grid 5 is placed. (4) A second conductive grid 12 similar to the first one and placed in the interior of a second perforated vessel. (5) The second perforated vessel 9, similar to the first one, but of course of smaller diameter so as to leave a free circular space where the second conductive grid is lodged. Like the first perforated vessel it is covered with a layer of cellulose permeable to liquids.



An element of a new French lead storage battery

The space between the casing and the first perforated vessel and containing the first conductive grid is filled with the positive active matter 8. The negative active matter 13 is placed in the annular space containing the second conductive grid; that is, between the two interior vessels 9 and 11. The electrolyte occupies the free spaces 14 and 15. The upper ends of these two annular spaces containing active matter are closed by means of a rubber ring, while a cover 2 made of insulating material closes the upper opening of the enclosing layer of cellulose and is formed with a central aperture closed with a rubber stopper which is removed during charging to release the gases developed, and the electrolyte is introduced through the same aperture. Each of the two conductive grids carries a stem which passes through the cover of the cell, constituting the positive and negative electrodes 4. The construction is believed to obviate all dropping of active matter to the bottom of the cell, and resulting short-circuiting, and also all buckling of grids by simpler means than are employed for the same purposes in the ordinary lead-lead batteries, the reasons for this belief being given in the article. In the ordinary battery the dead weight caused by materials which serve only the purpose of safeguarding its functioning reaches a figure which reduces the capacity of the battery as a whole to 7 1-2 ampere-hours for each kilogram of battery weight, while in the Phoenix, invented by a Mr. Genard, the active matter constitutes 42 per cent. of the whole weight, and the capacity is thereby raised to 14 ampere hours per kilogram. At the same time the active matter in Genard's battery contains only pure and dry oxides of lead, while in other batteries admixtures of glycerine, magnesium or asbestos are resorted to for purposes of strength.—*La Vie Automobile,* Aug. 27.

The second "International Congress of the Chill," as it is picturesquely called, being a congress for the consideration and advancement of methods for chilling or cooling, will be held in Vienna, October 6 to 11 next under the patronage of Archduke Leopold Salvator. The first was held in Paris in 1908. Hence the name *Congrès International du Froid.* The subjects for discussion are divided as follows: (1) the science of cooling; (2) industrial production of coldness; (3) chilling in alimentation; (4) chilling in other industries; (5) chilling for transportation purposes; (6) administrative and legislation. A program for discussion, aside from the ordinary grist of papers and memoirs, has been worked out by the *Société Internationale du Froid,* whose address is 10 rue Denis Poisson, Paris, and the subjects will relate largely to processes of cooling not widely understood or known, it being the object of the society to stave off lengthy academic discourses. Chilling methods used in the chemical industry, which were neglected at the first congress, will be treated fully in the regular papers.—*Le Génie Civil,* Sept. 3.

For cheap aluminum castings a 33 per cent. zinc alloy with fusion point about 470 degrees centigrade is preferable, but for castings which must be particularly light and are subject to considerable deformation stresses an alloy with copper, though much more difficult to cast, meets the requirements better. There must first be made an alloy of 50 per cent. copper and 50 per cent. aluminum, which requires high heat and causes the formation of oxides and ashes. Commercially pure aluminum is added afterward, until the copper content is reduced to about 7 per cent., and the alloy has then a fusion point between 560 degrees and 622 degrees centigrade.—J. L. Jones quoted in *Chemiker Zeitung*, June 21.

A rapid chemical method for ascertaining the presence of vanadium in steel is described by Paul Slawik. It is based on the fact that a brownish-red coloration is displayed when vanadium salts are acted upon by peroxide of hydrogen. The author gives these directions: Dissolve 0.25 grammes of the steel to be examined in 4 cubic centimeters of nitric acid of density 1.20; heat; add about 0.3 grammes of persulphate of ammonia. There follows a discharge of gas. Heating is continued until this discharge ceases. Then the solution is cooled. There is added 3 to 4 cubic centimeters of phosphoric acid of density 1.30. The yellow coloration due to the iron ceases and the liquid remains only faintly rose colored. Shake. By means of a pipette 3 to 4 cubic centimeters of peroxide is poured into the test tube slowly so only thin films of the two liquids are mixed at the point of contact. In the zone of contact there is now formed, if vanadium is present, a brownish-red ring. As little as 0.01 per cent. of vanadium can be detected by this method. By comparison with samples of steel whose vanadium content is known, and which are treated in the same manner, the vanadium content can be approximated. The author uses a volumetric method, which he describes, for exact quantitative analysis.—*Chemiker Zeitung*, June 21.

The manufacturers of the Gnome revolving motors have submitted a new type for test at the laboratory of the Automobile Club of France. It has four vertical cylinders and burns kerosene, having a Longuemare kerosene carbureter.—*Bulletin Officiél*, July.

The German Acetylene Society has arranged a six-day course in Berlin at which blacksmiths and welders may learn all there is to be known in practice about autogenous welding. The pupils work eight hours each day. A program of the tuition is given.—*Metall Technik*, August 13.

Don't

A FEW ADDITIONAL INJUNCTIONS TO THE TYRO AND THE EXPERIENCED AUTOMOBILIST THAT MAY STAND THEM IN GOOD STEAD IF CAREFULLY READ, REFLECTED UPON AND DIGESTED INWARDLY

Don't blame the magneto for carbureter troubles, and unless you understand the interior workings of the magneto don't take it apart.

Don't drive friends' cars unless it is necessary. If anything goes wrong you will surely be blamed.

Don't leave a car standing in the sun when it is possible to put it in the shade.

Don't use an open exhaust in towns or near houses in the country late at night; you have no right to disturb other people's sleep.

Don't think that the cheapest policy of automobile insurance is the best: what you insure for is that in case of accident you will be paid.

Don't underestimate the mileage of tires when obtaining an adjustment on tires. The tire companies from long experience know almost exactly what mileage a tire has run, and you are more likely to obtain better treatment by telling the truth than by underestimating.

Don't drive fast over loose stones. Better come down to a lower gear; it eases the engine and saves the tires from deep cuts.

Don't blow your horn immediately behind someone crossing the street or about to cross, if they have not seen you; either stop or give audible sound of your approach before you get to them.

Don't pass by horses fast on country roads; they may not be used to autos and the noise just behind them may make them swerve the wrong way.

Don't trust to luck. There is no such thing from the automobile viewpoint.

Don't rely entirely on the guidance of country people. Find out the way before you start: then you will know if the country people are giving correct information.

Don't fail to look at the level of the gasoline every time you go out: it does not take long and the habit may save you hours' delay.

Don't ask a friend to act as expert in the purchase of a used car: if it turns out wrong you will probably lose a friend. It is better to pay an expert who has spent years in acquiring knowledge.

Don't indulge in races on the high road. If another driver wants to pass you, let him; and if you want to repass him, he will probably let you.

Don't despise help proffered. If you don't want it, say so graciously; it costs nothing more to be polite.

Don't forget to take the number of a car in the following cases: Accident to yourself; to others; if you lend another autoist anything, or if you borrow anything from one.

Don't tinker with a car for want of something else to do; unless there is something wrong, leave well enough alone.

Don't go out without a spare shoe, inner tube, jack, pump, soapstone powder, tire irons, screwdriver, adjustable wrench, copper wire, insulating tape and cotton waste.

Don't take it for granted that a vicious chuck-hole won't snap the neck of a passenger in the tonneau simply because it does not affect the driver.

Don't ask a guest to read the road map and then blame him if you land eight miles outside gasoline control.

Don't drive fast around corners; the time you save by not slowing up, compared to the loss of rubber on the rear tires, is not worth it. Collisions do not often happen on straight stretches of road.

Don't sit in the car and smoke cigarettes while the passengers are pumping up tires. It might give wrong impressions.

Don't forget when passing a car that has pulled out for you to admit that you have brushed elbows with polite society.

Don't assume too much. Perhaps within a mile you may require the services of the farmer whose wheel you tried to take off.

Don't try to talk yourself out of obvious conclusions: A dead pig in conjunction with 35 miles an hour is an obvious conclusion from the farmer's viewpoint. Settle.

Don't try to argue constitutional points when a braced log-chain is athwart the radiator and its proprietor has the floor. Back away.

Don't allow your publicity man to dope out any old thing just to show that he's alive. Make him wait till he has something to say. If he waits too long, nudge him.

Don't consult the posters for information about a coming track meet. What they say is liable to be biased.

Main Building Exterior

Assembly Room

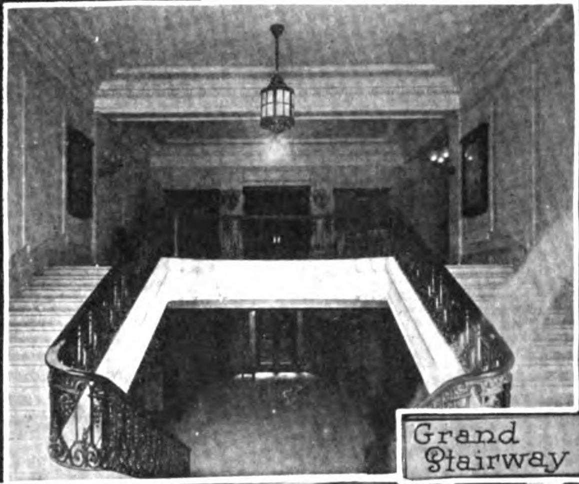
AUTOMOBILE CLUB of AMERICA

VIEWED from the vantage point of international affairs, there is no automobile organization in the United States in the same class with the Automobile Club of America. Aside from being the pioneer body in the New World devoted to motoring, this body has always occupied the leading and representative position as affecting the automobile in America in its relation with motoring all over the world.

Through its offices and machinery the American autoist who takes a tour in foreign lands is afforded advantages and conveniences that cannot be equaled. As a matter of reciprocity, the foreign motorist who wishes to tour in America finds equal advantages if he is duly accredited to the Automobile Club of America through his home organization.

From its inception this club has been a leader in everything tending to develop interest in motoring and the motor. It originated the first automobile show and conducted all the pioneer enterprises of the kind in the metropolis until the idea had be-

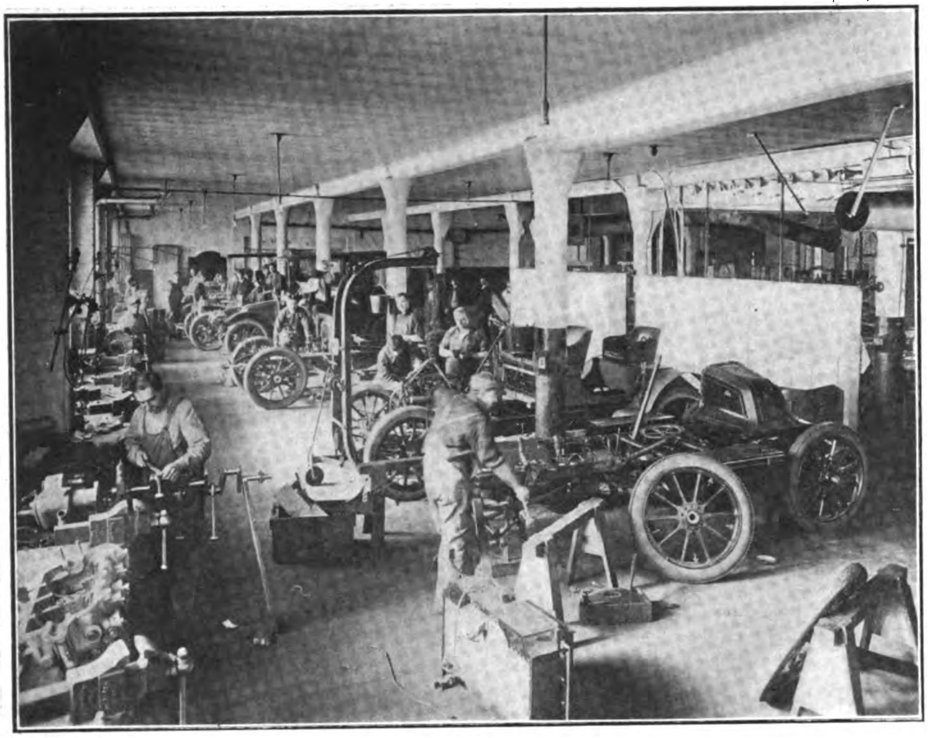
Common Room



Grand Stairway

Directors Room

Grill Room



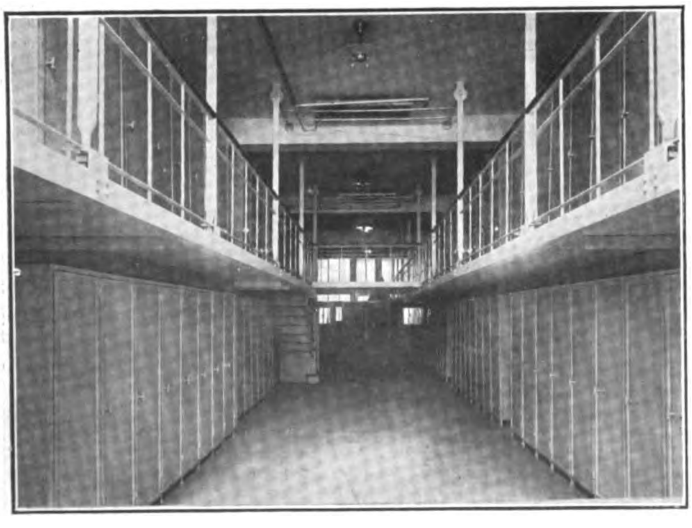
One-twelfth of the repair shop conducted by the club

come firmly implanted and had grown so as to cover the whole continent from Saskatoon to Buenos Ayres.

Its first show, conducted ten years ago, proved an instantaneous success, all space being taken by exhibitors many months in advance of its opening. There were sixty-nine exhibits and Madison Square Garden was crowded throughout the continuation of the show. One of the rules governing the affair sounds strange at this period of motor development. There was a track measuring one-eighth of a mile and the rule prohibited speeding upon it, owing to the sharpness of the curves. In spite of the speed limit imposed various kinds of tests were carried out upon the track. These included starting and brake tests and obstacle contests for steam and gasoline vehicles.

From this beginning the system of national automobile shows as it exists to-day has been evolved.

The club conducted the first endurance run ever held on American soil and for years was the main factor in automobile racing. As an organization it held its first sociability run November 4, 1899, when the club members gave a parade from the Waldorf to Hotel Claremont and return, and during its first year of existence it conducted seven short runs with much pleasure and success.



One-sixth of the locker corridor available at A. C. A.

The first racing event that attracted attention was the Blanchet Cup contest, which was won by A. L. Riker, but during the first year of its life several minor racing events were conducted.

One of the most important of the club's activities was inaugurated shortly after its birth, when the foreign relations department was instituted. At that time there were only seven recognized automobile clubs all over the world and foreign touring was almost a negligible quantity. To-day there are sixteen clubs forming the International Association of Recognized Automobile Clubs, one from each of the chief nations of the world, and the Automobile Club of America is the representative of the Western Hemisphere in its councils.

Each year from 3,000 to 4,000 Americans desiring to tour abroad are given the advantages of the club in this regard and about as many foreign tourists are received and entertained by the club. Customs, bonding, licensing and registration are all attended to, and through the introduction of the club the tourists are placed in possession of voluminous data and information with regard to travel. Owing to the fact that automobile regulation in the United States is under State and not Federal jurisdiction, several foreign countries cannot make agreements covering the exigencies of travel because they are not empowered to treat with individual States. This difficulty is obviated by the club through its relations with the Royal Automobile Club of Great Britain, which assumes to act as intermediary in customs and bonding matters where the legal obstacle referred to is interposed.

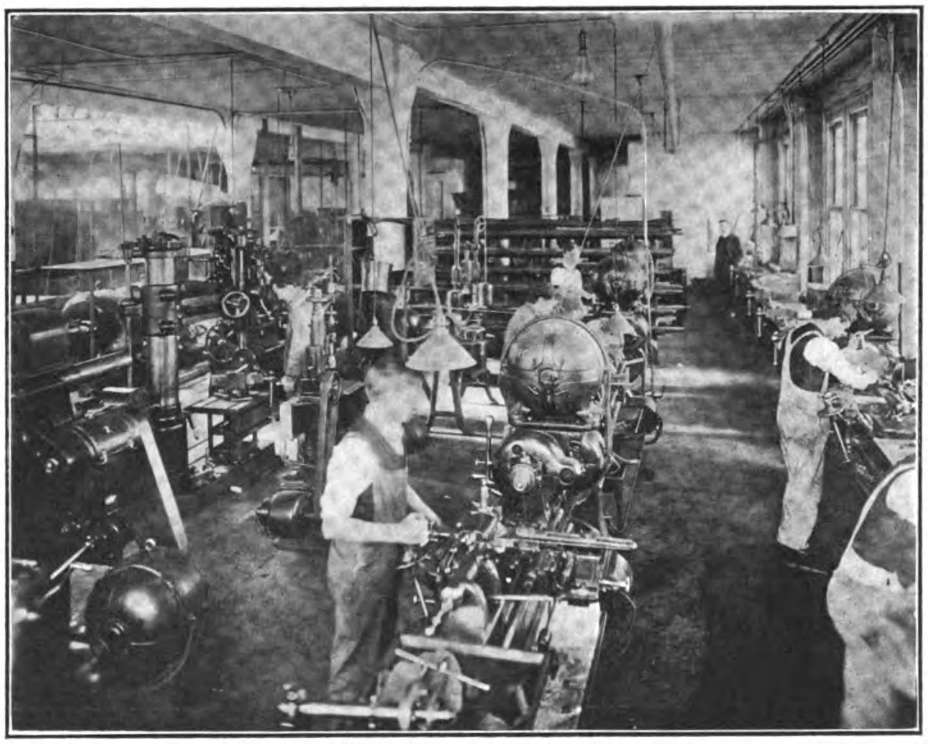
Before its first year was ended an endurance run to test the reliability of the automobile was proposed for the following Autumn.

This run developed into the famous New York to Buffalo event, which was called off at Rochester after the assassination of President McKinley. The conditions of this run seem strange when viewed from the modern point of vantage. The awards were based upon average speed. There were 87 entries and 82 starters, including several commercial delivery wagons and trucks and a few motorcycles. They were classified by weight and in night controls the entrants were allowed to make as many repairs as they pleased. This feature of the contest was provided for by the entrants by the shipment of quantities of parts and supplies to the control points, and there was a busy scene each night of the run after checking in.

On the way up-State the contestants went through a hill-climbing event on Nelson Hill, near Peekskill, N. Y., but the showing of the cars did not count in the general result, as the hill climb was regarded as a separate contest.

In 1902 the club conducted a reliability run to Boston and return, 488.4 miles. In this event the present general principles of the rules which govern reliability contests were outlined and foreshadowed. There were 80 entries and 75 starters in this tour. Of these 68 finished and 17 had clean scores.

The show feature continued to grow amazingly in patronage and interest and the club expanded along all lines of activity. The following year the feature was a commercial vehicle run of 100 miles over the streets of New York in which there were 13 entries. Good roads generally had been a prime object of the club from its inception and by this time the club had gained a strong foothold and exerted a powerful influence in many enterprises that have since developed into practical fruition. A dozen projects, all aimed to improve the highways, were fathered by the club and several of them are in existence to-day.



One-sixteenth of the space devoted to machine shop

The various sporting and pleasure events given under the direction of the club since its inception are too numerous to mention. While the club still maintains its place in sport, it has a wider field and one of vastly more importance to the generality of motordom.

It is headquarters for everything that is affiliated with the automobile in America.

The club was formed June 7, 1899, with General Avery D. Andrews at its head and was formally incorporated August 16 of that year. Its first quarters were at the Astor. George F. Chamberlain acted as head of the new organization, but was not formally invested with the title of president. Aside from its official interest in sport, the club went in for social diversion and educational pursuits in its earliest period to a greater relative extent than at present. The good roads meeting held during February, 1900, proved astonishingly effective in bringing the conditions of the highways to general notice. Precisely the same arguments were used by the speakers in addressing the club that are used now with so much force to prove the many and varied advantages that result from passable highways.

Albert R. Shattuck was elected president at the annual meeting and served with distinction then and subsequently. The club soon grew to 200 members and continued to expand in all directions, making particularly great strides during the administration of Elbert H. Gary, which terminated last April. Judge Gary, chairman of the board of directors of the United States Steel Corporation, devoted much immensely valuable time to club affairs and the effect of such labor is everywhere apparent in the structure of the organization.

The present officers of the club are as follows: President, Henry Sanderson; second vice-president, Robert Lee Morrell; third vice-president, Edward Shearson; treasurer, Finis E. Marshall; consulting engineer, Schuyler Skaats Wheeler; chaplain, the Rev. Wilton Merle-Smith, D.D., and secretary, Charles E. Forsdick. John E. Borne was chosen first vice-president of the organization at the last election, but death removed him since the date of election.

The quarters of the club are the most magnificent in this part of the world, at least, that are used for similar purposes.

The buildings are located between Fifty-fourth and Fifty-fifth streets west of Broadway. The main building was completed in 1906 and fronts eight stories high on Fifty-fourth street. Its carved-stone front and superb entrance give the impression of luxurious magnificence that is borne out in detail by inspection of the interior. Through a great marble hall the visitor finds entrance to the building. At the far end of this hall the way leads up a broad sweep of stone stairs to the main floor. At the head of the stairs a broad door shows the way to the grill room, restaurant and dining room of the club, while to the left is the general assembly hall, one of the finest rooms of its kind in New York or elsewhere.

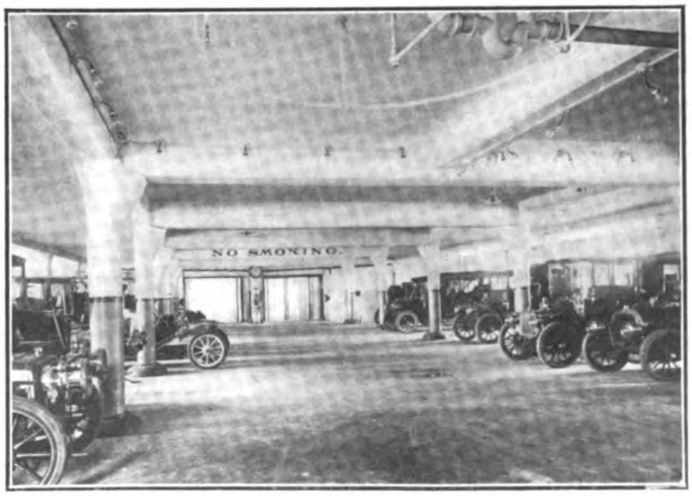
Chaste columns uphold the ceiling which is so high that it seems a little dim and shadowy except in the blaze of artificial light. The floors are of polished hardwood and equal in point of space any unbroken floor surface, except in one or two of the largest hotels in the country.

Save for the fact that the bureau of tours will be quartered on the first floor when the new building is thrown open, there will be no changes on the first and second floors of the main building. The third floor at present contains the administrative offices, the executive offices and several of the department headquarters. When the new building is occupied the rooms on the third floor of the old structure will be thrown together and will be occupied by the supply department, which has grown in size and importance until it now demands more room.

The fourth, fifth, sixth and seventh floors of the old building will not be changed in any respect, except that they will be connected with their corresponding floors in the annex. They are used as the garage and each floor will be equipped with a turntable and every other modern facility for the care of automobiles.

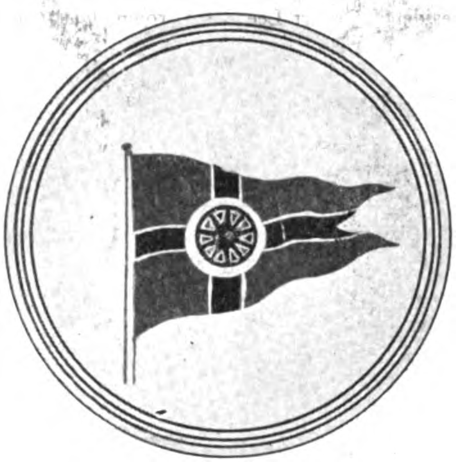
In the new building the eighth floor will be added to the garage equipment of the club, and in the corresponding level of the old building, which is now used as a machine shop, the partitions will be knocked out and it will also be a part of the garage, making five full floors that will be devoted to this purpose.

The new building is twelve stories in height, with a roomy and conveniently situated basement. In this basement the dynamometers of the club, of which there are two, one to test the cars and other motors, will be installed. Back in 1904, Mr. Wheeler, consulting engineer of the organization, was asked to design and build apparatus to determine the performance of cars of all kinds, and the machine that he devised was installed in 1908. It is



One-third of the live-storage room of the club

President Henry Sanderson



Emblem of the A. C. A.

Robert Lee Morrell, Second Vice-Pres.

equipped with many ingenious accessories for measuring force and speed and the advantage claimed for it is that it is possible to test a car in an hour or two and reach more definite results than by a road test covering much longer periods.

The motor dynamometer was installed in July, 1910, and was described briefly in a recent issue of THE AUTOMOBILE.

The technical committee will also be quartered in the basement.

The ground floor of both the new and the old buildings will be used largely as an entrance and exit for automobiles. The cars will enter from the Fifty-fifth street side and will leave from the Fifty-fourth street side.

The second floor of the new building will be for the chauffeurs. Every convenience will be afforded them except sleeping quarters and the arrangements planned for this department are remarkably complete and comfortable.

The third floor will contain the offices of the club, the rooms of the board of governors and committees, card rooms and some of the supply departments.

The next five floors will be devoted to garage purposes and the ninth will be arranged for the storage of parts, tires and other material for members and as a locker room. On the tenth, eleventh and twelfth floors are the machine shops of the club.

Out of a total available space of 187,159 square feet, 130,070 square feet are devoted to garage purposes, affording accommodation for more than 600 cars. The garage is open and available night and day and is equipped with modern devices of all sorts to facilitate the handling of motors. The club long ago decided to operate its garage strictly for the benefit of its members and "no commission" is the cardinal rule. Full lines of parts and accessories and the most advanced apparatus for repair work are included among the factors that have made this feature of the club favorably known throughout the world.

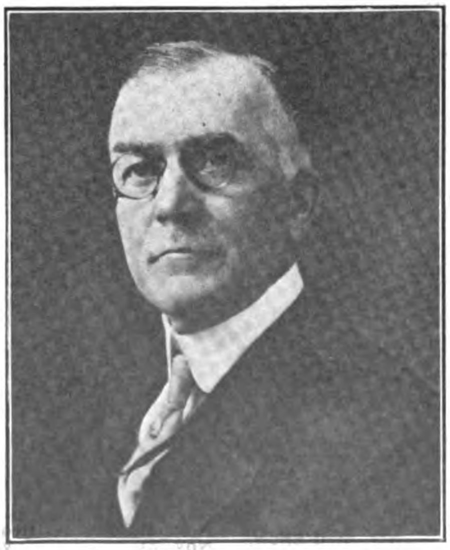
The membership of the club at the time of the retirement of President Gary was 2,055, divided into four classes, nearly 1,600 of which are active members. Since that time the growth has been normal and the total figures now are not far from 2,200. The new building will cost the club about $550,000. Needless to say the club is in flourishing condition financially.

As far as the sporting situation of the present is concerned, the Automobile Club of America is best known as the donor of the Grand Prize Cup, the second contest for which will take place October 15 on the Long Island Motor Parkway. The cup is of gold and is valued at $5,000. The club is not conducting the details of the contest.

In addition to the automobile, the club takes an official interest in aviation and motor boating.

The work of this organization is conducted on mechanical principles. The charter provides that the bulk of the detail work shall be done by committees and the formation of these committees has been a point of pride ever since the inauguration of the club as a forceful entry. The following compose the various committees of the Automobile Club of America:

Charles E. Forsdick, Secretary



Finis E. Marshall, Treasurer

Schuyler Skaats Wheeler, Cons'g Eng'r

Board of Governors—Henry Sanderson, president; Robert Lee Morrell, second vice-president; Edward Shearson, third vice-president; Finis E. Marshall, treasurer. Class I (term of office expires first Tuesday in April, 1911)—Frederick D. Underwood, Waldron Williams, William Pierson Hamilton. Class II (term of office expires first Tuesday in April, 1912)—Schuyler Skaats Wheeler, Colgate Hoyt, Alfred Ely. Class III (term of office expires first Tuesday in April, 1913)—John Jacob Astor, George F. Chamberlain, George Moore Smith. Class IV (term of office expires first Tuesday in April, 1914)—Dave H. Morris, Albert R. Shattuck, E. H. Gary.

Standing Committees—*Executive Committee*—Colgate Hoyt, *Chairman;* Robert Lee Morrell, Dave H. Morris.

Law and Ordinance Committee.—Wm. H. Page, *Chairman;* J. Dyneley Prince, Philip T. Dodge, Alfred Ely, John C. Brackenridge.

Good Roads Committee—A. R. Shattuck, *Chairman;* John Jacob Astor, Wm. G. McAdoo, Frederick D. Underwood.

Committee on Foreign Relations—Dave H. Morris, *Chairman;* A. C. Bostwick, Cortlandt Field Bishop, George Heath, J. Howard Johnston, Wm. S. Hogan, James A. Blair, Jr., W. W. Miller.

Contest Committee—Robert Lee Morrell, *Chairman;* E. R. Hollander, Henry H. Law, A. H. Whiting, Samuel B. Stevens, H. C. Pearson, Massachusetts Automobile Club.

Technical Committee—Alden L. McMurtry, *Chairman;* A. H. Whiting, A. L. Riker, Hiram Percy Maxim, M. A. Neeland, Alex. Churchward.

Bureau of Tours Committee—Colgate Hoyt, *Chairman;* Robert Lee Morrell, Dave H. Morris, George F. Chamberlain.

Committee on City Streets—Thomas Dimond, *Chairman;* M. M. Belding, Jr., Bryan L. Kennelly.

Committee on Public Safety—Winthrop L. Scarritt, *Chairman;* Henry Sanderson, Dave H. Morris, Colgate Hoyt, A. R. Shattuck, E. H. Gary.

Library Committee—J. E. Roosevelt, *Chairman;* G. Stanton Floyd-Jones, Henry R. Taylor.

Entertainment Committee—George D. Barron, *Chairman;* Emerson Brooks, H. L. Crawford.

Auditing Committee—Edgar L. Marston, *Chairman;* John I. Waterbury, Wm. M. Barrett.

Building Committee—Henry Sanderson, *Chairman;* Robert Lee Morrell, Dave H. Morris, Colgate Hoyt, J. Horace Harding.

Committee on Club Journal—George F. Chamberlain, *Chairman;* Robert Lee Morrell, W. W. Kelchner.

Membership Committee—Edward Shearson, *Chairman;* Lewis B. Brown, *Vice-Chairman;* Finis E. Marshall, Frederick D. Underwood, A. J. Hemphill, Ogden H. Hammond, J. C. Brady.

Motor Boat Committee—Henry Sanderson, *Chairman;* Ex-officio James A. Blair, Jr., George F. Baker, Jr., Henry H. Melville, Henry R. Sutphen (Motor Boat Club of America); Edgar Park, R. C. Seymour (Larchmont Yacht Club).

Aviation Committee—Cortlandt Field Bishop, *Chairman;* Dave H. Morris, Robert Lee Morrell, Colgate Hoyt, (Chas. Jerome Edwards, Samuel H. Valentine, A. Holland Forbes, J. C. McCoy, Aero Club of America).

Club counsel, Carter, Ledyard & Milburn, 54 Wall street, New York City; club attorney, W. W. Niles, 11 Wall street, New York City; club auditors, Haskins & Sells, certified public accountants, 30 Broad street, New York City.

Worcester Club Goes Up in Smoke

Worcester, Mass., Sept. 26—The ten rooms of the Worcester Automobile Club in the Chase Building, 44 Front street, considered the finest clubrooms in New England, were completely destroyed by fire early Thursday morning, at an estimated loss to the club and building owners of $175,000.

The fire, which started in the office of the club shortly before 5 o'clock from a defective wire, cigar or cigarette, destroyed the entire seventh floor of the building as well as the one below it. Five firemen were injured.

The automobile club is loser by about $35,000, of which about two-thirds was covered by insurance. The club's principal loss consisted of furniture and trophies.

President Daniel F. Gay has called a meeting of the board of governors for Tuesday night to be held in the rooms of the old Hancock Club at Lincoln square, and it is stated by some of the board that at this meeting a proposition to take over the Hancock clubhouse will be put up to the members of the Worcester Automobile Club, as well as those of the Hancock Club.

Correction

In The Automobile of September 8th these appeared a tabulation containing the specifications for the 1911 Marmon cars. In this table the price of the Marmon "Thirty-two" was given as $2,650 instead of $2,750. In this connection it may be noted that the wheelbase of this automobile is not 116 inches long, but 120 inches, as was emphasized on page 410 of the issue mentioned.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL CLIMBS, ETC.

Oct. 18..........New York City, Madison Square Garden, Electric Car Day at the Electric Show.
Dec. 1..........Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11. New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 15-21, 1911..Detroit, Wayne Gardens, Detroit Automobile Dealers' Association.
Jan. 16-21, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. [illegible]-Feb. 4,'11. Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-[illegible] 11,'11. Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Mch. 4-11, 1911..Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.

Races, Hill-Climbs, Etc.

Sept. 28-30......St. Louis, Mo., Third Annual National Good Roads Convention.
Oct. 1..........Track, Springfield, Ill., State Fair.
Oct. 1..........Long Island Motor Parkway, Vanderbilt Cup Race, Wheatley and Massapequa Sweepstakes.
Oct. 3..........Louisville, Ky., Reliability Run, Louisville Automobile Club.
Oct. 6-8..........Santa Anna, Cal., Track Meet.
Oct. 7-8..........Los Angeles, Cal., Speedway Meet.
Oct. 8..........Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 14-18........Washington, D. C., Start of Washington Post Reliability Run to Richmond, Va.
Oct. 15..........Long Island Motor Parkway, Grand Prize, Automobile Club of America.
Oct. 15-18........Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.
Oct. 27-29........Dallas, Tex., Track Meet.
Oct. 28-29........New York City, New York "American's" Motor Truck Contest.
Oct..............Exhibition Auto vs. Aeroplane, Dutchess County Fair, Poughkeepsie, N. Y.
Nov. 3-5..........Atlanta, Ga., Speedway Meet, Atlanta A. A.
Nov. 5-6..........New Orleans, La., Track Meet.
Nov. 10-12-13.....San Antonio, Tex., Track Meet.
Nov. 24..........Redlands, Cal., Hill Climb.
Nov. 24..........Savannah, Ga., Road Race, Savannah Automobile Club.

Foreign Shows and Races

May 1-Oct. 1......Vienna, Austria-Hungary, Automobile and Aviation Exhibition.

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EVERY man has his limitation, according to the statement made the other day by a well-known man who is making money in the automobile business. This authority for the "doctrine of limitation" seems quite positive about it, and he questions the accuracy of those who hold to the contrary.

* * *

WITH great frequency the Editor of THE AUTOMOBILE is addressed by young men who are attracted by the glamour of the automobile art, and they seek advice; they want to be told how to become a factor in a great and growing art.

* * *

FOR the young man who is absolutely honest, a worker, and who admits of no limitation, nothing can be easier than to enter the automobile business and take success away from the man who preaches the doctrine of limitation.

* * *

THAT the coming of the automobile has brought temporary success to many men, some of whom are of limited ability, is self-evident; even those who are willing to confess that man is limited in his ability are among those who gathered in a part of the harvest.

* * *

LOOKING for success in the automobile business today is like making a vain search for a needle in a haystack unless the searcher is honest, sincere, frank, fearless, and a worker. Does the candidate need a university education and the bolstering force of friends?

* * *

IT would be like trying to bolster up the claim of a "fallen angel" for a box seat in Paradise; the real workers would get in the way and the bolstered one would pine away in despair or slide back into the brine.

* * *

THOSE who desire to enter the automobile business and are glowing with ambition as they think, if they are merely animated with a desire to be rewarded for being on Earth, will find that the "ambition" that they are astride of is selling below par.

* * *

LET there be no mistake; the young man who desires to make a success does not even have to enter the automobile business; he will find what he wants in the way of raw material within himself. But if he is so constituted the automobile business needs him—needs him badly.

* * *

WHILE there is no limitation if the man so wills it, the fact remains that there are some serious handicaps; the man who "rests on his hard-earned laurels" is dead for the time being. Getting into a groove is like falling into a grave, only it is longer.

* * *

MOST young men, after they are afforded an opportunity to work, gather skill, just a little skill, complete some trifling undertaking, perhaps with some credit, and then what?

* * *

THEY find themselves in a sad predicament; the emolument that looked so good to them in the beginning ceases to patch out; the hats they wear rapidly shrink; in other words, the cost of a new chapeau large enough to fit a "swelled head" cannot be purchased out of a modest income.

* * *

THE work they so faithfully promised to perform is neglected; it is not fitting work for them; they want a better task to perform; the fact that some other man is doing the work more efficiently does not appeal—what can reach the center of reasoning of a man who is troubled with a dose of "swelled head"?

* * *

BUT what is a swelled head as compared with "exclusiveness"? What chance is there for the man who refuses to do anything but the particular work which attracts his discriminating (?) notice?

* * *

LEAKING is a bad habit for a ship to acquire; it is even worse in a man. Most men leak words; they talk too much; what they say will not stay said; they do not seem to understand that wisdom is as silent as a Sphinx.

* * *

RUTHLESSNESS is not an asset; the high disregard of the rights of others is the main disorder of the burglar and the cut-throat—why be ruthless? Success is neither defined nor measured by the accumulation of wealth that is not fairly acquired. The great chariot "Success" is of such large seating capacity that there is room aboard for all who are worthy.

OPPOSITION is the greatest braking mechanism that can be employed to pull down the ruthless; it will still the wheels of progress of the cruel and the greedy; it is the instrument of precision of the man who has to defend himself against the attack of the ruthless.

* * *

STRANGE as it may seem, the man who cannot "team" well with his confreres invariably gains the opposition of the most capable of them; the weaklings among them are not to be feared; it is the fellow that can do things, the man that knows that he can, who will put on the brakes if the ruthless and the greedy try to practice their religion in the camp that will have none of it.

* * *

CLIMBING up the ladder of ambition is a "boot-strap" proposition to the man who wants to thrust other men down; a real fighting, red-blooded man declines to make way; he puts up a fight; it is the fight of the man who has a principle in his keeping against the man who would not know principle if it met him coming down the road.

* * *

SHEER ability is capable of paying the interest at six per cent. on $1,000,000,000, with plenty of time left in which to court the nicest girl for miles around, marry the best woman in the world, play tag with the youngsters, be a friend to the man who may be in need of one, and offer a little encouragement to the unfortunate—if there are other duties to perform, sheer ability may be depended upon to find a way to accomplish them.

* * *

CRINGING is not teaming; it is not necessary to cringe; the companion or even the employer who wants a cringer should find them so scarce that they would come high. Should there be any for hire they are bad investments; the cringer has neither time nor capacity for becoming proficient in anything else.

* * *

LEANING backwards, trying to be honest, is the most dishonest practice that a living man can acquire; it is a clean case of dishonest honesty, if such it may be called.

* * *

SLANDERING is taught in the primary school of the blackmailer. Slander emanates from the unrestrained tongue of the irresponsible nondescript; he abides in low places, and a blight is put upon every undertaking that knows his way; nor does it matter whether or not it is in a plant for the making of automobiles or even on a newspaper.

* * *

THE automobile industry is in need of the clean and the industrious; it is in need of the man who is capable of shunning work long enough to take rest, refreshments and do a man's social duty—it is work, and more work, that has to be done; welcome is the man who will perform the tasks that await his coming!

* * *

WHAT fields of endeavor are open—automobile zones of activity—to the man who will work! There is scarcely a locked door in the whole industry. True, there are able men now holding sway behind many doors. Equally true, they are not the kind of men that are likely to stay down. When they work up, mind you, others must take their places.

* * *

TO the man who has a penchant for literary endeavor, the man who has an engineering bent and the ability to describe things as they are—not as some persons would like to have them distorted—there is a large field. Every maker of automobiles is in need of men who can take hold of the catalogue work, advertising, descriptive matter, etc.

* * *

TO the young engineer there is the drawing office; the place where the equipment is crystallized—what a splendid opportunity for a young man of working proclivities and a capacity for advancing!

* * *

TOOL-ROOM practice is now so important that a good automobile cannot be made without utilizing the services of a considerable number of tool-makers—this is a great field; it is no place for the man who has no capacity for thinking and for work.

* * *

SHOP ACCOUNTING is now regarded as of the greatest importance; it is necessary to keep track of the cost of everything without impeding the work, but the cost of the output must be determined the day it is finished—this takes brains and work.

* * *

ROUTING the work; keeping the men at the tools supplied with work; maintaining a brisk circulation; making sure that none of the work in progress will languish; nothing shall be side-tracked; just the place for intelligence of the class which wears no bells that handicap.

* * *

ELIMINATING complications in automobiles, reducing the total number of parts from perhaps 2500 to say 2000, represents an occupation that would bring vast returns to the workman who will give the matter sufficient attention, if he will be able to say when his task is completed that none of the eliminated parts will be missed when the automobile is put into service.

* * *

JUST sweeping the floor, and doing the other chores that would naturally fall to the lot of the man who is willing to work, paves the way from the lowest grade of position to the presidency of the largest company in the land. The sole requirement is to sweep the floor as perfectly as possible, being careful to collect the débris that generally hides behind half-open doors, but there is no objection to keeping the weather eye open with a view to doing other tasks if they happen along.

* * *

BEING a good salesman is something to consider, but in order to excel in this work, it is necessary to know nearly as much about the merchandise to be disposed of as the man who is responsible for its fabrication. Selling points, as they are generally perpetrated by a salesman, are plain, ordinary falsehoods projected from the tongue of the man who undertakes to paint a cabbage so that it will look like a rose—it is the truth that carries conviction.

Measuring the Wind for Aviators

METHODS USED AT ONE MEET FOR TELLING THE EXACT CONDITION OF AIR CURRENTS

TO allow of the greatest number of flights to take place at an aviation meet such as that to be held at Belmont Park, New York, in October, the first requirement is ability on the part of the aviators to tell, by some means in which they have confidence, the velocity and nature of the wind, not only near the earth, but also at various heights. A system announcing the velocity and steadiness of the air currents at 30, 100 and 200 feet above the ground, to say nothing of the services which might be rendered by means of an observation station located in a captive balloon, is recognized to be one of the crying wants for exhibitions, so long as the stability and equilibrium of aeroplanes are properties sought rather than materialized. The spectators who have paid admission, and therefore the box office as well, are interested in having all those intervals utilized for entertainment which can be utilized, and on the days when the velocity or character of the atmospheric currents changes considerably from hour to hour, a system of public announcement, such as by the sounding of gongs in conjunction with blackboard readings, not only keeps the spectators good natured, but also sets aside the doubts which might prevent the aviators from doing their best. Moreover, a record of the weather conditions, expressed in facts and figures and obtained by measurements, serves to facilitate comparisons between one performance and another.

Little has been done as yet to perfect the weather observations at aviation meets or any system for announcing and recording them. A beginning was made, however, at the meet which took place at Lyon, France, in the fore part of the Summer, and the arrangements made on that occasion may be described and, in default of more complete ones, may serve to illustrate some of the requirements.

Professor André, of the observatory at Lyon to whom the committee appointed to take charge of the matter first applied, took care to impress upon the members the need of minute precautions if illusory results should be avoided in the measurement of something so variable and unstable as the wind. It was out of question to just put up a few anemometers, such as may be bought in the open market, here and there along the level of the ground, as had been done at previous aviation meets. To raise a platform 50 feet above the field and install a station thereon would have entailed considerable expense. This difficulty was met in the following manner: A mast was raised 17 meters high and braced against the stand of the timers in the middle of the field. Being removed from all obstacles and higher than any, an apparatus at the top of this mast would not be in the path of eddies. By means of rails on the side of the mast and a pulley arrangement a wooden frame could be hoisted to the top and very readily taken down to the ground for inspection and adjustment. The choice of a suitable instrument was the next care. Anemometers used in the observatories are nearly all of the Robinson type, that is, they consist of four semi-spheres made of sheet metal mounted, with the circular edge placed vertically, upon the ends of four arms turning in a horizontal plane. The inertia of this instrument is too great for measuring feeble winds unless the semi-spheres are made quite large; and then the device, in case of being actuated by a strong gust of short duration, continues to revolve for some time after the cause has ceased. It serves very well to measure averages, but not the frequency or suddenness of gusts, and these are after all the features of greatest interest to aviators. Instead, there was adopted a very light device with inclined blades turning in a plane perpendicular upon the direction of the wind. Most devices of this type while quite sensitive are provided with a dial affording a direct reading of the velocity of the wind and they must constantly be turned by hand so as to face the wind. To obviate these two shortcomings the device was combined with a weather vane, which would automatically correct its position to the wind, and the dial mechanism was replaced with a simple gear which closed an electrical circuit once for each turn of a light spur-wheel meshing with a small pinion on the axis of the device. It was then easy to measure the velocity of the wind as well as its regularity by the dots produced by the electrical contacts on a roll of paper unwound by clockwork at the foot of the mast.

As the anemometer device employed was set in motion as soon as the velocity of the wind reached 10 centimeters per second, it was necessary to employ a weather vane of equal sensitiveness. It was constructed of a light wooden frame covered with aeroplane cloth so as to form a dihedral angle of about 5 degrees, and this shape was chosen so as to avoid the oscillations which would certainly result if a single plane were placed in the little eddies which would be formed directly behind the vertical shaft of the weather vane. These surfaces measured 0.4 by 0.4 meter and were supported by a wooden arm measuring 0.7 meter, in such manner that the distance from the center of gravity of the planes to the shaft was not less than 0.5 meter. The weight of this weather vane apparatus was exactly balanced by a piece of lead carried on a stem extending on the other side of the vertical shaft. The balancing was done with great care with a view to having the weather vane function with correctness even if the mast were not exactly perpendicular—and some flexion of the mast was to be expected, considering its dimensions and its rather weak support. The shaft of the weather vane was mounted in ball-bearings, and under these conditions the apparatus placed itself perfectly in a current of air as slow at one-tenth to one-twentieth of a meter per second, even when its shaft stood at an angle of 30 degrees with a plumb line. Finally, the anemometer device was attached by means of a little clamp to the top of the shaft of the weather vane.

In order to get readings of the direction of the wind, rather than providing the vane with an index hand displacing itself over a fixed rose it was preferred to use a fixed index and to mark the rose on an inverted truncated cone secured to the weather vane. In this manner it was possible to read the direction, even from the foot of the mast, with considerable accuracy and without displacing one's self in order to face the index.

The calibration of the apparatus took place in a large closed hall. It was moved against the air a given distance, and a large number of tests made at different speeds resulted in establishing the figure of 3.20 meters as practically a constant for the distance covered between two contacts. The transmission of current took place at one end through the metallic mass of the device and through an insulated bronze ring at the lower end, against which there leaned lightly a small fixed brush also insulated. The closing of the circuit thus obtained was utilized to ring a bell placed in the interior of the station and connected to the instrument by a flexible wire. By measuring with a stop watch the time elapsed between two consecutive rings of the bell the time was obtained in which the wind covered 3.20 meters, and the velocity in meters per second was read off by means of a corresponding schedule prepared in advance. In reality the elapsed time was not measured between two consecutive bell signals, but between ten such, corresponding to a distance of 32 meters.

This acoustic method of signaling was found very convenient, as the bell could be heard at a distance of several meters on the outside of the station, so that every variation in the speed of the wind was noted by every person in the vicinity. In addition, every signal was recorded, as above mentioned, by a chronographic register, so as to check all readings.

The station was also equipped with barometers, thermometers and hygrometers, all self-registering, which rendered it possible to record with considerable accuracy all the meteorological conditions under which flights were made, and twice each day telephonic communications were received from the observatory announcing whatever changes in the weather appeared to be approaching.

Events Among Aviators

HISTORICAL associations surround with glamor the feat of Georges Chavez, who crossed the Alps in a Blériot monoplane on Sept. 23. The Italian Aviation Society had offered a prize of $20,000 for flying from Brigue, Switzerland, to Milan, Italy, by way of the Simplon Pass, whose altitude at the lowest point is about 7,000 feet, but unfortunately the young aviator after accomplishing forty miles of flight at the high altitude and braving fierce currents rising from the steep Italian side of the mountains, undertook to descend by gliding to Domodossola, an aeronautic station located on the plain on the way to Milano. When arrived within fifteen feet of the ground he lost control of the machine, whether this was due to a sudden upward swerve at high speed or to a gust of wind, and the machine turned a somersault and came down on top on Chavez, breaking both his legs and inflicting contusions on face and shoulders. As his recovery at first seemed probable, a committee of the Italian Aviation Society began to raise a $10,000 consolation prize for him, while a penny subscription was started for the purpose of erecting a monument at the spot where he landed, to commemorate the first human flight across the mountains which Hannibal, the Visigoths and Napoleon had crossed with their armies only at great peril and with much loss of life. But on Sept. 27 Chavez succumbed to his injuries.

On Sept. 19 Chavez made his first attempt, but found the tops of the Simplon enveloped in clouds and returned safely to Brigue. Thereafter he explored the mountain daily by automobile, and on the day of the event he came rushing down from Simplon Kulm, reached Brigue at 1:30 p. m., took the monoplane out of its shed, mounted it and had it started, and at 1:40 the spectators caught the last glimpse of him disappearing over the hazy outlines of the mountain peaks. The telephone announced that he had passed the Kulm at a height of 450 feet. Another message a few minutes later said he had passed Gondo. But the bell rang again, and now he had fallen at Domodossola. Just before he started, Henry Weymann, an American aviator favorably noticed for his gallant work in the Eastern Circuit contest in France and for his subsequent attempt at winning the large Michelin prize for reaching the Puy de Dôme with a passenger in direct flight from Paris, had returned from a vain attempt at the same coveted feat, having found that his Farman biplane was unable to reach the altitude necessary for crossing the mountains. Chavez was born in Paris 23 years ago and gained fame among aviators in the beginning of this month by beating Morane's altitude record. Rising from Issy-les-Moulinaux he reached the height of 8,792 feet in 41 minutes.

Much discussion has been stirred up among aviators with regard to the reasons for the accident which befell Chavez. He came down in gliding flight with the motor idle, and it is the opinion of many monoplane operators that this method of descending is dangerous because, in case of a sudden cross current in the atmosphere which disturbs the equilibrium, the aviator is deprived of the motor power as a means for regaining his balance quickly by spurting forward.

Hubert Latham and Louis Bréguet have been nominated for decoration with the cross of the Legion of Honor for meritorious work in connection with French military aeroplanes.

W. K. Vanderbilt, Jr., has ordered a Blériot monoplane provided with a 60-horsepower Gnome motor and an auxiliary motor of smaller power to be used either in combination with the main motor or as auxiliary when the latter is incapacitated. It is said to be ready for delivery and capable of fantastic speed.

On Sept. 16 Aubrun flew a Blériot machine 186.3 miles in 3 hours 33 minutes and 7 seconds, making an average speed of about 55 miles per hour, and breaking the record for combined speed and distance.

Two aviators, Loridan and Mahieu, attempted on Sept. 26 to make the flight from Paris to Brussels, for which the city of Paris and the Aero Club of France had offered prizes totaling $35,000, provided the flight was made with a passenger and finished on the day mentioned. Loridan reached St. Quentin, 81 miles from Paris and about one-half of the required distance, and fell from a considerable height, injuring himself and the passenger. Mahieu reached nearly as far, but fell from a height of 60 feet near Lafère. Both he and his passenger escaped injury.

The National Council of the Aero Club of America has sanctioned the conditions for a race from Chicago to New York, as outlined by the New York *Times* and the Chicago *Evening Post,* which jointly offer a prize of $25,000 for the winner. The race is to start from the Hawthorne race track, near Chicago, on October 8, if the weather permits, and must be finished in New York City on or before October 15. At least three competitors must start, and the start may be postponed from day to day on account of bad weather, which provision leaves a considerable element of uncertainty, if one or two elect to start, considering the weather sufficiently favorable, while the third competitor holds back and possibly does not start at all. Between the start and the finish the competitors may descend and rest and repair as they please. A large number of competitors have been announced from time to time. An additional prize of $5,000 has been offered by Clifford B. Harmon, a well-known amateur aviator of New York City. The fliers are supposed to follow the old automobile route via South Bend, Toledo, Cleveland, Buffalo, Rochester, Syracuse, Albany.

At Belmont Park, New York, preparations are being pushed for the great international aviation meet to be held October 22 to 30. Sheds for housing the machines of the contestants are now being erected and when finished will be at disposal for all aviators officially entered in the meet, and they may thereafter begin practicing flying when they choose. J. C. McCoy, chairman of the committee on aviation, announces the following entries: Leblanc (Blériot), Latham and Thomas (Antoinette), Lesseps, Morane and Aubrun (Blériot) and Simon, all from France; Graham-White, Radley and Ogilvie from England; Moissant and Weymann, American aviators flying French machines, and the American aviators Charles K. Hamilton, Walter Brookins, Ralph Johnstone, Thomas S. Baldwin and Tod Shriver. The ground at Belmont Park has been cleared of all obstructions and presents a clear field, with the exception of the pylons, which are slender towers serving to mark the course of contests. What was the old betting ring underneath the grand stand has been transformed into an exhibition hall where flying machines, automobiles and other things connected with outdoor sports will be exhibited, and arrangements are made for a restaurant service which will render a whole-day stay at the grounds practicable.

The Muffler on Aviation Motors

A good muffler absorbs only about 8 per cent. of the power developed in a single-cylinder motor. While the loss is usually somewhat larger in a multi-cylinder motor, it is on the other hand reduced about 80 per cent. before it reaches the propeller, owing to the inefficiency of the latter. The loss in propulsive power in applying a muffler to the motor of an aeroplane engine would therefore at the present stage of propeller efficiency not exceed 2 per cent., and the return in comfort as well as in ability to hear other motor sounds would compensate for this small loss. The additional weight of a muffler for a 50-horsepower motor is estimated at 10 to 15 pounds, including the exhaust tubing required for reaching it.

Auto Show of 1911

MOST COMPLETE LINE OF CARS EVER EXHIBITED UNDER AUSPICES OF A. L. A. M. WILL GRACE MADISON SQUARE GARDEN IN JANUARY

ACCORDING to all indications, the coming Eleventh National Automobile Show, which will be held at Madison Square Garden from January 7 to 21, 1911, will set a new mark in that important branch of motor activity. While it is still three months before the doors will be thrown open to the public, all space has been assigned for the first section of the show as shown in the accompanying series of illustrations.

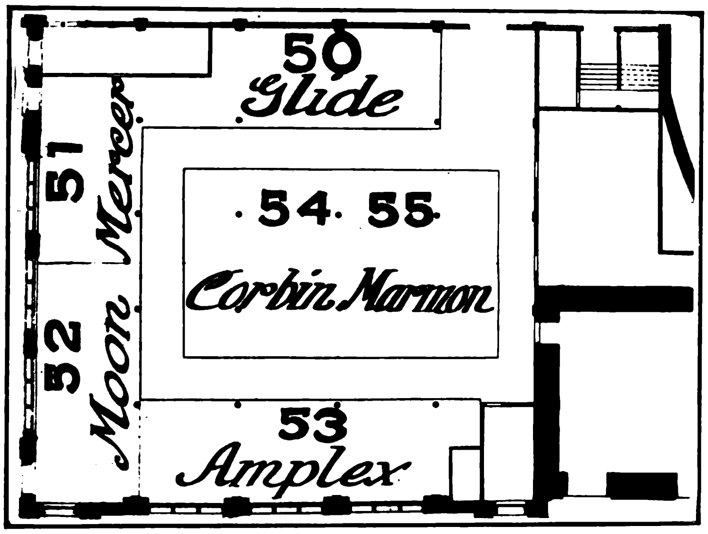


Diagram showing disposition of space in Exhibition Hall

The exhibition of 1911 is divided into two parts. The first will be entirely devoted to the display of passenger or pleasure cars and will last until January 14. The commercial or freight vehicles, electrics and motorcycles will be on show beginning January 16 and will remain until the night of January 21. The parts and accessories display will run through both weeks of the exhibition.

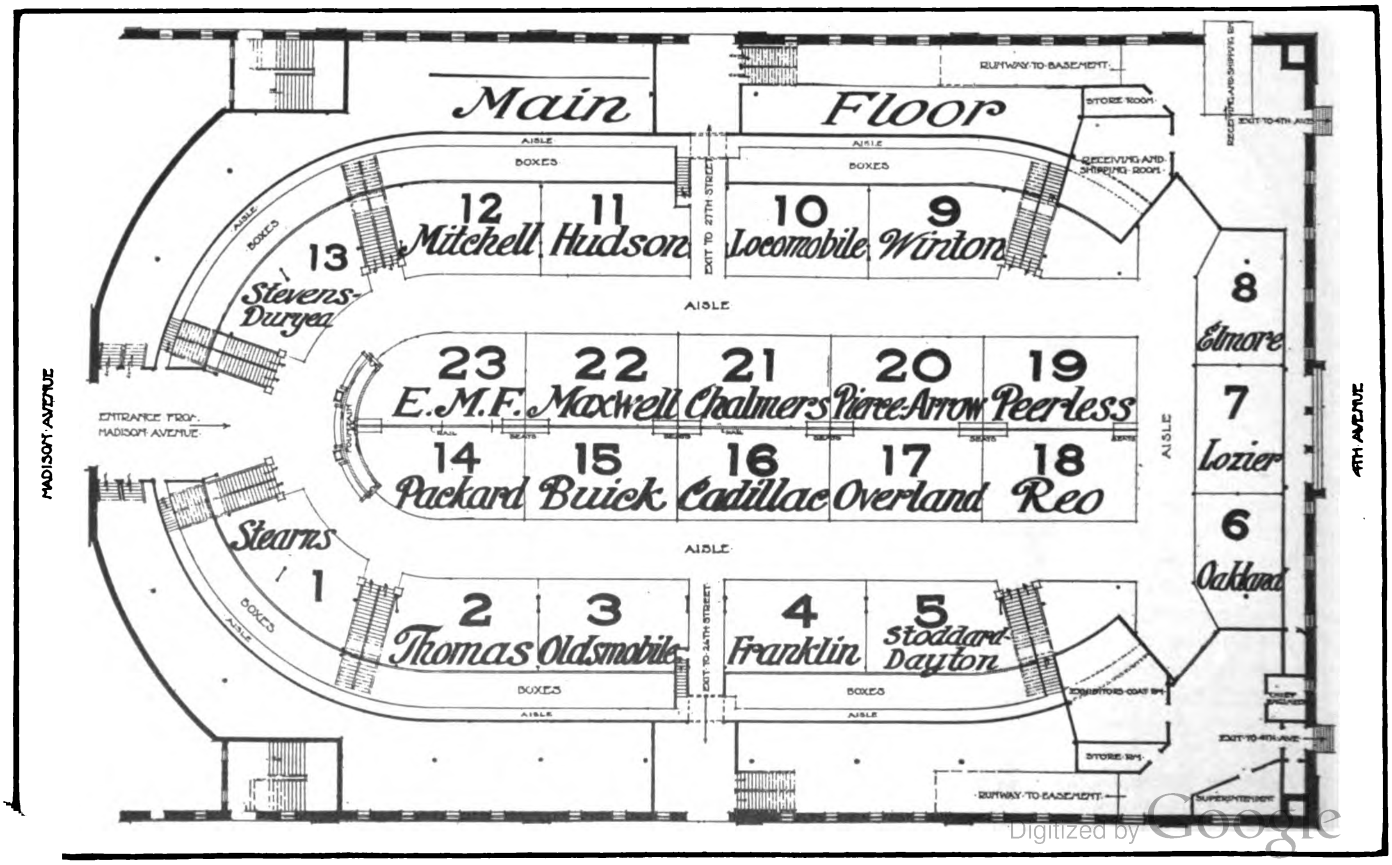
The main floor of the garden will contain twenty-three exhibits, thirteen of which will be strung around the outer edge of the big exhibition room. In the center there will be ten exhibits, while those in the big circle will be divided from the center block by wide aisles. Around the outside of the big circle the boxes will be arranged and still farther out from the center an aisle will afford easy passage about the hall.

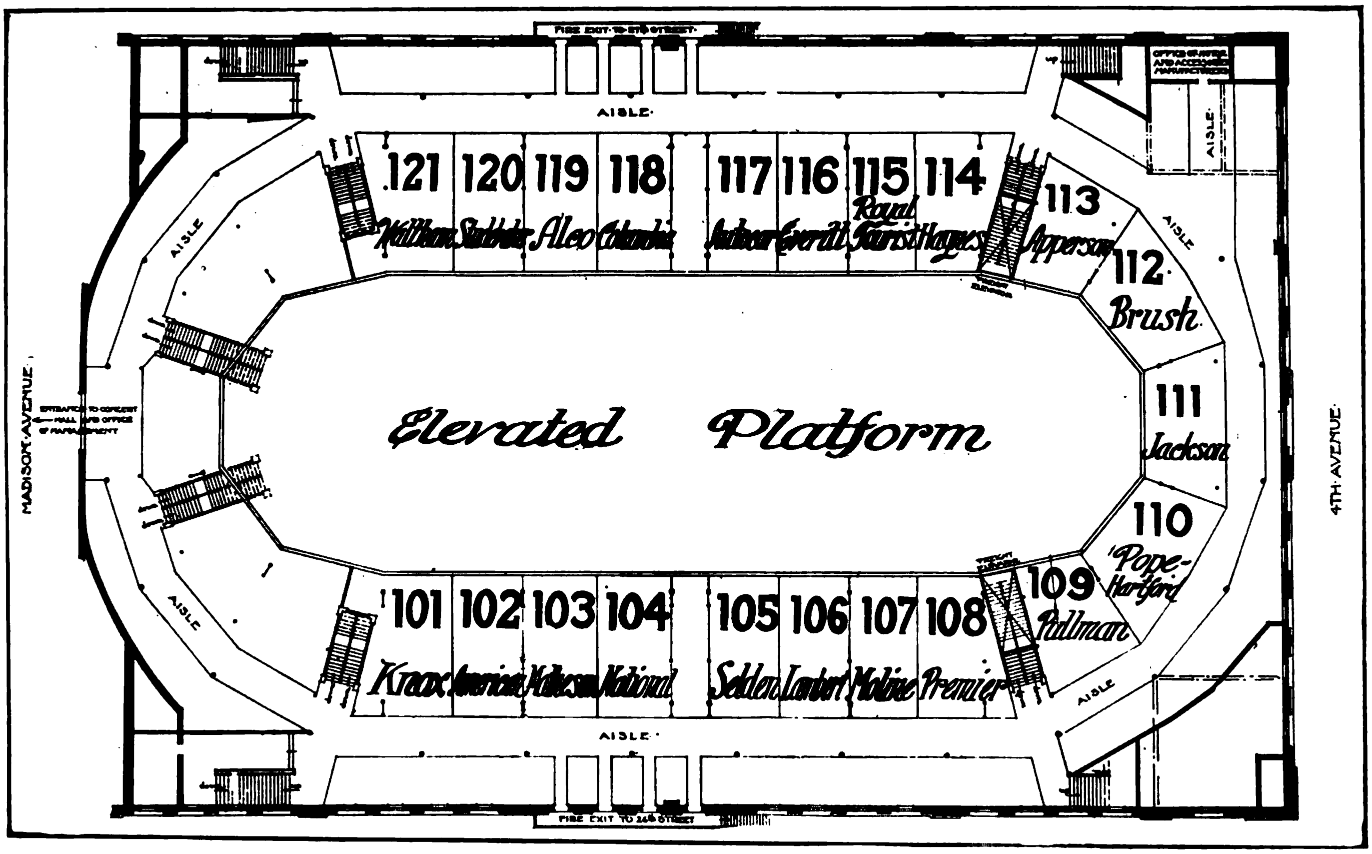
On the elevated platform twenty car exhibits will be quartered in a magnet-shaped formation which will be encircled by a wide aisle to give opportunity for close inspection by the public.

Exhibition Hall will contain six car exhibits and in the balcony there will be twenty more in the same formation as that followed on the elevated platform. Thus sixty-nine exhibits by as many distinct automobile companies will be shown during the first seven days of the national show. Nothing like as complete a line of cars made by licensees under the Selden Patent has ever been shown, because during the past year the membership in the Association of Licensed Automobile Manufacturers has increased materially and several newcomers will exhibit their product.

The foreign cars licensed under the patent will be well represented and the domestic field will be about as complete as it is possible to make it.

In order to provide space in the garden under this plan, a number of radical changes will be required in the main floor. Preparations for these changes will be made with a wealth of detail so that when the time comes for the alterations the girders and supports that will be used in changing the interior can be moved in and bolted together in the shortest possible time.



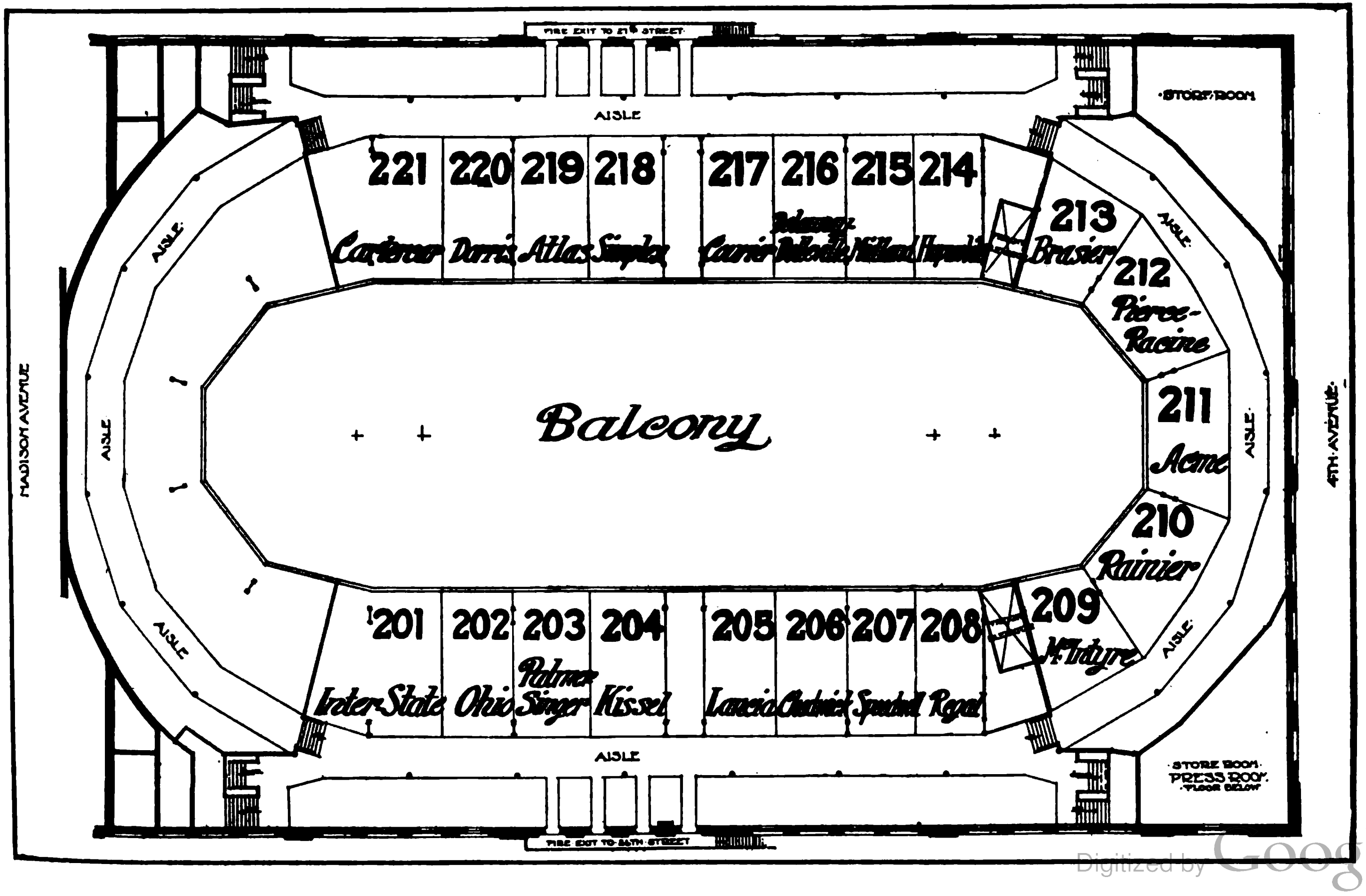


The decorative scheme has been worked out and according to announcement it will be more artistically beautiful than ever before.

Public interest in the National Automobile Show has always been intense and this year, with the growth and development of the industry, it is expected that the attendance will be larger than it was at the previous high-water mark. The musical programs, which are now being arranged, will be very complete and all indications point to the highest class of entertainment of that kind.

Society will be represented to a larger extent, this being foreshadowed by the early reservations.

The committee in charge of the enterprise consists of the following: Chairman, Colonel George Pope; Charles Clifton, President of the A. L. A. M.; Alfred Reeves, General Manager of that association, and Merle L. Downs.



Defend Auto Industry

CHIEFTAINS OF THE BUSINESS TELL WHY THE MOTOR CAR WILL REMAIN A PERMANENT FACTOR IN CIVILIZATION AND MODERN DEVELOPMENT

THE recent attack of banking interests upon the automobile industry has led to expressions of opinion on the permanency of the automobile by numerous men prominent in the business. In a symposium compiled by *American Industries* the following statements will appear in October:

"Probably the best answer to the charge of overproduction can be answered by pointing to the export trade. Had there been any real over-production, automobile manufacturers would have turned to the foreign market long before this."—F. B. Stearns, president The F. B. Stearns Company.

"The tendency to luxurious living, which has been attributed to the automobile, is no more the result of the motor car than is any of the other thousand and one things which contribute toward making life more luxurious than it was two or three decades ago."—H. H. Franklin, president Franklin Automobile Co.

"A great hullabaloo has been raised because the automobile is diverting trade from speculation, the purchase of jewelry, millinery and has taken money from saloons and resorts. In so doing, it is doing much to unite families, parents and children in their recreations and pleasures."—E. R. Thomas, E. R. Thomas Motor Co.

"With the big end of the business still untouched (that of building delivery wagons and trucks), it is safe to say that the industry is still in its infancy and has a future ahead of it too gigantic for any of us to even conceive."—R. H. Salmons, general manager Selden Motor Vehicle Co.

"Whatever volume of money has been expended in motor cars, represents money in motion. And that money in motion has kept busy the wheels of industry during and after the panic of 1907."—Alexander Winton, president The Winton Motor Carriage Co.

"We do not believe there is any over-production of high-class or high-grade cars."—L. W. Rinear, The White Co.

"There is no doubt but that in the near future the American motor car manufacturer will have to give liberal acceptance to that logical outlet channel in the foreign field."—N. I. Taylor, Regal Motor Car Co.

"From this period of transition will emerge, strong and capable, a coterie of immense, well-managed firms of manufacturers to enter upon the work of supplying the public with a product for which there will ever be an established demand."—Walter E. Flanders, E-M-F Co.

"Transportation is civilization. Time saved is money made."—Maxwell O. Parry, Parry Auto Co.

"The motor car has become as necessary to the farmer as his most valued farm machinery by putting him nearer his market and his friends."—George M. Dickson, National Motor Vehicle Co.

"It is no longer possible to sell an automobile simply because it is an automobile. The public has become educated to their use and value."—W. B. Roberson, Alpena Motor Car Co.

"The automobile is with us to stay, and neither the pessimistic banker with his four or five cars, nor the stock jobbers of Wall street, can prevent the increasing utilization of such an essential factor in civilization as the motor car has become."—R. W. Hutchinson, Jr., Pullman Motor Car Co.

"So long as the common people class the automobile as a luxury rather than a utility, just so long will the industry require tender nursing."—O. R. Hardwell, Sears, Roebuck & Co.

"The farmers who will be large consumers in future have the money to purchase with and they will certainly spend it as they choose."—G. A. Mathews, president Fuller Buggy Co.

"Competition there is and competition aplenty, but ruinous rivalry will not enter where so much is at stake."—H. A. Lozier, Lozier Motor Co.

"There is an outlet for all cars of merit in this country."—George C. Holtz, Badger Motor Car Co.

"The automobile has come to stay because it brings to a live people increased facilities for the transportation of both freight and passengers."—Charles H. Pope, Midland Motor Co.

"The country is not bankrupting itself in buying autos, but is demonstrating its progressiveness and prosperity."—D. M. Parry, Parry Auto Co.

"The commercial vehicle will be an indispensable proposition and will be of great benefit in all the larger cities."—W. W. Sterling, Elkhart Motor Car Co.

Field Day for KlineKar at Norristown Meet

PHILADELPHIA, Sept. 24—Six races, a couple of time trials and several motorcycle races constituted the card presented by the Norristown Automobile Club at the Narberth race course, near this city, to-day. Two stock car events under piston displacement classification were won by a KlineKar driven by C. C. Fairman and a third event by a Warren-Detroit. The KlineKar was opposed in both its races by two other KlineKars. The same KlineKar won the free-for-all handicap. The free-for-all at five miles was won by a Fiat and the program concluded with a freak "secret" time race at two miles, which was won by an Otto car. In the time trials at one and ten miles a Fiat made :49 1-5 and 8:31 1-5 respectively. As the automatic timing devices were out of order, it is unlikely that either mark will stand.

The summary:

One-mile time trial—

Car	Driver	Time
Fiat	De Palma	0:49 1-5
Five-mile race, 231 to 300 cubic inches—		
Warren-Detroit	Tom Berger	5:23 4-5
Otto Car	Geo. H. Jones	5:39 1-5
Five-mile race, stock chassis, 301 to 450 cubic inches—		
KlineKar	C. C. Fairman	5:58
KlineKar	W. D. Morton	5:28 1-5
KlineKar	James D. Kerr	5:34 1-5
Ten-mile time trial—		
Fiat	De Palma	8:31 1-5
Ten-mile race, stock chassis, 301 to 450 cubic inches—		
KlineKar	C. C. Fairman	10:44 2-5
KlineKar	W. D. Morton	10:44 3-5
KlineKar	James D. Kerr	10:45 1-5
Five-mile, free-for-all—		
Fiat	De Palma	4:57 2-5
Warren-Detroit	Tom Berger	5:03 2-5
Otto Car	W. J. McFarlane	5:06 2-5
Ten-mile, free for all, handicap		
KlineKar	C. C. Fairman	10:32 1-5
KlineKar	J. D. Kerr	10:32 2-5
Otto Car	W. J. McFarlane	10:33
Two-mile race under legal speed limit (secret time 6 minutes 30 seconds)—		
Otto Car	W. Kruse	6:08
Otto Car	W. J. McFarlane	6:06 1-5
KlineKar	C. C. Fairman	5:57 2-5

Salisbury Fire Prevents House Party

Owing to a visitation by fire on the night of September 21, which destroyed plant No. 2 of the Salisbury Wheel & Manufacturing Company, at Jamestown, N. Y., the annual house party of the company, which has come to be regarded as one of the features of the social side of the automobile trade, has been called off.

The building will be a total loss to the company, and arrangements have been so disordered by the occurrence that the recall of the invitations to the house party was necessary. The function was to have taken place the week of September 30.

Land of Motoring Promise

BY HENRY MacNAIR. GOOD ROADS AND NATURAL WONDERS IN THE OFTEN OVERLOOKED STATE OF MAINE. TIMELY SUGGESTIONS FOR OCTOBER TOUR

NOT alone to the explorative tourist who has wearied for the nonce of the furrowed telford and hummocky macadam which betoken the lanes of the rabidly strenuous, but to the seeker after recuperative delight in the restful haunts of nature does Maine's varied expanse of forest and lake make seductive appeal. Maine, the eastern outpost of the "States," with its lace-like fringe of coast, and its five thousand laughing streams which call up alluring visions of conquest with net and rod!

Since 1614, when Captain John Smith ranged the New England coast from the Penobscot to Cape Cod, countless thousands have journeyed to that romantic primeval land whose charm has oft been told in song and story. Mason and Gorges planted colonies on its jagged coast, then Massachusetts reached out a long arm and embraced that portion of "Ye Mayne Land" so-called to distinguish it from the many bordering islands. For a hundred and sixty-eight years it remained the District of Mayne, in turn devastated by torch and tomahawk, and rent with cannon and bayonet. At last came its days of peace, and the Pine Tree State has become the playground of the Nation, the rendezvous of the mighty Nimrod, the haunt of the mute inglorious Walton. But the motor car held back, and he who braved the mountain fastnesses of this *terra incognita* was a pioneer indeed. Few knew, and many need now to be told, that the State of Maine has more miles of excellent natural highways than any of its New England neighbors. Few indeed are there who can tell of Maine's fifteen hundred lakes, of her twenty-five hundred miles of coast, and fewer still of her five thousand miles of touring roads. The misconception of road conditions in this, the largest and in many respects the most interesting of our Eastern States, is due in part to the fact that the poorest of her highways are on the New Hampshire border; her gateways seem closed to the motorist. He ventures along the sandy banks of the Androscoggin, or the Saco, he returns and essays the rough and stony road which leads from ancient Kittery to Portland's promontory, and retires in disgust at what seems to portend a halting, limping journey through a wildnerness. But let him push on along the coast to Bangor, or ascend the peaceful Kennebec to Moosehead Lake, then no slight discomfort of the road will abate his enthusiasm for the glorious and ever-changing panorama which has been so prodigally laid out before him.

Rangeley Lakes and Poland Spring were formerly the *"Ultima Thule"* of the automobile tourist, but of late days the doughty motor chugs its way to northernmost Fort Kent, to Eastport and on through quaint old St. John with its reversible waterfall, or climbs the international range of hills and descends the beautiful valley of the Chaudiere to the walled and historic Quebec. These and many other delights are his who ventures far afield, though none need seek beyond the confines of the State for abundant enjoyment of wheeling over smooth and picturesque roads. One who has traveled from Bangor to Moosehead will always pleasurably recall the twenty-mile stretch along a ridge which the natives call a "hossack." How the dial-finger pointed continually at thirty or thirty-five or forty, with never a "Thank-you-marm" to disturb his gears, or his equipoise. And then the drive down the east side of the majestic Penobscot; who could ever forget it? Unless perhaps the memory of its manifold beauties was eclipsed by the subsequent trip along the coast near Rockland.

What more would you have in this list of good things which Dame Nature has provided for Maine's perennial feast to the eye and the soul? Poland Spring, for more than a century the resort of the aristocratic and wealthy, its beneficent waters known on both sides of the Atlantic, its quietly restful surroundings appealing to all but those inoculated with speed-mania. The chain of lakes known as Rangeley Lakes, but individually known as Mooselookmeguntic, Welokennabacook, Molechunkamonk and others, bountifully stocked with the finest of trout and bass; and nearby accommodation for the tourist in the finest of hotels, in a comfy log cabin or in a tent. Portland with its famous lighthouse, its unapproachable Casco Bay, its Longfellow houses, and its top-story dining rooms. Augusta with its Capitol and Blaine residence, overlooking the ice-yielding Kennebec. Belgrade Lakes the beautiful, meant only to drive dull care away. Auburn and Lewiston, the twin cities of the Androscoggin, busy in their making of cotton and woolen goods. Rockland and the stretch of unequaled coast, whose beauty can only be known to him who sees. Bangor on the Penobscot, standing at the doorway of the magnificent Aroostook country, a center for many charming tours on unexcelled gravel roads. Moosehead Lake, the source of the Kennebec, with its four hundred miles of shore line, its islands and hunting and fishing camps.

Then, too, are the vast forests of the North where abound the moose, the caribou and the deer, delimited by the majestic rivers St. John and St. Croix, with their many tributary streams and lakes. All this and more goes to make an ideal spot for the annual gratification of our wanderlust, where we may forget the dull grind of commerce and like Walt Whitman "invite our souls."

PRACTICABLE MOTOR TOURS IN EASTERN MAINE

[Reproduced by permission from the Official Automobile Blue Book. The numbers on the heavy lines refer to corresponding routes in the New England volume.]

H. H. Franklin Interviewed

PRESIDENT OF THE H. H. FRANKLIN MFG. CO. IN RESPONSE TO QUERIES BY "THE AUTOMOBILE" GIVES HIS VIEWS ON PRESENT SITUATION

A—What is the attitude of the banks?

A—The usual attitude—by that I mean that the bankers will look upon automobile propositions just the same as they would any other legitimate mercantile establishment. My experience with the banks has been that they are not unduly alarmed.

B—Is there much paper out?

B—While not fully informed I was surprised during a slight investigation that there was not apparently an abnormal amount of paper out.

C—Will the various makers of automobiles be able to meet the payments as they come due?

C—Answer to this question depends on what is meant by "various." Conservative, well-conducted concerns will certainly be able to meet their payments.

D—To what extent will the paper that is out be extended?

D—Not informed.

E—How are the accessory makers making out?

E—Not informed, but do know that indications are that these manufacturers have caught up with their orders, and are apparently in position where they can handle the requirements of the business.

F—What will be the automobile output for 1911?

F—Not to exceed one-third of 1910. There is reason to believe that the 1910 output as to number of automobiles will not be exceeded for many years.

G—Will the 1911 automobiles be high or low priced relative to the 1910 output?

G—Prices as fixed seem about the same. Trade conditions will undoubtedly affect some prices.

H—Will the present method of selling continue? If not, what are the probable changes that will be made?

H—No. Selling will be on the same basis as any legitimate business. A basis upon which it has been conducted up to the present time. A cash basis will also be done away with, and this phase of the situation should be given considerable attention by the manufacturers, for it is certainly more expensive to do business on a credit basis than on a cash basis.

I—Will the prosperous makers of automobiles, like the Franklin, get behind the weaker companies and keep them from going to the wall?

I—No. Not anything would be gained if they did.

J—Will there be a combination of interests more than is in sight at the present time?

J—Not informed; but not anything will be gained at this time by a combination.

K—Will the Knight type of motor be taken up in this country?

K—Very likely. The tendency, of course, in this country is to take up and look into anything that looks like a development.

L—Will the Franklin company do anything by way of adapting rotary valves?

L—Franklin engineers at this time do not see anything in the rotary valve.

M—What is the greatest extravagance in the automobile business, in other words, what points are there that can be manipulated that will lead to a lower cost of production?

M—The whole automobile business has been on an extravagant basis. The rapidity with which changes and improvements have been made has added very much to cost. The main thing that will lead to lower factory cost will be standardization, fewer changes, better organizations, special machinery, etc.

N—What is the exact reason for desiring to use large tires on automobiles? Please deliver exact data on this point.

N—Solely for economy and freedom from tire troubles. To best illustrate this point, I will say that the better class of cars carry the same tire equipment which is carried on the Franklin cars and use from three to four sets of tires to negotiate 10,000 miles, while our one set of tires average us the same distance. This statement is not made from any theoretical estimate but from actual facts substantiated by owners of the Franklin car from whom we have gained the information.

O—How is the second-hand car question to be handled?

O—On a strictly business basis.

Communications

Regarding the attitude of the underwriters in connection with gasoline trucks not being allowed on the docks of piers in New York City.—Many of the leading firms in New York are to a great extent bound up with the docks in view of the fact that a percentage of their goods are imported.

As you are well aware a properly constructed gasoline truck with a properly constructed gasoline tank is as immune from fire as an electric vehicle. In other countries, England to wit especially, the underwriters, insurance companies, etc., insist upon inspection of the gasoline tank and after approval no further question is raised about their going in and out of the docks and piers.

We would point out that New York possesses some of the finest docks in the world, far superior in construction and protection against fire to any others that have been the writer's lot to view. Around London there are still many wharfs and docks constructed solely of timber, and these would be more liable to catch fire than your superb New York wharfs. The English Board of Trade statistics have shown that during the last two years not one single case of fire has occurred through the entry of gasoline trucks on their premises. Considering that the handling of goods, due to the enormous imports and exports of London, are, we believe, very much greater than those of New York, and taking into consideration again the fact that New York piers have better protection against fire than the London ones, it beats us entirely to appreciate the underwriters' attitude.—W. A. Wood Automobile M'f'g Co., Julian A. Halford.

Should makers guarantee their car indefinitely?—It has occurred to me that the one thing that will build up the automobile situation is to get a value on second-hand cars. To-day a second-hand car has little or no value from a factory standpoint, that is, I mean to say that a new car is sold with a guarantee against defects and all faulty material so long as it remains in the hands of the original buyer, but the moment it has been sold and it is in a second man's hands the factory disclaims any responsibility whatever.

Now, the factory that will come out and guarantee their cars so far as to replace any defective material free of charge at any time, in other words, guarantee their cars for life, will immediately place a value on the second-hand car which will materially affect those who have been attempting to borrow money from the banks on automobiles. That is to say, the banker will see some kind of value in an automobile. To-day the banker sees no value in an automobile and most bankers that I have had the pleasure of talking with during the last month consider an automobile a liability rather than an asset of its owner.—A. R. Mosler & Co., C. C. Boynton, General Manager.

General Motors Deal Still Pending

Rumors, and then some more rumors, all false, with regard to the financial plans of the General Motors Company have been vigorously circulated during the past week. The sale of bonds to Chicago and Michigan capitalists has been alleged and denied, and the same may be said for the Boston deal which is said to involve $2,500,000, and Tuesday and Wednesday of this week a report outlining an immense underwriting of the whole General Motors project by metropolitan bankers, the terms of which were alleged to be a bond issue of $15,000,000, were all punctured almost as soon as they were floated.

As a matter of fact negotiations of the utmost importance to the company and the trade are pending at this time, but they have not been closed. The reports that will be published concerning the New York underwriting deal in particular has been thoroughly discredited.

At the offices of the company no official statement as to the status of affairs could be secured save that negotiations were under way looking to a solution of the financial problem involved.

Owing to the fact that the situation has numerous ramifications and is far from simple from any viewpoint, any forecast of the true result at this time would be impossible.

It is understood that the ultimate conclusion of the present negotiations contemplates entirely superseding anything in the way of tentative arrangements that may have been entered into. The situation could hardly be called *in statu quo,* because of the earnest efforts that are being made to accomplish something definite in the way of development.

Boston Auto Show Announced

Boston, Sept. 26—The Boston automobile show next March will not be a closed exhibition from which unlicensed cars will be excluded, as many people identified with motoring believed.

The show space will cover 105,000 square feet and the exhibition will open Saturday night, March 4, and continue through until March 11. The first floor will have the pleasure cars, the basement the commercial vehicles and the accessory men will be up in the balcony. The double-check system, in use at other shows, will be inaugurated here.

KisselKar 1911 Line Announced

Milwaukee, Sept. 26—The Kissel Motor Car Co., of Hartford, Wis., will build in the neighborhood of 1,500 cars for 1911, not including commercial or freight cars, the first models of which have just been issued. The 1911 KisselKar will be produced in five chassis types, as follows: 4-30, 4-50, 6-60, 6-70 and a 4-50 special, all being adaptable to various forms of bodies. The 1911 models contain few radical changes, but show a general refinement and the general lowering of the car.

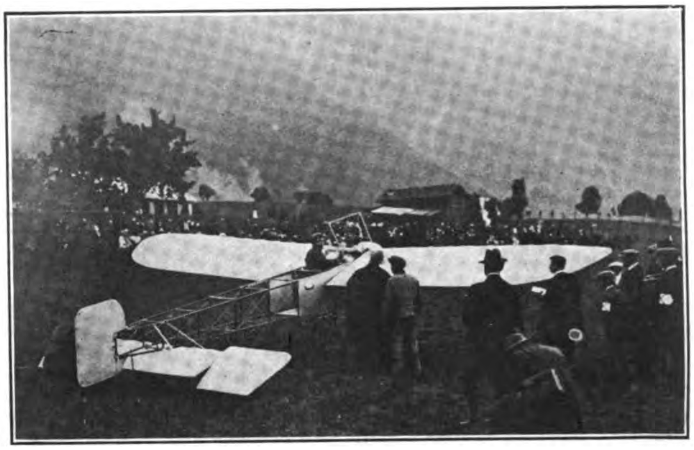
The principal change is in the frame, which will have a double drop on all models excepting the Western Special, a new model placed on the market for the first time. With 36-inch wheels and 4-inch tires provided on these models, an unusual clearance is given. The wheelbase of the car has been generally lengthened.

The system of braking is changed, the double internal brake giving way to one internal and one external excepting in the 4-30 chassis. Front axles will remain the same, excepting that spindles are changed, lowering the car one and one-half inches. The tie-rod will be on the rear and the steering arm above the axle. The clutch is improved by adding a little more face. Full universal is provided between clutch and transmission. In the motors the only change is that the oiling system is self-contained force-feed in the oil basin.

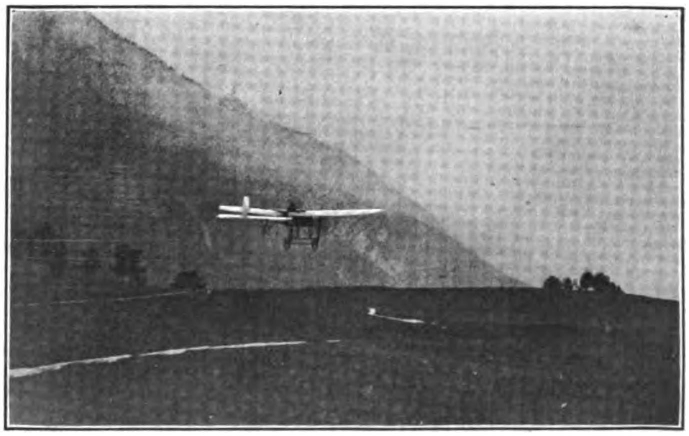
The radiator design is the same and is again distinguished by the white and blue enamel circular name-plate in the upper left-hand corner.

First Aeroplane Crosses Alps

Brigue, Switzerland, Sept. 23—The illustrations as here afforded are of the first attempt made by Georges Chavez, taken during the flights he made just before he succeeded in crossing the Alps in his last flight, ending in the death of this daring aviator. He had made numerous efforts to accomplish this task, but on each occasion he found the pass hid away in a cloud bank and he was persuaded to turn back. At 1:40 p. m. on the day of his final attempt he found the conditions satisfactory; he started from the station at Brigue in the presence of numerous spectators. He negotiated the Simplon at a height of 450 feet, and had all but won the prize of $20,000 offered by the Italian society when he met his sad fate; a gust of wind took him unawares and his life was the forfeit. The accident took place at a point near Domodossola on the Italian side of the Alps.



Georges Chavez starts from Brigue, Switzerland



Chavez rising toward Simplon Pass at his first attempt

Chavez approaching Simplon Kulm on September 19

Doings in the East

IMPROVEMENTS AT THE MAXWELL PLANT—SYRACUSE RUN POSTPONED ON ACCOUNT OF WEATHER—POPE COMPANY'S FAVORABLE STATEMENT—FRANKLIN FORMS A SELLING ORGANIZATION

—The Abbott-Detroit will be handled for 1911 in Rhode Island by the Whittem Motor Vehicle Co., of 200 Meeting street, Providence.

—The Bison Motor Sales Co., of Main and Barker streets, Buffalo, N. Y., will handle the Abbott-Detroit for 1911 in addition to the K-R-I-T.

—The Howard Demountable Rim Co., formerly located at No. 1411 Race street, is now installed in new headquarters, 324 North Broad street, Philadelphia.

—The Danbury, Conn., Agricultural Society will give a fair commencing October 3 and continuing until Oct. 8. An automobile show and speed trials will be among the features of the fair.

—The Greenville Metal Products Company has increased its capital from $250,000 to $600,000, and will make big extensions to its plant at Greenville, Pa., where automobile parts are manufactured.

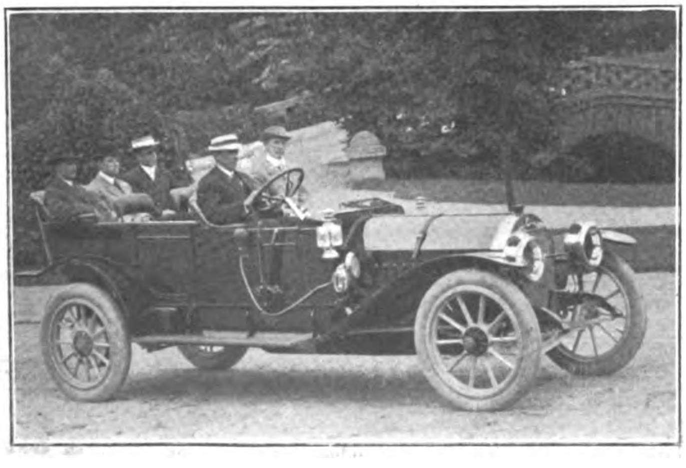
—Thos. J. Morthway, of 92 Exchange street, Ford agent at Rochester, N. Y., has taken on the Abbott-Detroit and is building an addition to his present garage and salesroom to accommodate the new line.

—The mammoth new garage of the Woods Electric Co. on Twenty-first street above Market, Philadelphia, is rapidly assuming definite proportions. It is expected to have the garage proper ready for business October 15.

—The T. C. Bradford Automobile Co., of Wilmington, Del., has taken the agency for the Hudson car for the peninsula, which comprises all of the State of Delaware, nine counties on the eastern shore of Maryland and two Virginia counties.

—Transformation of the Kingsland Point and Tarrytown plants of the Maxwell-Briscoe Motor Co. is being accomplished by the reclamation of about twenty acres of flooded lands between the plants. Several additional buildings will be erected on the sites thus made and the establishments will be practically connected.

—The New Jersey Automobile and Motor Club, leading the fight for remedial motor legislation in the State, intends next week to communicate with the office seekers of the State, asking their views on the motor situation. The big Newark club will then advise the 25,000 motorists of the State as to which candidates are aligned with them in their demands for more reasonable motor laws.



First 1911 six-cylinder Premier touring car—Designer George A. Weidely at the wheel, President Harold O. Smith beside him. In the tonneau are Treasurer Horace B. Hewitt, W. McK. White, advertising, and R. W. Macey, sales manager

—"What the Motorist Should Know," a handsomely made little booklet on proper lubrication, has been issued by the Vacuum Oil Company, of Rochester, N. Y. Aside from general information on the subject of motor lubrication, the book contains a list of 281 makes of automobiles with recommendations as to the variety of oil best fitted to each, in the opinion of the company.

—Of interest to the motoring public is the second annual statement of President Albert A. Pope of the Pope Manufacturing Co. to the stockholders for the fiscal year ending July 31, 1910. According to the president's report, the sales for the past year were $4,010,199.94, which represents an increase of $1,106,458.53 over the preceding year. The net earnings amount to $745,398.87.

—The Franklin Automobile Company, a selling organization dealing exclusively in Franklin automobiles, will hereafter be the distributor of all motor cars made by the H. H. Franklin Manufacturing Company. This company has branches in the following cities: New York, Boston, Chicago, San Francisco, St. Louis, Pittsburg, Buffalo, Baltimore, Cincinnati, Rochester, Cleveland, Albany and Syracuse.

Inspecting the Vanderbilt Cup Course in a Regal

—H. B. Larzelere, formerly sales manager of the Chadwick Engineering Works, has organized the Nance Motor Car Company in Philadelphia, which will build a popular-priced six-cylinder car. Mr. Larzelere will be president and general manager of the new concern and N. H. Adams head of the sales and advertising departments. The Nance company will shortly announce its full factory personnel and delivery dates of the new automobile.

—Negotiations have been completed by William P. Herbert. head of the General Motor Car Co., with the Rauch and Lang Carriage Co. of Cleveland, Ohio, for the agency in the Philadelphia territory of the latter's line of electric pleasure vehicles. The General Motor Car Co., which also represents the Lozier, likewise announces three additions to its selling organization—Keene Carruthers, of New York, A. Paul Oliver and Thomas J. Denney.

—The Syracuse *Herald* sociability run, scheduled for last week, had to be put over to Saturday on account of a severe rainstorm. There are over 100 entries for it. A picturesque trip is afforded through Camillus, Elbridge, Auburn, through the Owasco Lake Valley, Skaneateles Lake, Marcellus to Syracuse. The entire route is 74 miles. A secret time is set and the car coming nearest it is awarded a trophy cup, and there are also other prizes.

—Charles L. Stackpole has acquired control of the Yonkers Garage at Yonkers, N. Y.

—M. Zimbrich has purchased the salesroom and garage of the Geo. J. Arnold Co. at 103 Lexington avenue, corner E. Genesee street in Syracuse, N. Y., handling the Stoddard line.

—Walter R. Lee, secretary and general manager of the New York Automobile Trade Association, has been appointed assistant general manager of the Carhartt Automobile Sales Company of New York.

—The Pullman car is again represented in Boston, this time by the G. H. Proctor Supply Company.

—E. F. McDonald, Jr., has assumed the management of the Central Auto Sales Company, with offices in W. Genesee street, Syracuse.

—Albert M. Pearson, for a long time connected with the truck department of the Packard branch at Philadelphia, has resigned to accept a place with the Boston branch of the White Co. as manager of the commercial department.

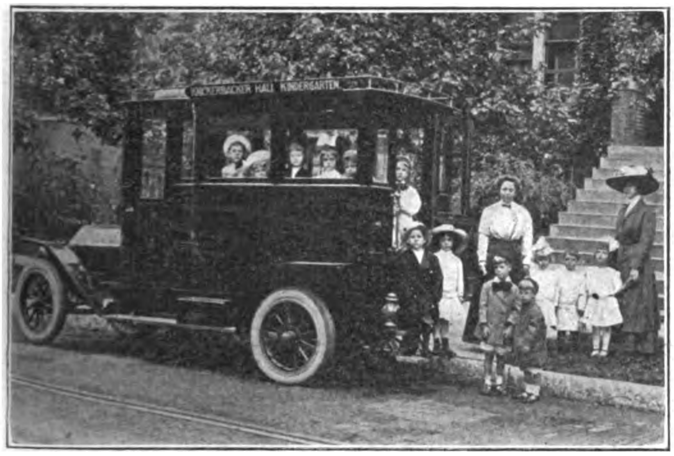
The South and the Coast

AUTOMOBILE CLUB OF MARYLAND GROWING—ATLANTA'S NEW MAKERS SECURE TEMPORARY PLANT—PACIFIC HIGHWAY ASSOCIATION ORGANIZED

—Multonomah County, Ore., is expending $120,000 annually on roads in that county.

—The Moon car is being represented in Baltimore by Cooper & Upton, 2312 Madison avenue.

—Marcus Blanchard has taken the agency for the Everitt car for Santa Clara County, Cal., with an initial order of ten cars.



Overland 'bus by means of which Indianapolis kindergarteners are enabled to defy the weather

—A sales branch of the E-M-F Motor Car Company has been established in Wilmington, Del., with E. G. Brown as the manager.

—J. L. S. Snead, formerly of San Francisco, but now of Portland, has opened a branch distributing office for the K-R-I-T Motor Sales Co., at 276 Union avenue.

—E. B. Waterman, of Medford, Ore., has accepted the agency for the Speedwell car at that point. He is also vice-president of the Oregon State Automobile Association.

—A. M. Brown, of the Hiland Automobile Company, Pittsburg, Pa., which handles the Peerless line, has accepted the management of the H. O. Harrison, Los Angeles, business.

—Under the management of Azariel Smith and Chas. W. Cleveland, formerly of Toledo, O., the Hupp Motor Company has opened an agency in Portland, at Seventh and Couch streets.

—Residents along the Liberty Pike near Harrisonville, Baltimore county, celebrated the closing of the toll gate in that vicinity by burning a replica of the toll house and gate. The road is now a State highway.

—New agencies are constantly being established at Portland, Ore. The latest to enter the field is the Haynes Company, which has established an agency, and a large garage will be secured on "Gasoline Row" early next month.

—The Zell Motor Car Co., of Baltimore, will become the agents for the Hupmobile October 1 for the State of Maryland and the city of Washington. The Zell Co. also handles the Chalmers-Detroit, Peerless and Hudson.

—The Automobile Club of Maryland has ushered in the Fall by admitting 22 new members. These include many of the most prominent business and professional men of the city and one lady, the latter being Mrs. L. Marshall.

—F. E. Cohen & Brother, Portland, Ore., besides handling the Maxwell during the next season, will be agents for the Columbia car and the Sampson trucks. The Columbia car has not been represented in Portland heretofore.

—The McCarty Automobile Company, of Spokane, has been incorporated, capital, $25,000, with L. D. McCarty president and general manager. A temporary office will be opened in the Eagle block. It will handle the Rambler.

—The Ajax Auto Traction Company, of Kenton, Wash., has commenced the erection of its plant, which will be 80 x 200 feet in size. It will engage in the manufacture of gas engines for autos, auto trucks, marine and stationary engines.

—The Primo Motor Company, Atlanta's new automobile maker, has secured a temporary plant. It is located in Atlanta, on the Georgia Railroad, and contains 15,000 square feet of floor space. Machinery will soon be installed in this building.

—Edward B. Zane, who has been Spokane, Wash., manager for Nute & Keena, handlers of the Packard, has bought the Eastern Washington territorial rights, and has put in orders for a number of 1911 Packard cars. He will continue as heretofore at 1012 First avenue.

—The Pacific Highway Association of North America was organized September 19th at a meeting in Seattle at the Arctic Club, following a banquet given by the Automobile Club of Seattle to visiting autoists from all the important cities of the Pacific Coast. This is the outgrowth of the Western Automobile Association. The new association will have as its principal object the promotion of the construction of an international highway along the Pacific Coast from Canada to Mexico.

Great Western 1911 semi-torpedo—General Manager E. Mack Morris at the wheel. President Milton Kraus beside him. In the tonneau are Secretary R. H. Bouslog, Vice-President; A. L. Bodurtha and Superintendent Paul Creighton.

Middle West News

BRODESSER TRUCK COMPANY MOVES FROM MILWAUKEE TO JUNEAU—GARFORD AND KISSEL COMPANIES LICENSED UNDER SELDEN PATENT—MANY AGENCIES AND BRANCH HOUSES ESTABLISHED

—The agency for the Cole "30" has been secured in St. Louis by A. A. Franklin & Company.

—E. L. Dundon has been appointed St. Louis agent for the Jenkins emergency automobile wheel.

—Jose M. Sojo, of San Juan, Porto Rico, has signed up with the Abbott Motor Co. for the agency of the Abbott-Detroit car.

—The Schreiber Motor Car Company of Milwaukee, Wis., has taken the agency for the Hudson car in addition to the Locomobile and Haynes.

—The Steely Auto Engine Company, with a capital stock of $150,000, has just been incorporated to make automobiles and light delivery wagons at Detroit.

—A. F. Eckstein, of Milwaukee, Wis., has become general manager of the Highland Garage Company, Twenty-seventh street, near Highland boulevard.

—J. V. Black, recently of Detroit, is to take charge of the Goodrich business in Cincinnati. He will be located in the Goodrich Tire Company's new building on Race street.

—Announcement is made that The Garford Co., of Elyria, O., and The Kissel Motor Car Co., of Hartford, Wis., have just been granted licenses under the Selden Patent No. 549,160.

—The Ritter Automobile Company has been incorporated at Madison, Wis. The capital stock is $25,000. Henry R. Ritter, J. C. Harper and Homer E. Webster are the incorporators.

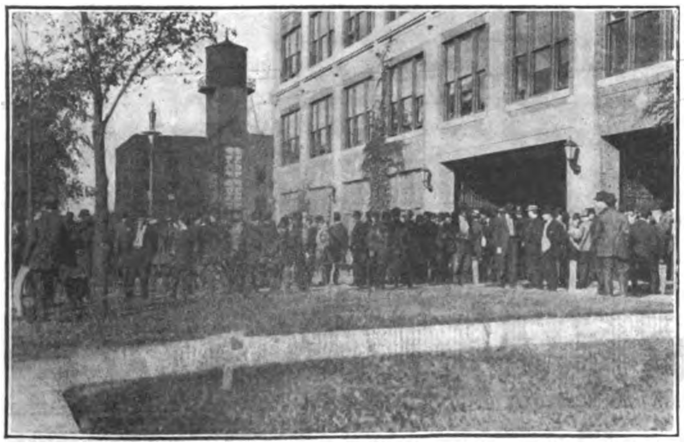
—J. H. Diehl, for many years a Cleveland business man, will have charge of the factory branch which will be established in Cleveland by the Louis J. Bergdoll Motor Co. of Philadelphia.

—H. B. Waltz, who has been identified with the selling end of Cleveland automobile agencies for some time, has joined the sales force of the Sterling Motor Sales Co. and will sell the Cutting car.

—The Gilchrist Motor Sales Company, with headquarters at the Empire Garage on Seventh street, Cincinnati, is now handling the "Matheson Six," formerly represented by the J. S. Stevens Auto Company.

—Charles M. Culp, of South Bend, has been granted a patent on an emergency tire which may be attached to an automobile wheel. The tire is made up of six parts, which may be stored under the seat of the machine.

—At the adjourned annual meeting of the Atlas Drop Forge Company, at Lansing, Mich., the board of directors was reelected. The board elected the following officers: President, R. E. Olds; vice-president, R. H. Scott; secretary-treasurer, S. H. Carpenter.



Men at Packard factory waiting for time office to open in order to obtain positions in answer to "Help Wanted" ads

—McAlister Brothers Motor Car Company, which handles the "Cadillac" car in Pittsburg, has just moved into its big new building at Baum and Beatty streets, East End, one of the most complete automobile plants in the country.

—M. K. Enders, of New York, who has been connected with the Ford Motor Company for five years as traveling representative of the New York branch, has taken charge as manager of the Ford Motor Company's branch in Cincinnati.

—G. H. Wallis, of Corliss, Wis., has been appointed chief engineer of the Kelly-Racine Rubber Co., which is now erecting a $500,000 plant at Racine, Wis. Mr. Wallis has been erecting engineer for the Corliss Engine Co., at Corliss, near Racine.

—The Mitchell-Lewis Company, of Racine, Wis., has placed with the Laporte Carriage Company, of Laporte, an order for 1,000 five-passenger automobile bodies. The order is the largest the Laporte concern has ever received and amounts to $140,000.

—Walter Egerton, who has been connected with the Barclay Auto Company, of Minneapolis, in the capacity of salesman, for several seasons, resigned his position last week to go with the Winton Motor Carriage Company's Minneapolis branch.

—At the annual meeting of the Longdin & Bruegger Co., of Fond du Lac., Wis., manufacturers of tops, canopies, dashes, etc., it was decided to enlarge the present plant by the construction of a three-story addition, 30 by 40 feet, and remodel the old works.

—A. H. Wyatt and W. H. Kitto, of Cleveland, will build an auto truck plant at Lisbon, Ohio. A fund of $25,000 is being raised by the people of the city for the purpose of buying stock in the new concern. Present plans contemplate placing the plant in operation this fall.

—The Regal Motor Car Company of Detroit has established its own factory branch in Minneapolis for the distribution of this make of vehicle throughout the Northwest. Headquarters have been established at 418 to 420 Third avenue South. The firm name will be the Minneapolis Regal Auto Company, and J. P. McGuire will be in charge.

—The Brodesser Motor Truck Company of Milwaukee, Wis., has completed the formality of changing its place of business to Juneau, Wis., by filing amendments to its articles of incorporation to this effect. Work on the new plant at Juneau is being rushed and it is possible that occupancy will be given on December 1 instead of January 1.

—The Abbott Motor Co., of Detroit, will be represented at the Vehicle and Implement Show in the Coliseum Building at Chicago the week of October 10 to 15 by three cars, a roadster with fore doors, a fore-door touring car and the regular touring car and stripped chassis. The exhibit will be in charge of Sales Manager V. K. McBride and a corps of experienced demonstrators.

—The Chase Motor Car Company, of New Bremen, O., has been incorporated with an authorized capital stock of $50,000. There are thirty-five stockholders in the company. The plant of the Grothaus Laufersieck Company has been secured, and motor trucks of the commercial variety will be manufactured. The incorporators are J. H. and Edmund Grothaus, J. F. Laufersieck, Otto J. Doesel and Louis Huenke.

—The Rockhoff Foundry Company, of Fostoria, Ohio, has commenced work on a new factory building, 40 x 100 feet, at Mishawaka, Ind. The concern is an extensive manufacturer of crankcases for marine and auto engines. The company makes a specialty of heavy aluminum castings and at present has large contracts with the Apperson and other automobile concerns for thousands of crankcases for immediate delivery.

Packard Taking On, Not Laying Off Men

Contrary to the rumor which has had widespread circulation, the Packard Motor Car Company denies that it has laid off several thousand men at its Detroit plant. In proof of its assertions the company, through General Manager Alvan McCauley, has given out a statement that the company is taking on men at the rate of about 100 a day as its new buildings are finished or new machinery is installed.

In this statement it is asserted that the force of over 5,000 men is being constantly added to and that 500 more men will be put to work within a week.

The following advertisement was inserted recently in the Detroit newspapers:

"WANTED—Automobile workers in all departments—machine operators of all kinds, assemblers, body makers, painters and finishers.

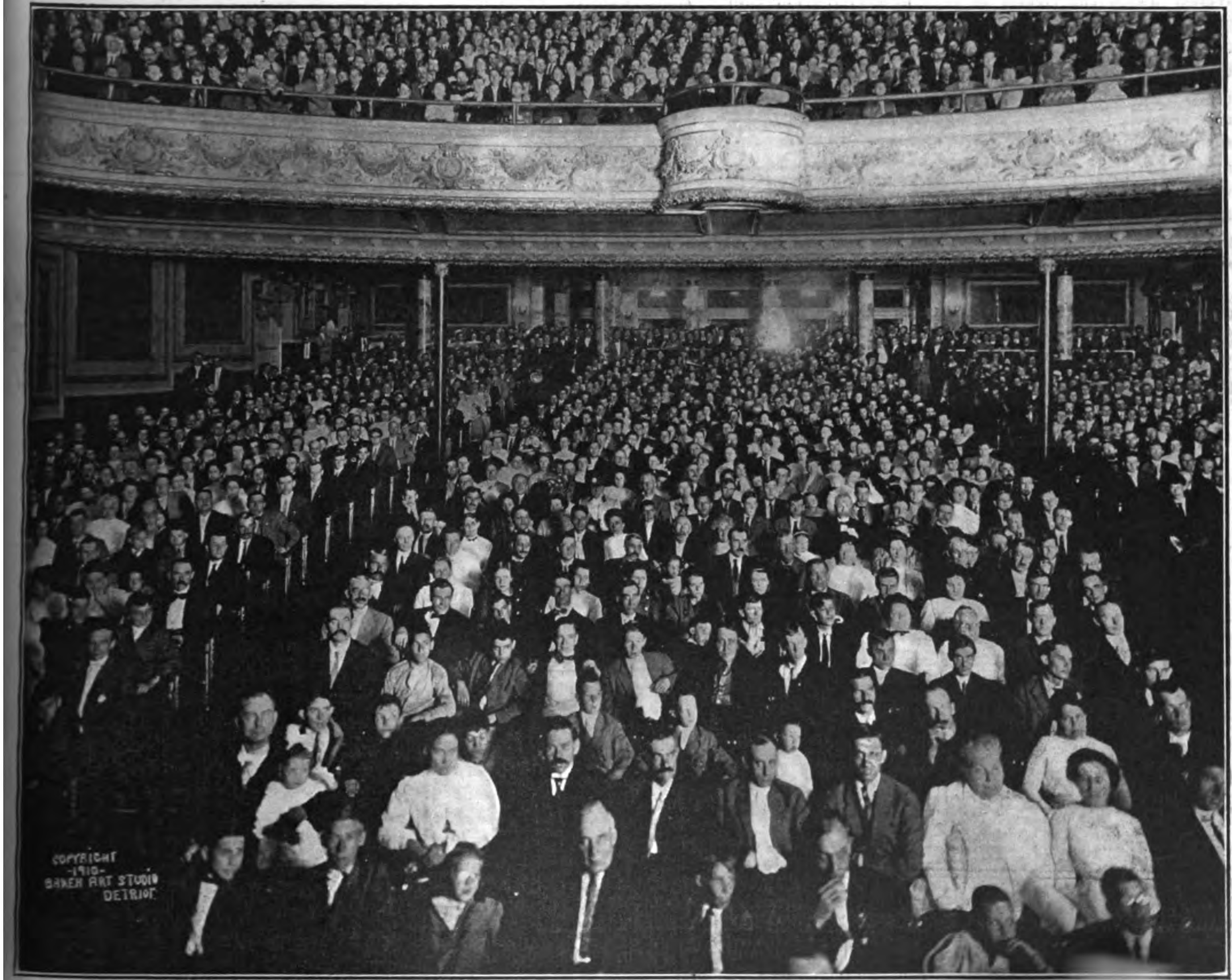
"Packard Motor Car Company."

The Packard Company shows in the accompanying illustration how it was answered.

On page 444 of our issue of September 15th we stated that the equipment of the Stoddard-Dayton stock cars includes a storage battery, which is not the case. The ignition system installed on this make of car comprises a Bosch high-tension magneto and a set of dry cells, constituting two independent means for igniting the charge.

Goodrich Succeeds with Campaign of Education

Some time last April the B. F. Goodrich Company, maker of the well-known Goodrich tire with a large establishment at Akron, Ohio, decided to conduct an educational campaign with a view to acquainting automobilists with the tire situation as it is hoping, perchance, to make a long stride in the direction of the more or less complete elimination of the many foolish ideas that pass current among automobilists in relation to tires. A series of moving pictures were brought together, they representing every phase in the manufacture of tires as the work is done by the Goodrich concern, beginning with the tapping of the trees in South America to obtain the supply of latex passing along and into the plant where the various steps in the process are clearly depicted, and the final product is shown in service. An engaging lecturer conducted this campaign and the motion pictures were shown in Ohio, Pennsylvania, New York, New Jersey, West Virginia, Maryland, Connecticut and Maine, but it is understood that the campaign will continue until the entire country is covered. The entertainment is heralded under the caption "Tree to Tire," and the illustration here presented represents a body of 2,500 persons who were in attendance at the Light Guard Armory in Detroit, and it is a noteworthy fact that upward of 2,000 persons were turned away. One of the surprises of this campaign is represented in the interest that women folks are taking; probably 20 per cent. of the attendance is made up by ladies. The company finds ample evidence of the fact that education has real merit.



BIG CROWD IN LIGHT GUARD ARMORY, DETROIT, LISTENING TO GOODRICH TIRE LECTURE [illegible] TIRE"

Continental Motors

A MOTOR OF COMPACT AND CLEAN DESIGN SUITABLE FOR AUTOMOBILE WORK; PARTICULAR ATTENTION HAS BEEN PAID TO LUBRICATION, COOLING AND ACCESSIBILITY

THE first thing that strikes one in looking at the Continental motor is the absence of unnecessary parts and the compactness and cleanliness of the design. One great object that seems to have been achieved is the accessibility of all parts that require dismantling from time to time for the purpose of adjustment or cleaning.

The motor here shown is the new Model "T," having a bore of 5 inches and a stroke of 5 3-4 inches; it is of the four-cycle type with the cylinders cast in pairs, and the inlet and exhaust valves placed on opposite sides. This style of construction adds to the cost of manufacture and slightly to the weight, but obviates certain difficulties sometimes encountered with piping and get-at-ability in other systems.

The timing gears are all placed in a clean housing in front, with a plate that is easily detached. The suspension lugs are of ample proportions and are so made that the alignment can be easily made by the aid of packing pieces under the extensions that rest on the frame. These can clearly be seen in Fig. 1. The same gearing is utilized to drive the pump and the magneto, a Bosch high tension, which can easily be dismantled by unscrewing the holding-down bolts under the base plate. The pump is fitted with two stuffiing boxes on either side of the main body. Behind the magneto is situated the main oil filler of ample dimensions, with a cap that serves the combined purpose of cap and vent plug. The exhaust manifold is particularly clean and it will be noticed that there are four outlet ports giving a quicker passage for the exhaust gases besides reducing the heat over the valve heads.

The water connections are made at the lowest point of the circulation, and the easy bends are conducive to an even flow for the water.

At the rear end of the lower half of the base chamber there is a large plug to empty the oil, and as the incline of the casting is toward the rear, all the oil can be emptied with the one plug.

The amount of oil in the base, which when full holds four gallons, is registered by a neat device which is located between the cylinders and can easily be seen. Besides the splash system of lubrication there is attached to this motor a new patent force-feed oil pump, shown in Fig. 2, being under positive pressure. One stream of oil is fed in over the gears, another to Nos. 1 and 2 connecting oil bushings and a third to connecting-rod bushings Nos. 3 and 4. All oil before going into the pump must pass through a thorough cleansing process which prevents all impurities from reaching the bearings.

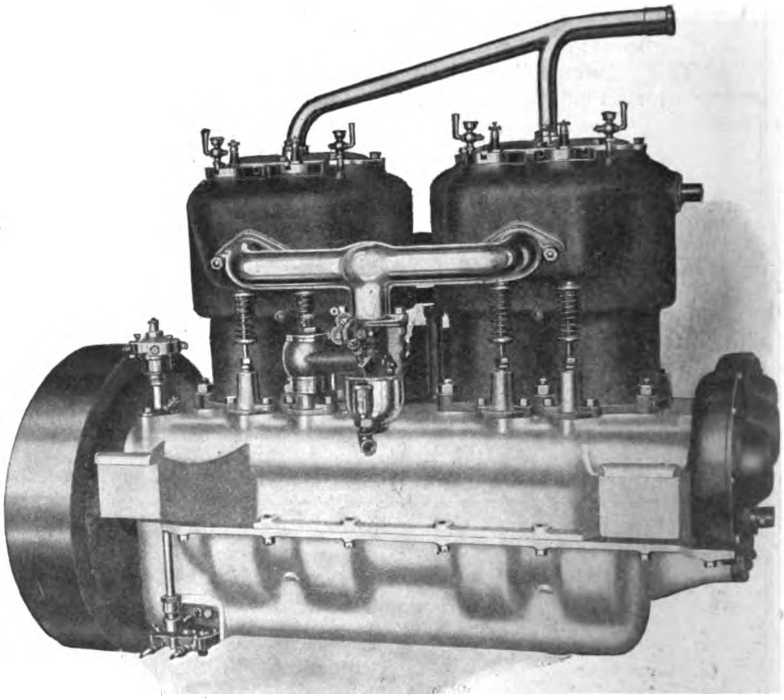


Fig. 2—Inlet side of engine, showing carbureter and oil pump

The crankshaft and camshaft bearings, which are very liberal, are of white bronze. The connecting-rod and main bearings are provided with liners 0.002 thick, so that the slightest wear can be easily taken up.

The balancing of the motor has been a matter of special study, the flywheel and crankshaft being balanced separately and all reciprocating parts are weighed into less than one-half ounce.

The inlet side of the engine, Fig. 2, clearly shows the absence of complication, the only parts being the Schebler carbureter and the distributor for the coil and battery ignition.

All the valve lifters are fitted with adjustable feet so that all wear can readily be taken up. Pet-cocks are fitted, and on the front cylinder provision is made for fitting a fan bracket.

The engine is manufactured by the Continental Motor Manufacturing Company, Muskegon, Mich., which makes a specialty of the construction of all kinds of motors for marine and automobile purposes.

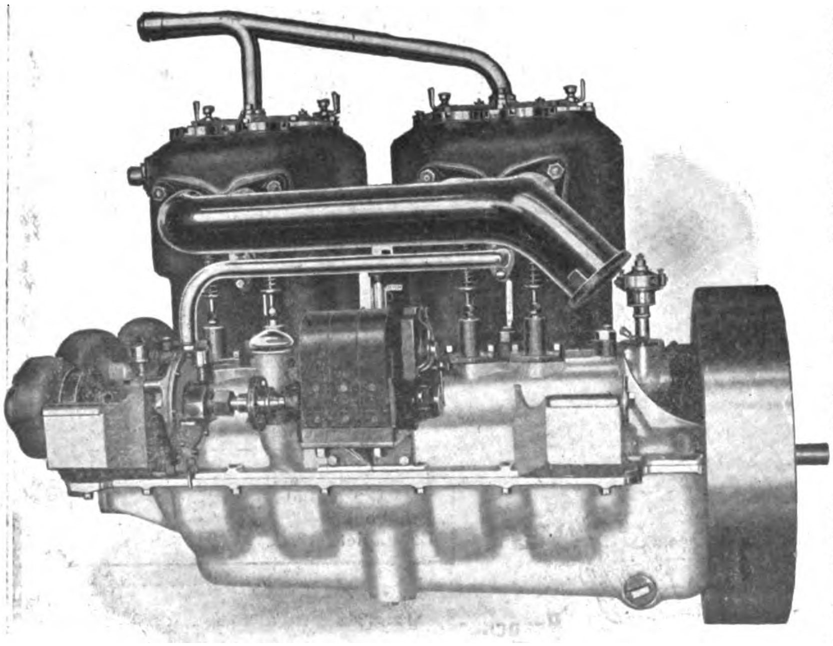


Fig. 1—Exhaust side of motor, showing pump, magneto and exhaust manifold

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THE AUTOMOBILE

Line Up Before Start

IN a race that broke four records, the Alco entry, Number 18, won the sixth running of the Vanderbilt Cup, Saturday. It was the fastest, closest, largest in point of entries and by far the hardest that has been run for the cup. The Marmon car, Number 25, was second, so close to the winner that the result was not definitely known until the officials had made some careful calculations to determine that the Alco had a margin of about 24 seconds. National, Number 10, was third, 1 minute and 6 seconds behind. Eight cars finished the contest according to the official figures and two others came up to the tape in time to have their status definitely fixed before the race was called off. These in the order of their finish were as follows: National, 31; Lozier, 2; Pope-Hartford, 17; Simplex, 11; Benz, 7; Stoddard-Dayton, 15; Pope-Hartford, 22, and National, 1. Ten of which were stock cars.

Harry F. Grant, driver of the winner, averaged 11:20 for each round, without reference to tire trouble, of which he had little. Once he stopped nearly four minutes while a tire was being replaced; another time such a change required nearly two minutes, and in the twentieth round he was held about as long a time when his lead was less than two minutes, but was able to get going before the wasp-colored Marmon had quite time enough to push its yellow and black body to the front.

The race of the Alco was not spectacular in any respect. The car was always prominent and went to the front at the right time, managing to last long enough to win.

Not many of the quarter-million spectators selected the long-hooded, black six-cylinder car to repeat its victory of last year, and not until the race was half over did the running of the car impress itself on the general public. Then, when the rushing, driving rivals who had been in front succumbed for one cause or another, the Alco came into its own and landed the victory in one of the fiercest finishes ever witnessed here or elsewhere in such a long race, the margin being less than a half-minute.

The Marmon, while beaten, was not disgraced. It did not have the giant power of its conqueror by 22 horsepower and yet it was only beaten half a mile in nearly 300. Its driver, Joe Dawson, made a brilliant race of it all the way and looked all over a winner at one stage.

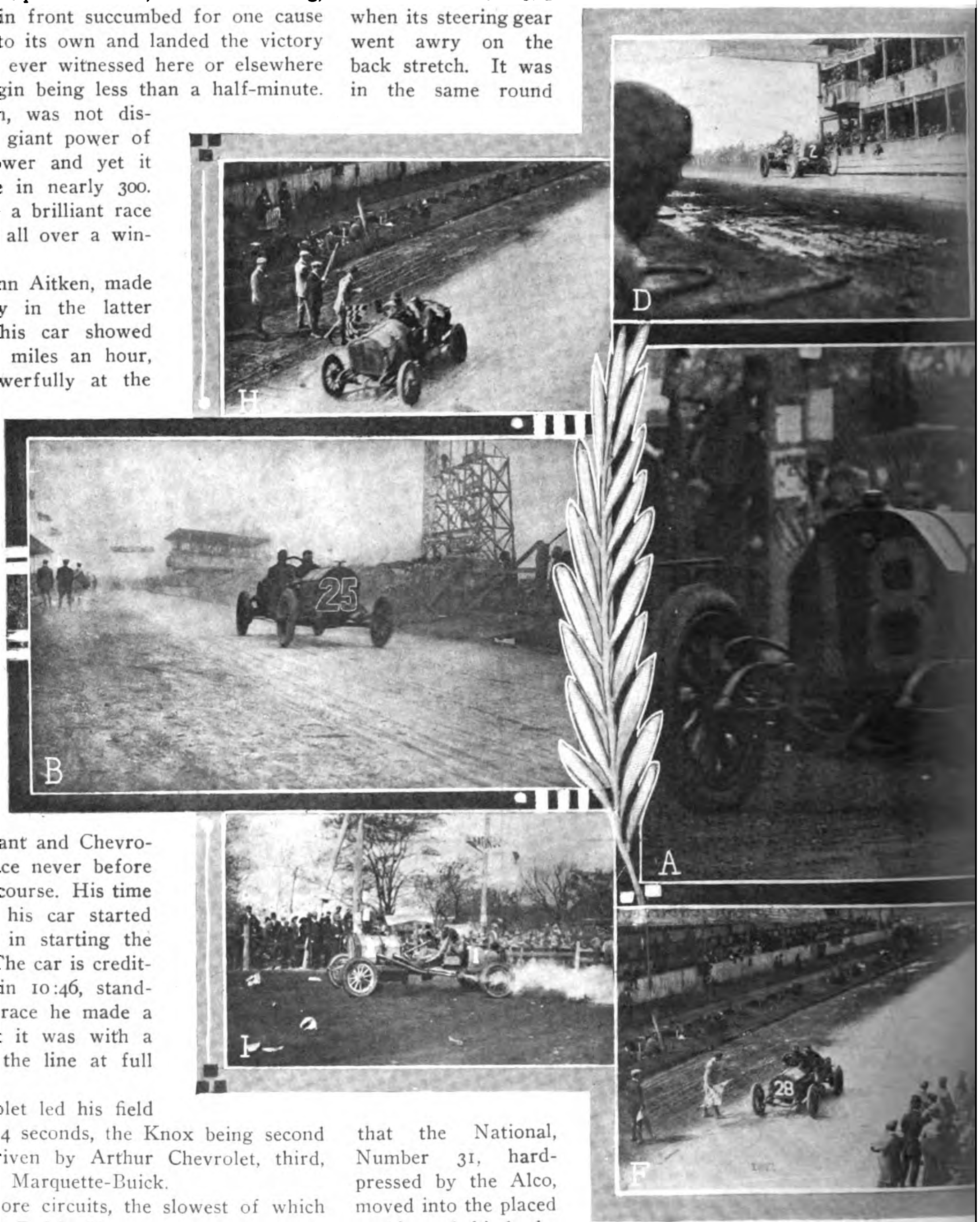
The National, driven by John Aitken, made a gallant showing, especially in the latter portion of the struggle. This car showed one round in 9.31, nearly 80 miles an hour, and was swinging along powerfully at the end.

Just at 6 o'clock the record-breaking field was sent away, with Livingston's National in front and Belcher's Knox as rear guard. One of the Oldsmobiles, Number 5, broke its oil pump on the way to the line and was withdrawn. All the cars got away in good order except Number 29, Marquette-Buick, driven by Louis Chevrolet, which stalled its motor just after the getaway. It required only about 10 seconds for Charles Miller, mechanician of the car, to re-crank the giant and Chevrolet drove that round at a pace never before equaled for a first lap on this course. His time was taken from the second his car started and includes the time spent in starting the engine for the second time. The car is credited with making the circuit in 10:46, standing start. Last year in the race he made a round under 10 minutes, but it was with a start where he moved over the line at full speed.

Despite his mishap, Chevrolet led his field at the end of the round by 14 seconds, the Knox being second and the Marquette-Buick, driven by Arthur Chevrolet, third, neck and neck with Burman's Marquette-Buick.

Tearing along for seven more circuits, the slowest of which was done in 10:33, Marquette-Buick, Number 29 held its lead until midway of the ninth lap. Repair work of nine minutes deprived him of the lead before the finish of this round and Burman's car assumed the pacemaking. That car had been following the lightning pace of Number 29 ever since the start, with the Knox second for three laps, when valve troubles put it out of the running. Dawson's Marmon had taken up third place when the Knox retired and moved into the runner-up's position and Marquette-Buick, Number 29, fell out for repairs.

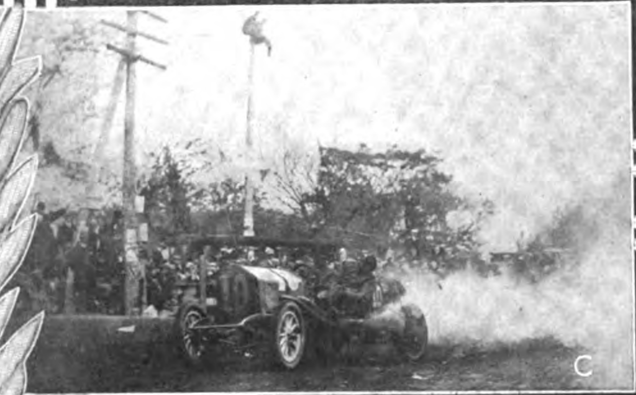
Burman's car stood the pace for just one round, when radiator troubles intervened and the car was taken from the race.



A—Winning Alco at Westbury; B—Marmon car which finished second; D—The Lozier passing the grand stand; F—Apperson being flagged; H—No. 15 Stoddard-Dayton which finished; I—National No. 1 at Westbury turn

This resulted in the Marmon's assuming the lead in the tenth round and holding it for eight circuits of the course. In the ninth lap the ultimate winner first showed prominently, when it finished in third position, 3:40 behind the Marmon. Disbrow's National, Number 31, displaced the Alco for a time and Louis Chevrolet's car, having completed its repairs, was rushed up to third place and eventually traded places with the National contender. But in the fourteenth lap the Marquette Buick was delayed 17 minutes in making repairs and in the next round met with a fearful end when its steering gear went awry on the back stretch. It was in the same round that the National, Number 31, hard-pressed by the Alco, moved into the placed positions behind the flying Marmon. One round at that pace was enough for Disbrow's car and the Alco dropped in behind the pace, about three minutes to the bad. John Aitken's National, Number 10, rushed into third position in the fifteenth round and made a bid for second in the two succeeding laps.

In the eighteenth the Marmon had a bad time, losing nearly nine minutes in repair work, resulting from an accident. This moved the Alco into the lead, with the National, Number 10, second, just ahead of the Marmon, which was four minutes behind the pace. From there to the finish the Marmon steadily decreased the distance between it and Grant's car, and when the latter stopped for a quick tire change in the twentieth lap the yellow jacket nearly reached him. But the black car had something left and in the fiercest drive ever witnessed in a Vanderbilt Cup race managed to last long enough to win by a margin of a trifle less than 25 seconds. The Marmon, going over 68 miles an hour for the lap, was second, and the National, pulling up a little when it was apparent that it could not displace either, was third.



C—No. 10 National at Westbury; E—National No. 31 passing the stands; G—No. 7 Benz, driven by Hearne, passing Westbury; J—The bullet-nosed Pope-Hartford No. 22; K—Amplex No. 9 on the course near the Hicksville turn.

The winner set a new mark for speed in this race, turning the 278.08 mile course in 4:15:58, or at a rate in excess of 65.18 miles per hour. Throughout the whole race Grant drove as if his car was the only one in the contest. He attempted no wild spurting. He simply reeled off the entire course at the rate of 67 miles an hour and tried to make up little of the time lost in making tire changes. It was a wonderful exhibition of nerve, but it lacked the vim and dash of some of his rivals. Aitken, driver of National 10, tried for the lead in the thirteenth lap, when he opened wide his throttle, declined to shut down on the turns and made the circuit in 9:31, the fastest time ever made in the contest, being nearly 80 miles an hour. Tire trouble in the earlier stages had dropped him a little too far to the rear and this one wild round landed him up with the leaders.

Early Friday evening the annual procession of automobiles started for the course from New York. As the hours wore on, the single line of cars became a double file and later a squad of four abreast on the main thoroughfare. By hundreds and thousands the cars came, choking the roads and carrying such an army as never before witnessed the big race. The number of cars at the course was estimated as high as 20,000 and the crowd that saw the race was measured up to the half-million mark. It is likely that 15,000 for the cars and 250,000 for the crowd would be conservative figures. Everybody was good-natured during the long watches of the night, but there was little apparent enthusiasm after the big race started.

The course was very rough in some spots, and the majority of the mishaps to the cars were caused by the tremendous jolting given them on the back stretch.

One danger that seemed possible and worried everybody before the race commenced did not develop. That was the likelihood of collision when two or more cars tried to pass on the narrow roads. The rule was made that the slower would have to keep to the right when a passage was attempted, and it worked very well.

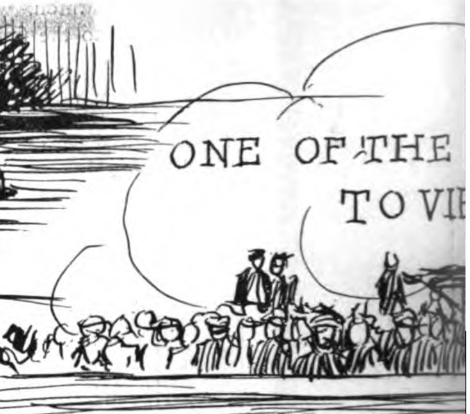
In a word, from the viewpoint of automobile racing, the Vanderbilt Cup of 1910 stands out as the greatest of the series. It was gallantly run and won.

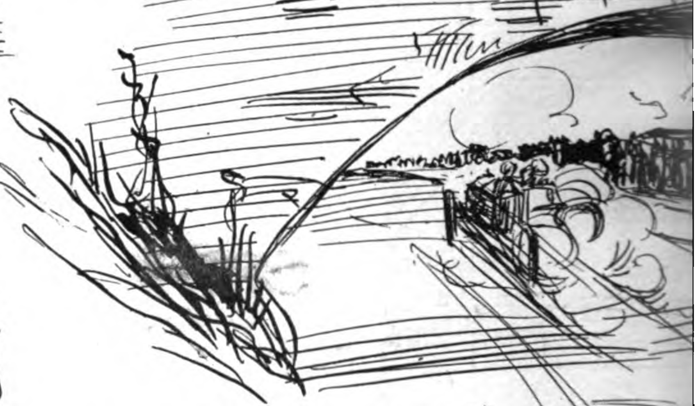
The miraculous skill of the drivers engaged in this race can be best chronicled by saying that in one of the laps thirty-seven cars were on the course at the same time. How they avoided a general mix-up speaks volumes for their skill and discipline.

The Wheatley Hills Sweepstakes developed a new claimant to speed honors when Falcars finished first and second in the 15-lap race on the Vanderbilt Cup course, which started an hour after the big cars were sent away. There were nine cars carded to go, but the Technical Committee disqualified the Correja entry because it did not conform with the stock car qualifications required under the terms of the contest. The Marmon got away in front and stayed there until the end of the seventh lap, when Gelnaw's Fal took up the running and won handily by over ten minutes from its teammate, which was driven by W. H. Pearce.

The Massapequa Sweepstakes, for still smaller cars than the Wheatley Hills, was won by a Cole "30," driven by Bill Endicott. An Abbott-Detroit, driven by Mortimare Roberts was second, and another Cole "30," handled by Harry Edmunds, was third. It was the luckiest sort of a win, for the Lancia entry, with a long lead, came to grief, turning turtle and going out completely. This left Endicott's car with a big margin of lead which he carefully maintained.

THE NIGHT BEFORE THE BATTLE





SOME REMARKABLY CLEVER POLICEMEN

HE MADE A FAIR SHOWING

THE MISSING BUICK GOAT—MASCOT

MANY VANTAGE GROUNDS
N THE RACE

A SNAP SHOT OF A SPECTATOR

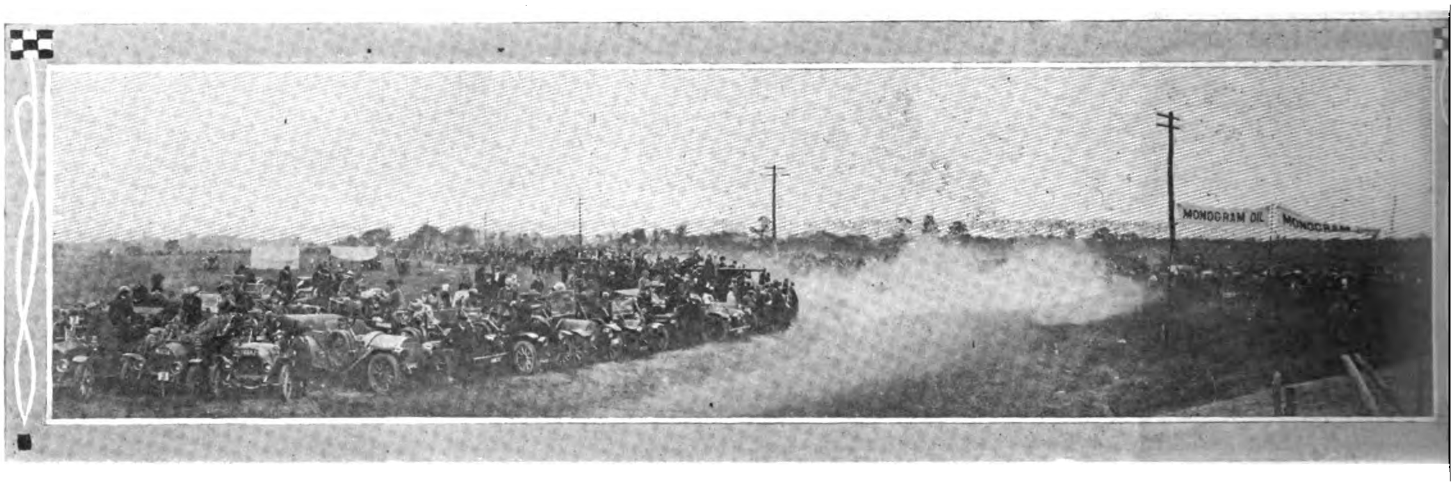
WILLIE K AND GEN. MGR. PARDINGTON IN FINAL TALK BEFORE THE RACE

AND THEY ENJOYED THE RACE

At the Massapequa Turn

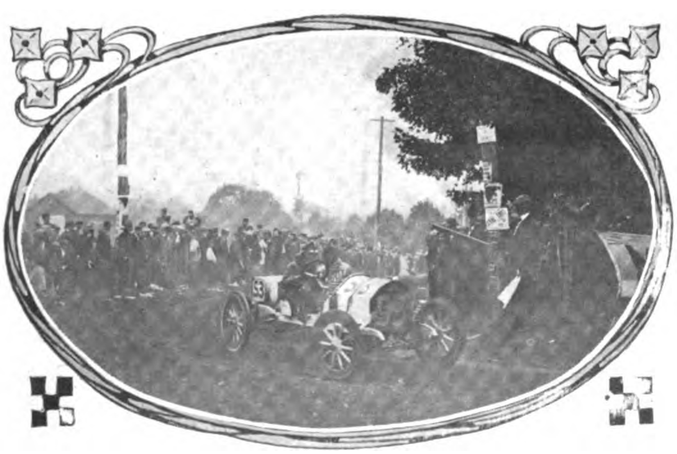
The Falcar finishing first in the Wheatley Hills Sweepstakes

THREE disabled racing cars, all red, marked a special curve, some 30 feet beyond the crest of the earth and gravel banking which had been provided at the Massapequa turn. The first marker, car No. 56, arrived at about 8:30, the second, No. 54, at 9 sharp, and the third, No. 6, at 9:40. At the beginning of the turn the banking consisted mostly of a reddish-brown earth, affording an effectual retarder for the front wheels which bored themselves into it, giving the momentum of the car a chance to raise the rear wheels so they would slew around more easily. And slew they did, with few exceptions, from the beginning of the race until about 8 o'clock, when most of the soft-earth banking had been distributed over the clothes of the spectators.



At the Massapequa turn, throwing up dust and stones out of the loosely-placed banking material

Further on in the turn the banking, being here largely composed of coarse gravel, was more resistant and its outer edge was raised into the air like the crest of a choppy wave, separated by an irregular trough from a cornfield in front of a farm where most of the pedestrian spectators had placed themselves in a fringe that wavered in and out as caution or curiosity dictated.

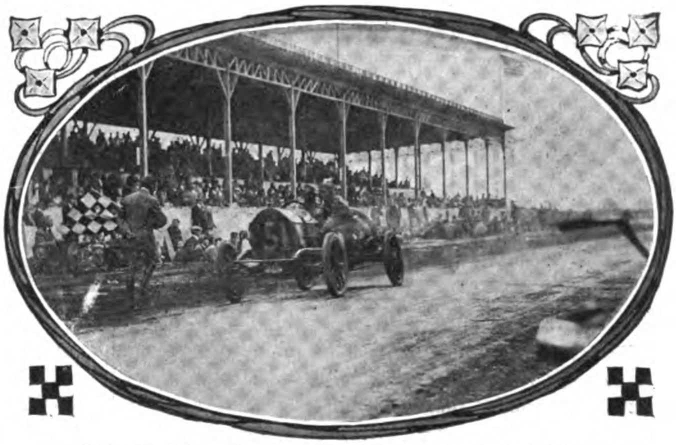


Abbott-Detroit car, No. 53, taking the Westbury turn

As the soft part of the banking was wearing down, the crest of the gravelly part seemed to move into the course by comparison, but the majority of the drivers had learned to know the spot and carefully hugged the middle of the road. Still the crest became more and more indistinct, and every now and then one or another of the flying monsters, less coolly controlled than it should have been, squeezed an inch or two off this treacherous ridge, narrowing the road by that much for the next man, and each time this happened the driver could be seen rightening his car with two sudden movements of his steering gear. Yet nothing serious happened for over two hours after the start of the race. If only one half of the actual number of cars had been in the race the banking might have endured the test to the finish, almost as well as if it had been backed up with twenty more wagonloads of material on the offside. It was getting monotonous. Reports of real accidents from other parts of the course were floating from man to man, and from automobile to automobile in the parking spaces, and here at the worst turn nothing happened. Perhaps it was just because it was so bad and all knew it. The speed of the cars was certainly quite moderate. Nothing like 60 miles an hour. Nothing to compare with the bold turns at Krug's Corner and Jericho in the early days when Lancia and Nazarro taught the young native idea how to shoot and the Vanderbilt Cup race was an institution for the promotion of foreign purchases and domestic improvements.

It seemed a good time for a belated breakfast. Probably all pessimistic views with regard to that banking were only the promptings of an empty stomach and lack of sleep. Rustic constables helped out the bracing morning air with surreptitious nips from flat bottles, ducking below the level of the crowd and leering in half-conscious betrayal of the impressive but misfit operatic policeman's uniform loaned them for the ocasion. Surely it was time for refreshment. In company with a sufficiency of roast lamb sandwiches and a bottle of mild Medoc the reporter sought a hospitable retreat. The repose behind a friendly stack of unhusked corn some 300 feet from the scene of action and apparently the only untaxed spot in the vicinity was slightly broken into by some faint signs of commotion. The parkers

WHAT A MEMBER OF "THE AUTOMOBILE" STAFF SAW AND HEARD AT THE FAMOUS CORNER WHERE DIRE THINGS THREATENED



Cole, No. 51, winning the Massapequa Sweepstakes

stood up in their vehicles. Young persons ran up toward the turn and soon returned chattering. No voice was raised. The decorum was perfect. Evidently some car had a little tire trouble. It was scarcely worth while to run up with a bottle in one hand and a sandwich in the other to examine the specific causes of something so trivial. It could wait. A car swished by. Another. The people turned their heads after them and turned around and looked in the opposite direction, toward the parkway, for the next one. Everything looked regular. And it was. The remarkably cool temper of the spectators made it so. The little incident which had passed so smoothly was indeed nothing but the disabling of car No. 56, driven by Padula. A leisurely post-prandial examination, ten minutes after the act, found the red car resting in the edge of the crowd, with short stumps of the right rear wheel spokes dug deeply into the soft ground. The whole felloe and the tire were gone. The wreck was guarded by two Abbott-Detroit men who were tired of answering questions and looked glum. A telegraph pole bore slight witness of an encounter, and the bystanders confirmed the inference that it had been hit by the right rear wheel of car No. 56, with the result mentioned. The pole was placed about 16 inches beyond the ridge of the gravelly banking, previously referred to, and the car had evidently straddled the ridge.

Scene at the Massapequa turn, where crowds congregated in the hope of seeing something happen

Precisely at 9 o'clock the Lancia car, No. 54, came sidling down the road. Before it reached the turn, which is really two blunt turns in quick succession, it could be observed running at angle of 10 to 15 degrees with its axis, like a dog trotting. Something was the matter with it, but by some strong effort it rounded the first part of the turn. Then it shot in a perfectly straight line slantwise over the banking and charged straight for the scattering crowd. A child or woman screamed, just once. The car swung around its left front wheel, clear around, pointing with its rear end forward. It looked as if it must have hit a number of persons. It had come to a sudden dead stop, and the driver, William Knipper, and his mechanic were carried to the roadside. Racing is a profession. The incidents and accidents of it are part of the business. A spectator whose name was given as Morris Levinson suffered a broken leg. Within a few minutes he was taken in the waiting ambulance to the Homestead Hospital. The crowd was thick around the scene. When it scattered, Knipper and his man were also gone. The car, draped on the roadside about 30 feet behind No. 56, showed a front axle twisted to a partial fracture at the left steering knuckle and a shaker bonnet that was also damaged.

Forty minutes later, when the end was in sight and while the fans were swapping notes and picking the winner, the Simplex car, No. 6, Ralph E. Beardsley driving, hove in sight and without any warning or indication that anything was wrong shot over the bank, following in the tracks of No. 56, and, in fact, bumped into the wreck of this machine so hard as to sever its rear axle from its fastenings by shoving the frame forward over it. Beardsley unlimbered his tall form from the cramped seat. He was unhurt, the mechanician likewise. And the car for a moment seemed good enough to resume work and was pushed into position for starting afresh. But closer inspection revealed something wrong, and its journey was ended then and there.

(*Continued on page 602*)

One of the little Massapequans at Hicksville

Stock Cars Prove Supreme

ALCO IN FIRST PLACE CLOSELY FOLLOWED BY MARMON, TWO NATIONALS, LOZIER, POPE-HARTFORD, SIMPLEX, BENZ, STODDARD-DAYTON, ANOTHER POPE-HARTFORD, AND THE THIRD NATIONAL, PRESENTING A STOCK CAR EVENT WITH A SINGLE RACING MACHINE, THE BENZ, AMONG THE CARS THAT COMPLETED THE FULL DISTANCE

SIX years ago, when the first Vanderbilt Cup Race was run, every entrant was a special racing car, designed and constructed specifically for racing purposes, and the cost of these special automobiles ranged all the way from twenty to sixty-three thousand dollars apiece. When the race was declared finished, there were but four of these special cars in the running, and of the four cars but one was of American design and construction, i.e., the Simplex, and it was in a state of bad repair at the end of the race. A review of the several events leading up to the Sixth Annual Race, just completed, would amount to a substantial re-statement of the above, excepting that from year to year American automobiles took the more prominent part, and even last year the American builders were censured by those who thought they knew all about it, because they persisted in using their stock automobiles in preference to building racing cars.

To the sporting fraternity it looked as if an automobile, to be able to compete in a great event, would have to be specially designed and constructed, utilizing the freak ideas of some abnormal mind, paying but slight attention to the regular and orderly thoughts and considerations that govern the acts of designers who obey the conventions and bow to the will of precedent. The Sixth Annual Vanderbilt Cup Race, as it terminated on October 1, is a monument to the acumen of the builders of American automobiles, the obverse side of which is inscribed. telling of the stupidity of all who put their faith in special racing machines, and who relied upon the patronage of sports, rather than upon their own good sense to guide them to success.

Disregarding, for the time, the fact that the stock automobiles that competed in the last Vanderbilt Race may have been tuned up for the occasion, and otherwise prepared for the strenuous work expected of them, the fact remains that substantially every one of the good performers were stock cars, whereas the special automobiles, almost without exception, were found by the wayside, wrecked beyond recognition, in some cases, practically beyond repair in all instances, and so thoroughly in disrepute because of their poor performance in competition with stock automobiles that it is a question whether or not any maker of cars will ever again risk his reputation by putting a specially built racing machine in competition with a sturdy stock car.

The newspapers everywhere are taking advantage of the headline material that is so much in keeping with their tastes and their needs; they point out that the track was in wretched shape, with dangerously banked curves, and all the other surface indications of lack of preparation, and there is ample evidence to be seen at every hand of the fact that it was a gruelling test for the cars, conducted under the most severe conditions imaginable, and what does it show? The automobiles that were in at the finish were all stock cars, excepting one, and that was the only foreign automobile in the race that made a showing worth talking about, and it finished eighth. From the winning Alco No. 18 driven by Grant down, including Marmon No. 25 driven by Dawson, National No. 10 driven by Aitken, National No. 31, driven by Disbrow, Lozier No. 2 driven by Mulford, Pope-Hartford No. 17 driven by Fleming, Simplex No. 11 driven by Mitchell, Stoddard-Dayton No. 15 driven by Harding, Pope-Hartford No. 22 driven by Dingley, and National No. 1 driven by Livingstone, the entire list belong in the stock car category. These models may be had by any automobilist who may care to purchase them, and these cars are built in the regular way, by routine methods in the several plants, and they prove that the regular way is the only way to attain truly reliable results.

Pursuing this line of thought to finality, it is only necessary to say that the cars that were running, but that did not conclude the twenty-second lap when the race was called off, belonged to the stock category also. This list of cars, beginning with the Amplex No. 9 driven by Jones (the only 2-cycle automobile in the contest), included the Oldsmobile No. 20 driven by Stillman, Houpt-Rockwell No. 26 driven by Linberg, Apperson No. 28, driven by Hanshue, and Jackson No. 19 driven by Scheifier. The Knox No. 32, driven by Belcher, is a member of the stock car family also, and while it failed to stay in the race up to the finish, the fact remains that it completed its first lap in 11 minutes and was only prevented from giving its customary good account because of a valve disorder, whereas the specially built racing machines showed lack of stamina, and were spilled by the roadside, in some cases being so completely disrupted that it would take an automobile expert to tell that they were originally intended for racing machines.

The absence of the Old Guard of foreign racing automobiles this year is the best indication possible to have of the fact that the makers of these special types of racing machines are fully alive to their uncertainties, and the foreign builders are cute enough to know that it is better for them to "rest upon their laurels" and try to survive on a "has been" basis than to struggle with the inevitable. There is nothing unusual about this attitude on the part of these makers; they have experience, and they know that a regularly built automobile is the product of evolution, whereas a special machine is the progeny of a revolution.

The very fact that the foreign makers of automobiles are taking and using American machine tools of the kind that have been developed in connection with the building of automobiles is sufficient proof of the keenness of the foreign makers, and it is not too much to state that keenness is the child of experience.

The only class of people who seem to be a little dull about the real status of the racing machine versus the stock automobile is the American purchasing public. It seems to have been the understanding of this public that the quality of an automobile is gauged on the scale of dollars, particularly if the name-plate on the car bears the cross of the collectors of the Port of New York. It will come as a surprise to those who have overlooked the underlying merit of standard methods of construction to find that American stock cars not only are capable of winning in a race like the Vanderbilt, but they finish in good shape.

The facts cannot be enlarged upon; the record speaks for itself. It is useless to try to emphasize the situation as it is. Perhaps a few of the underlying reasons will serve to clear the atmosphere and settle once for all the proper status of stock cars. The reason why special racing machines were conspicuous performers in the earlier events is due to the fact that the evolution of the stock car from its inception to its present state of perfection took five years in the consummation. Special cars, although they must ever rank as mere model work, had the advantage of much attention on the part of men who were more or less skilled and experienced in work of this character, and they rendered many a good service to the automobile business because they tried out a great number of ideas, all of which, in so far as they possessed merit, were incorporated into the stock cars, forming a part of the very evolution that ultimately resulted in the supremacy of the stock car and the downfall of the specialized product.

All Eyes on Grand Prize

MOTORDOM TURNS FROM VANDERBILT CUP RACE TO THE BIG CONTEST FOR UNLIMITED MOTORS WHICH WILL BE HELD OCTOBER 15

ENTIRELY different in its conditions from any other road race in the United States this year is the Grand Prize contest for the $5,000 gold challenge cup of the Automobile Club of America, which will be held on the Vanderbilt Cup course October 15. The only limitations placed upon the contestants are as to width, which must not exceed 68.89 inches; exhaust, which must not be directed toward the ground and each car which must not be directed toward the ground, and each car cars must be examined by the Technical committee prior to practice and must secure certificates showing that they are safe. The cars are required to carry two persons seated side by side, weighing at least 134 pounds each on the average. No agent of oxidation other than atmospheric air is to be allowed.

Under such a system of rules, the contesting cars may be simon-pure racing machines with special motors and special refinements of construction and equipped with any sort of device to assist mechanical operation that is deemed to be advantageous. On the other hand, stock cars with racing equipment are not barred. There is no limit on the size of engine to be used. Automobiles with nine-inch cylinders are eligible, just as are those of half that diameter.

The original intention was to have the distance of the race 22 laps on the 12.64 miles course, but later it was decided to increase the length of the run to 30 laps, which makes the distance 379.2 miles.

The start will be at daybreak, just as it was in the Vanderbilt, but owing to the moderate sized field, the intervals at which the contestants will be sent away will be 30 seconds.

The entry list this year consists of four trios and three single entries. Under the rules, each car must represent a member of the International Association of Recognized Automobile Clubs and while three countries are represented, only two clubs have been certified.

The Kaiserlicher Automobile Club of Berlin is represented by three Benz cars, while the other dozen in the list are credited to the Automobile Club of America. This classification is broader than it really should be, as the Fiat trio, Italian cars of much class, are included among those which will carry the colors of the American club and the same may be said for the Mercedes, entered by George W. Loft.

The sure-enough American cars that are carded to start are three Marmons, three Marquette-Buicks, an Alco and a special Roebling-Planche. Thus there are four German cars; three Italian and eight Americans in the race.

The drivers engaged to participate in the race represent the highest types of automobile pilots developd both here and in Europe. The contest will hardly prove to be as much of a drivers' race as the Vanderbilt Cup. The result will not be so strictly chargeable to good or bad driving as was the great contest of October 1.

The reason for this is two-fold: First, the field is only one-third the size of the Vanderbilt and second, there are no weak spots in the entire list of drivers. In other words, no matter how the race results, the outcome probably would not be changed if the driver of any of the losing cars had been seated behind the wheel of the automobile that finishes first.

Every man can be relied upon to get the uttermost atom of speed from his charge, as all are past-masters of the driving art.

From the viewpoint of actual money prizes, the Grand Prize is the richest in America. The Motor Cups Holding Company has hung up $7,000 for the winner and placed cars and while only $1,000 in supplementary and accessory prizes has been offered so far, before the day of the race dawns, the list will undoubtedly be largely augmented, and may reach $10,000.

The race October 15 is the second that has been held for the magnificent trophy and purses. The former run-off was held at Savannah, Ga., Thanksgiving Day, 1908, and the money prizes for that event approximated $20,000.

There were twenty starters, fourteen of which were the cream of European workmanship, guided by the best talent available. There were six American cars in the contest, but they were outclassed by the foreigners. The race was won by a Fiat, driven by Louis Wagner, who will also conduct another Fiat in the coming race. His win was spectacular and sensational in the extreme and was largely due to an element of racing luck in the final round.

The winning Fiat, a Benz driven by Hemery and another Fiat, driven by Nazzaro, had been running neck-and-neck since passing the middle ground of the course. For the last eight laps these cars alternated in the lead, and upon entering the final round Nazzaro's Fiat had established what seemed a winning margin over the Benz racer. Wagner's Fiat was in third place, about two minutes behind the leader.

While in full flight after passing the stand, Nazzaro suffered a puncture and time spent in repairs wiped out his lead. Then another puncture intervened and his chances for first place went winning. Wagner, without suffering any mishaps, swung over the line 56 seconds ahead of the Benz, while the unfortunate Nazzaro was third.

In the coming race this trio will have mounts from the same makers as they drove in the former race and a terrific struggle between them is promised, no matter where they finish. The roughness of the course must of necessity place a limit on speed. It is unlikely that many measured miles will be run at a 100-mile an hour gait, not because the cars are not fully capable of such speed, but by reason of the minute ruts and ripples on the racing surface. In the Savannah race a Renault car went slightly faster than 101 miles an hour for a single mile and one of the other contestants made an even 100-mile rate for a short distance. The straightaways, however, on the Southern course were longer than any on the Vanderbilt raceway.

At an average speed of 70 miles an hour, which does not seem a wildly unlikely speed, the American cars have shown that they are capable of maintaining that pace. Many miles have been timed in practice close to the 70 mark and rounds of the course in about 10 minutes have been common enough both in practice and in the Vanderbilt Cup race. An average round of 10:50, carried throughout the thirty laps, would be at a rate of 70 miles an hour and such speed is promised in practically all the camps.

The entries for the race are as follows:

Car.	Entrant	Driver
Benz	Benz & Co.	Barney Oldfield
Benz	Benz & Co.	Victor Hemery
Benz	Benz & Co.	Franz Heim
Fiat	Fiat Auto Co.	Louis Wagner
Fiat	Fiat Auto Co.	Ralph De Palma
Fiat	Fiat Auto Co.	Felice Nazzaro
Marmon	Nordyke-Marmon Co.	Ray Harroun
Marmon	Nordyke-Marmon Co.	Joseph Dawson
Marmon	Nordyke-Marmon Co.	....
Marquette-Buick	Marquette Motor Co.	Louis Chevrolet
Marquette-Buick	Marquette Motor Co.	Robert Burman
Marquette-Buick	Marquette Motor Co.	Arthur Chevrolet
Roebling-Planche	W. A. Roebling, 2d	W. A. Roebling, 2d
Alco	Am. Locomotive Co.	Harry F. Grant
Mercedes	George W. Loft	George H. Armstrong

The dark horse of the race is the Roebling-Planche entry which will be driven by Washington Roebling 2d. All the others are familiar racers. Mr. Roebling is an experienced driver and the word has been passed around that he expects to give a good account of himself in the contest.

French Commercial Test

MASTER BUILDERS OF PARIS TRY OUT VARIOUS TRUCKS WITH THE VIEW OF DETERMINING ECONOMY AS COMPARED WITH HORSES

INTERESTING official figures on the cost of automobile transportation for the building trade have been secured as the result of a month's test held jointly by the Automobile Club of France and the master builders of Paris and district. Believing that economies could be effected by using motors in place of horses, but not having the necessary technical knowledge to work out a scheme of motor transportation, the Master Builders' Association appealed to the technical committee of the French Automobile Club. This latter body arranged with eight automobile constructors to supply one truck each, and to submit to a rigorous control in order that accurate figures on cost might be furnished the builders.

The work to be undertaken consisted in transporting stones, gravel, plaster and general building material from the Association's quarries and headquarters at Viry-Chatillon to the site of building operations at Villejuif. The journey was one of 10.2 miles, over moderately good roads; the estimated speed was 6.2 miles for the outward trip under load and 8½ miles for the return journey empty. The load to be carried varied from 3¾ to 5¼ tons, but the method of payment was made according to square meter of material (stones, gravel, sand, etc.) and not according to weight, a single journey with a full load being paid at the rate of $3 to $4. Theoretically a square meter of any given material from one quarry ought to be practically invariable in weight, but it was found that the density of the material to be transported showed such differences that weighing had to be resorted to.

The tests showed that the precentage of time during which the vehicles were held up for repairs was 13 per cent. of the actual working time. Although it is obviously desirable to reduce this figure as low as possible, the technical committee considered it satisfactory, for the Paris General Omnibus Company estimates 20 per cent. of the running time for repairs and renewals. Working 9½ hours a day, traveling 62 miles, and maintaining an average speed of 6½ miles an hour, the average consumption of the eight vehicles was 13.2 gallons of gasoline, 1.1 gallons of lubricating oil, and ¼ pound of grease per day, the cost being, in round figures, $4 per day for fuel. In making comparisons it must be remembered that gasoline costs practically 42 cents a gallon outside Paris. As a basis for this class of work it was established that for 5-ton loads a motor of 25 to 30 horsepower should be employed; cost of fuel should be calculated at $4 to $5 a day; repairs and renewals should be calculated at the rate of $5 to $6 a day, the fuel consumption should not exceed 14 gallons, and the range of action should be about 60 miles a day. These figures are based on trucks with metal-shod wheels; if solid rubber tires are employed the cost is estimated to be increased by 3 cents a ton-kilometer. It should be noted, too, that for this class of work every full journey was followed by one of equal length without load, and that the distance being comparatively short, much time was spent in loading and unloading. Had it been possible to give the trucks a load for the return journey a considerable economy could have been effected.

The trucks submitted varied considerably, as will be seen from the following table setting forth their characteristics. They had all internal-combustion motors, and all chain drive, with the exception of the Krieger, which had electric transmission and drive. Metal tires were employed by all but the Dietrich and Krieger. Three of the competitors used tip bodies, the other five having the fixed type. The width of the bodies averaged 40 inches, but the length varied from 13 feet to 23 feet; the weight of the body alone averaged 1,110 pounds. Delahaye, Krieger and S. T. I. M. used gasoline as fuel; Dietrich employed white spirit; Soller and Aries employed benzol, and Schneider and Dufour used successively gasoline, alcohol and benzol.

Make	H.P.	Bore Ins.	Stroke Ins.	No. Cyl.	Cooling	Quantity Water	Weight Empty, lbs.
Dietrich	27	4	6.2	4	Pump	8.8	7,275
S.T.I.M.	25	4.3	5.5	4	Pump	17.6	10,000
Soller	24	8.2	6.2	2	Pump	22	9,259
Aries	30	5.1	5.1	4	Pump	6.6	.....
Schneider	40	4.8	5.5	4	Thermo	7.2	11,000
Krieger	24	3.5	4.7	4	Thermo	8.8	5,467
Dufour	20	7	6.2	2	Pump	15.4	7,495
Delahaye	30	3.9	7	4	Pump	9.9	7,275

Ignoring the amounts spent on the vehicles for repairs, the most satisfactory performances were made by the Delahaye, Schneider, Soller and Aries trucks. The following table shows the distance covered both under load and empty, the time spent in useful work, the consumption of gasoline and lubricating oil and the average speed maintained. Under this latter head is given the average under load and empty, the difference between the two being very slight.

Truck	Distance covered Total	Load	Empty	Time, hrs.	Speed av'r'ge	Av. Daily Consumption Oil	G's'l'ne	Average useful load, lbs.
Dietrich .	1,481	739	742	186.3	7.5	2.1	14	8,099
S.T.I.M. .	1,114	556	558	216	6.4	1.7	12.3	8,886
Soller	1,525	761	764	270.2	6.9	0.75	14.7	11,772
Aries	991	495	496	185	6.5	0.95	14.0	11,772
Schneider.	703	351	352	119.2	7.3	0.81	13.1	11,862
Krieger ..	844	424	420	145	6.9	0.67	11.2	8,677
Dufour ...	...	...	...	...	...	....	....	.....
Delahaye .	1,481	739	742	255	7.2	0.38	10.8	9,347

Distance and speed limits in miles; oil and gasoline in gallons

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Car versus Horse in Real Economy Test

In an effort to prove the much-discussed proposition that it is cheaper to drive and use an automobile than a horse and buggy, the Maxwell-Briscoe Motor Company is conducting a practical test in New York City and vicinity. This test consists of actually driving a horse drawing a buggy for six hours a day and a Maxwell automobile of current type, four-cylinder motor, for the same length of time.

Of course the automobile goes practically over twice as far as the horse in the course of the six hours run each day and the figures, in order to form the basis of any just comparison, must take that fact into consideration. The comparative cost per mile and cost per passenger per mile to operate both systems of transportation have been worked out in detail as far as the test has progressed.

All the suburban districts of New York as well as the heavy traffic streets of the metropolis have been or will be covered.

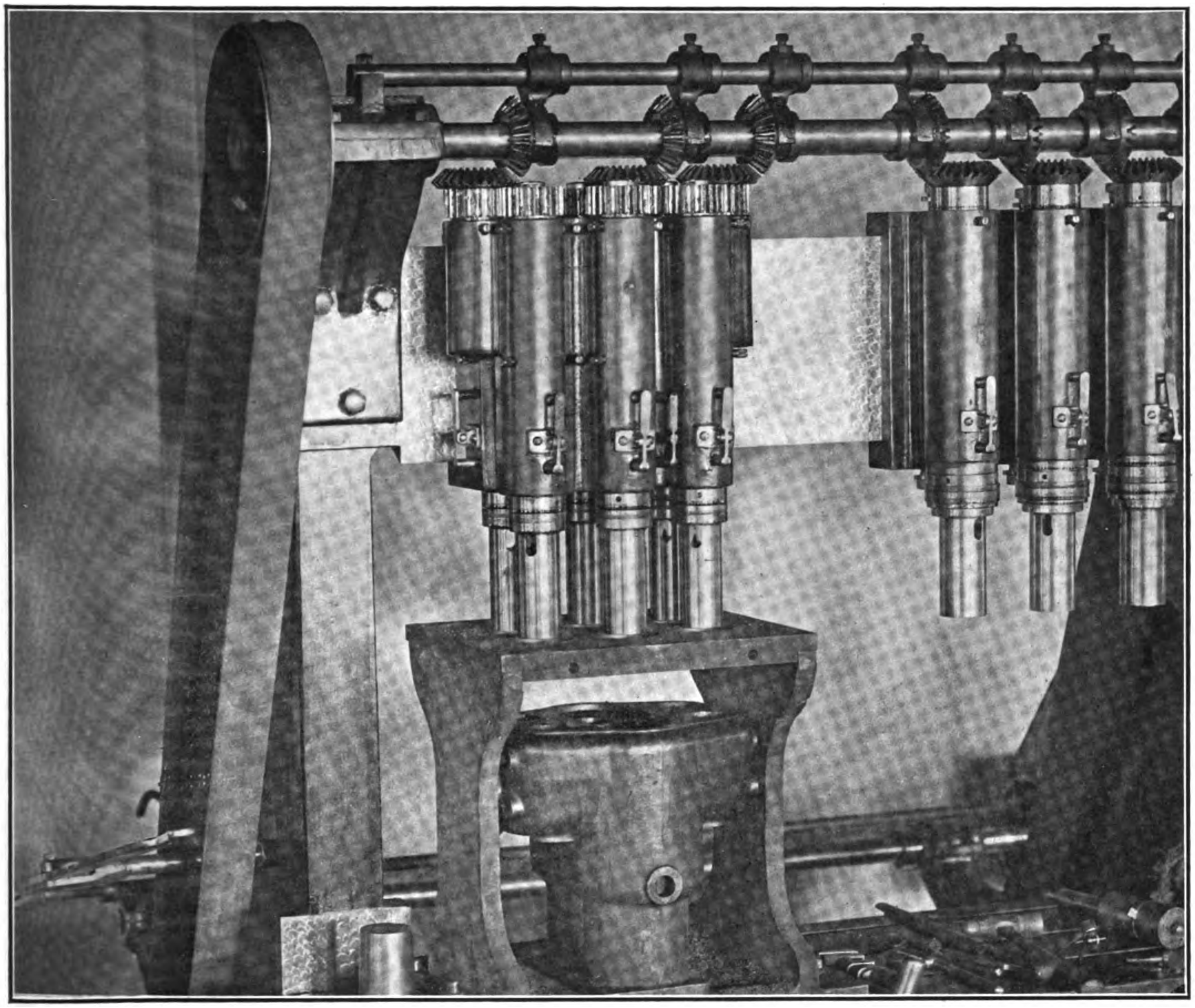
One day's run is typical of the rest as far as the figures are concerned. Take the fourth day for example. The route was laid out through Staten Island and the interesting contest started at 9 o'clock in the morning. The horse and buggy were first away, but the car soon established a big lead and was only in sight of the horse when doubling on its trail.

During the six hours the car covered 80 miles without any mechanical repairs, replacements or adjustments. The motor consumed 5 3-4 gallons of gasoline, which cost at retail 16 cents a gallon or 92 cents. It also used one pint of lubricating oil at 65 cents a gallon or 8 cents. This made the total $1 even for the day.

The horse traveled 35.8 miles during the six hours and required 12 quarts of oats at 6 1-4 cents per quart or 75 cents and 20 pounds of hay at 1 cent per pound or 20 cents. This made the total expenditure for the horse 95 cents for the day. But the horse traveled only 35.8 miles on 95 cents, while the car made 80 miles on $1.

Among the Makers

DETAILS OF THE RAMBLER FOR 1911—PULLMAN LINE FOR THE COMING YEAR WILL SHOW MANY REFINEMENTS—MECHANICAL POINTS OF THE SELDEN—ELMORE 1911 MODELS DISCUSSED



SPECIAL FORM OF MULTIPLE-SPINDLE DRILL USED AT THE MOON PLANT TO BORE CYLINDERS WITHOUT RESETTING

SPECTACULAR automobile building is passing into history and the time is arriving when the man who elects to go into the business of manufacturing automobiles will have to make a large investment for special machine tools of the class that will be capable of doing work on a par with the special forms of machinery that are now being employed in the plants where automobiles are really made. A cursory examination of the manufacturing proposition, considering it as a whole, lends substance to the conclusion that automobiles will have to be sold hereafter, and the man who buys is much inclined to find out what he is to get for his money. In the plants that are fitted out to build good automobiles in sufficient quantity to control the "overhead" charges, despite an enormous investment in special machine tools, there will be no difficulty in convincing the man who buys that he will be justified in making the investment, but the influence of special equipment will be felt by makers in one of two ways, *i.e.*, (a) the maker who is so fortunate as to have the special equipment will be able to turn out a large number of good automobiles at a low price, (b) the maker who cannot afford to manufacture on a specialized basis will have to devise some way to back out of a critical situation. Prospects in the commercial automobile field are regarded as sufficiently good by some makers of passenger automobiles as to serve as the reserve position if a turning movement becomes necessary. This is all very consoling, but if all the makers of passenger automobiles turn their attention to the manufacture of freight automobiles, provided they move simultaneously, the supply of freight automobiles will far exceed the demand.

Rambler Line for 1911

TWO CHASSIS AND NINE SEPARATE STYLES ARE OFFERED FOR THE COMING YEAR—DETACHABLE FORE-DOORS AND NUMEROUS REFINEMENTS WILL FEATURE THE OUTPUT

THE Rambler for 1911 offers a complete line, including open and closed cars in nine different styles, all with detachable fore doors. The details and mechanical construction of all are alike and there are two sizes—45 and 34 horsepower. The fundamental Rambler advantages characteristic of previous models, the offset crankshaft, straight-line drive, large wheels and tires, spare wheel and engine accessibility, are all continued.

Improvement has been made chiefly in details which have been thoroughly refined. Standard equipment for all 1911 models include spare wheel and tire, Hartford-Truffault shock absorbers, top and envelope, wind shield, gas headlights and Prest-O-Lite tank, combination electric and oil side and tail lamps.

The 45-horsepower chassis is used for Ramblers Sixty-four and Sixty-five. Sixty-four may be had as a five-passenger touring car, toy tonneau or landaulet; Sixty-five as a seven-passenger touring car or seven-passenger limousine.

Sixty-five has 128-inch wheelbase, 40 inch wheels and 4 1-2 inch tires, underslung front springs and drop frame. The two features last mentioned are to provide a low body level and this model, with 40-inch wheels and the increased clearance, has the same body level as the five-passenger model with 36-inch wheels. It is particularly pointed out that with the advantages of clearance, riding qualities, appearance and less tire wear provided by the larger wheels and tires, the increase in tire cost over the 36 x 4 1-2 size is but $10 per tire. The standard finish for Sixty-five includes nickel trimmings. This change from common practice with 40-inch wheels gives to this model added character and individuality.

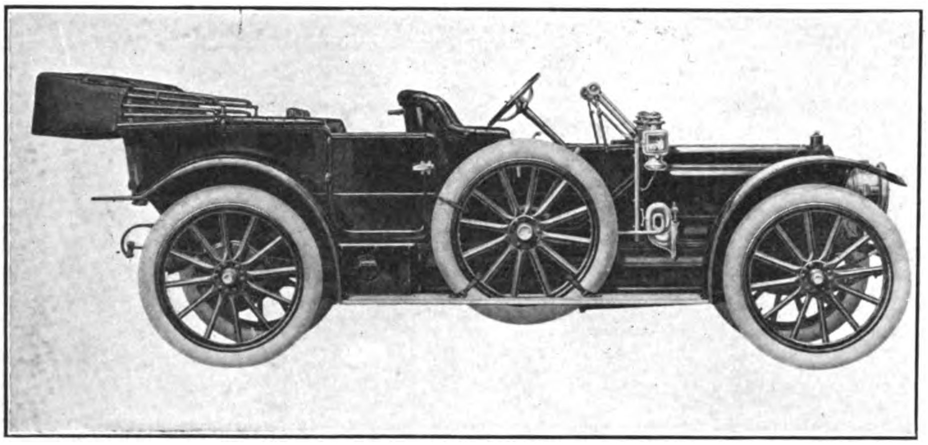
Rambler Sixty-four, in other details like Sixty-five, has 120-inch wheelbase, 36-inch wheels, 4 1-2 inch tires and regular front spring suspension with straight frame and brass trimmings.

The 34-horsepower car, known as Sixty-three, is furnished as a five-passenger touring car, two-passenger roadster, four-passenger coupé and town car. This is a more economical car to use and maintain and is particularly popular with the owner who prefers to drive his own car.

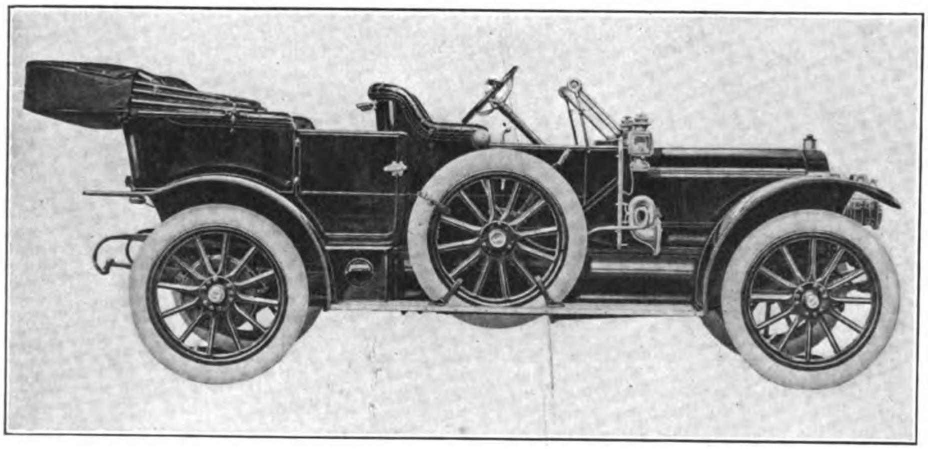
The Roadster is regularly geared to a speed of from 55 to 60 miles. For a hilly locality a lower gear, giving greater hill climbing ability is optional.

Sixty-three has 112-inch wheelbase, 36-inch wheels and 4-inch tires. This model is furnished with dual ignition, Splitdorf magneto and 6-80 Vesta storage battery.

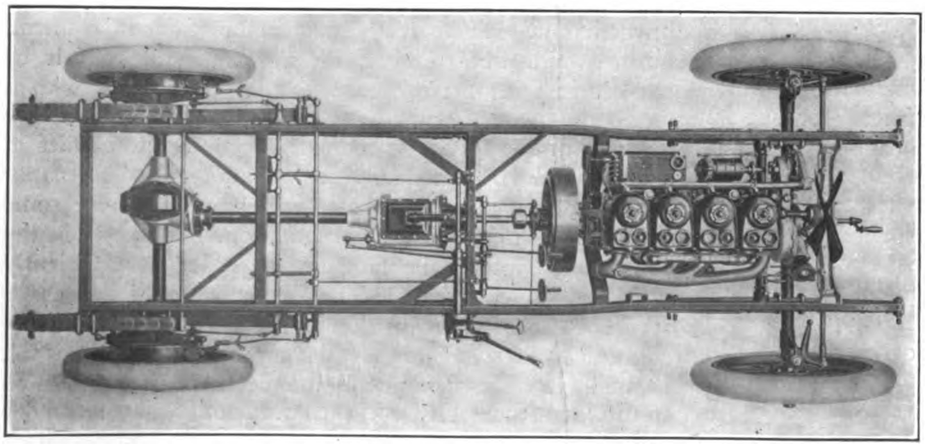
The 45-horsepower models have double ignition, Bosch magneto and 6-80 storage battery. Both sets, by means of the Rambler high-tension switch and the Rambler timer, operate through a single set of plugs.



Model 55 complete with top, top cover, glass front and spare wheel



Model 63 presenting the right side of the car with the spare wheel on the running board



Model 64 chassis, showing brake adjustment by means of thumb nuts and larger brakes

Sixty-three body is trimmed with a good quality of machine-buffed leather and the larger models with hand-buffed quality. Excepting these two particulars, magneto and leather, the quality and details of all models are identical.

The improvements which are found in these 1911 models are as follows: The fore doors for all models are practically dash high, but are detachable. Anticipating a desire by owners to remove the doors in hot weather, new models have been designed so that they may be used and look equally well whether with or without the doors. To accomplish this interchangeable feature, the front floor and floor supporting brackets have been redesigned. The sloping section of the floor now has a greater angle with, of course, corresponding increase in comfort as a foot rest and the side brackets are flush with the floor level.

On earlier models these side brackets were higher. On the lever side a solid panel, a duplicate of the door on the left side, extends from the seat to the dash with transmission lever inside and brake lever in a convenient location outside. The latch for the left side door is secured to very neat aluminum door jamb fastened to the seat riser. The photographs illustrating the appearance with and without the doors.

The standard form of front springs, semi-elliptic, is continued, but these springs are now wider and thinner, providing greater flexibility. One of the most important changes is found at the rear springs. These are called 7-8 elliptic, differing from the common type of 3-4 elliptic spring in that the upper section is longer and is secured at two points instead of one. By passing two spring bars through the frame from one spring to the other and securing the springs to these bars, the frame is relieved of practically all twisting strain and side sway is effectually minimized. Grease cups are now equipped at every spring joint.

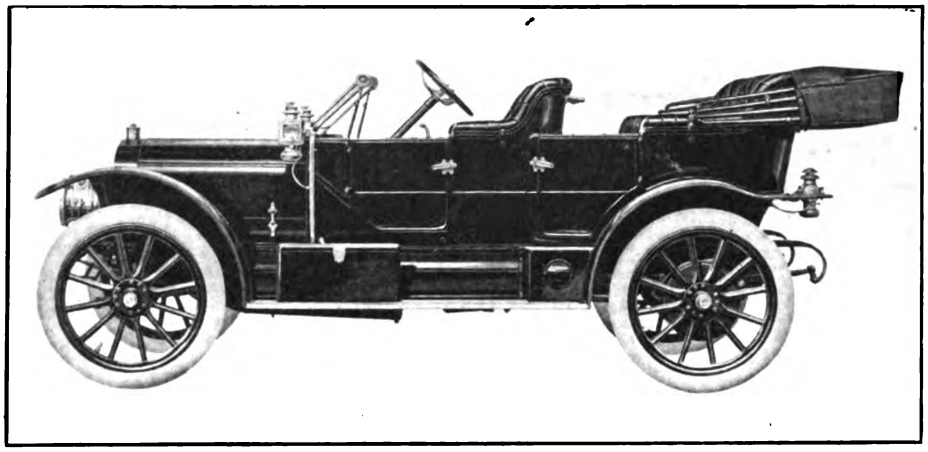
In conjunction with the new springs, Hartford-Truffault shock absorbers are included as standard equipment. Four are furnished for the 45-horsepower chassis and two for the 34-horsepower chassis.

The brakes are larger and the leverage greatly increased. The wheels may be locked by the application of either set and every car is required by test to come to a full stop from a speed of 18 miles an hour within 50 feet. The brake drums are increased in diameter from 13 to 15 inches. In width the braking surface is increased from 2 to 2 3-4 inches, the total increase in surface being 97 square inches. The foot brake is connected to the outer band, the band being contracted by lever action giving a greatly multiplied force over the previous design.

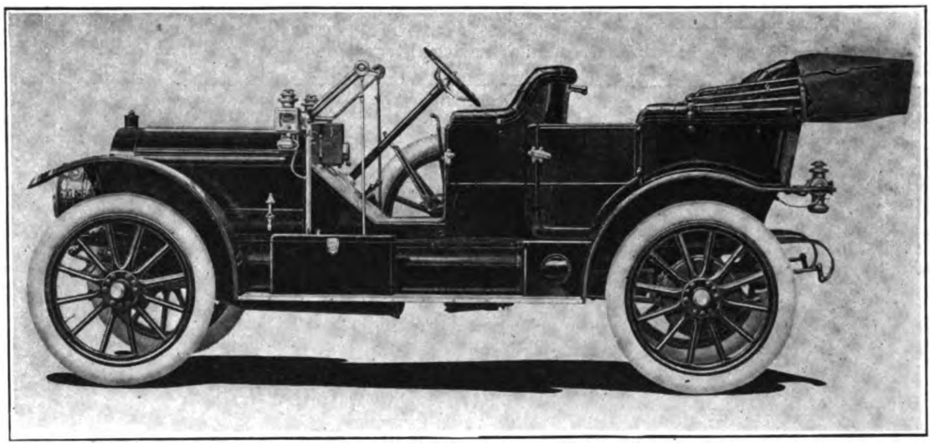
The inner expanding shoes are operated on the toggle joint principle. The application of both sets of brakes is shown by the illustrations. Both brakes are provided with equalizers. Spokes for 36-inch wheels are increased in width from 1 1-2 to 1 3-4 inches and are 2 inches wide for the 40-inch wheels.

The Stromberg carbureter has been adopted for 1911 and it is located on the right instead of on the left side. This change principally facilitates starting in cold weather. The inlet manifold is carried above the exhaust and two priming plugs are placed on the top in an accessible position. If at any time difficulty is experienced in starting, raw gasoline may be inserted by removing these priming plugs.

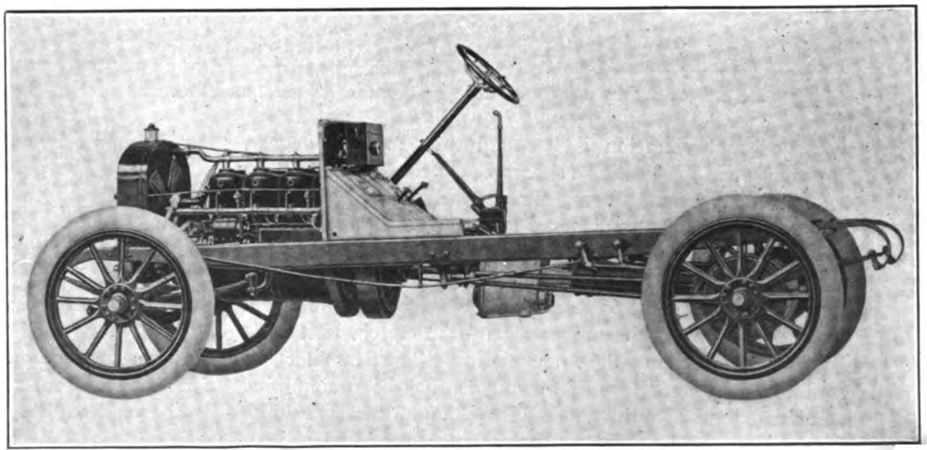
The cams and camshaft are now forged integral. The cams are alike and uniformity in this particular is absolutely assured in every motor. The magneto coupling is now bolted together. This facilitates removal of the magneto and change of timing. The lubricator, formerly supported in a bracket attached to the frame, is now secured to the engine. The oil feed pipes are



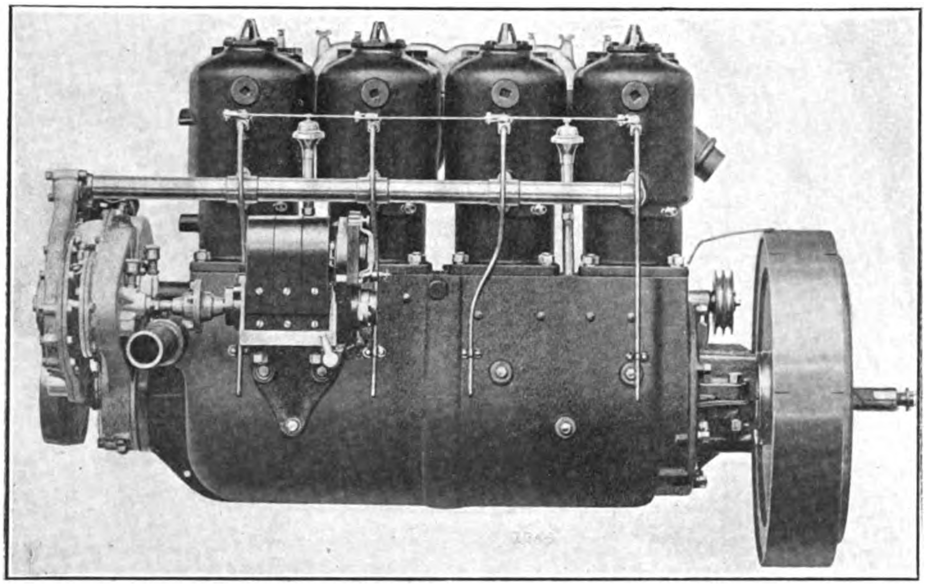
Rambler 63, including top, top cover, glass wind shield, spare wheel, tire, lamps and tools



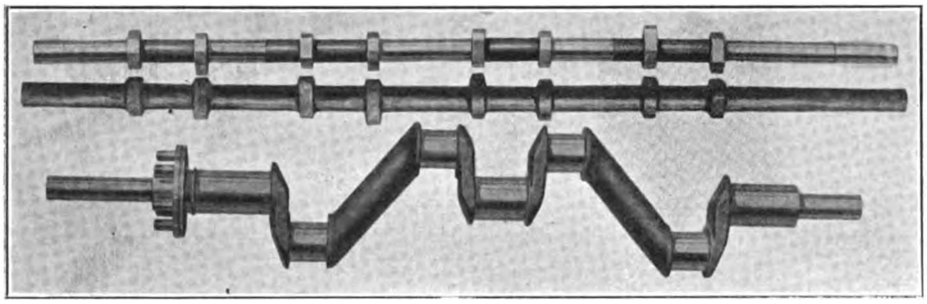
Model 63, showing car with fore-door detached for hot weather



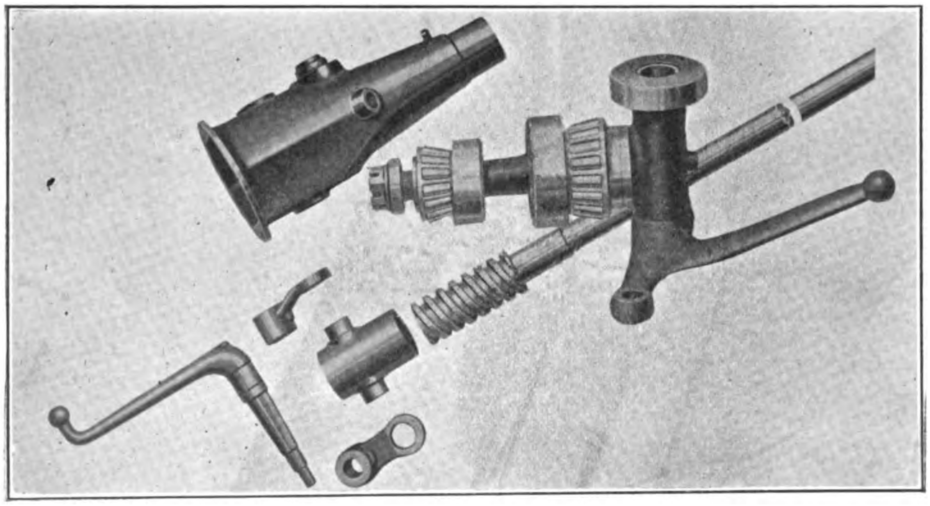
Model 64 chassis, side view, showing new aluminum floor design



Model 64 and 65 engine, showing new location of magneto, heavier pump and drain pipe



Model 64, crankshaft and camshaft, with integral cams properly hardened



Details of front wheel knuckle and parts as used in steering

thus shortened and vibration is lessened to a marked degree.

The ignition wiring is partially encased. On the 45-horsepower chassis the crankshaft and bearing surface is increased 28 square inches. The flywheel is bolted instead of beyed to the crankshaft. Although of the same weight as before, the metal in the flywheel is diffrently distributed to give greater weight at the rim.

The universal joint shaft is longer. The increase is sufficient to permit the removal of the universal and the clutch, if it is so desired, without disturbing the transmission. The Rambler expanding clutch, now a feature of all models, has been simplified both in construction and adjustment. The change does away with the separate shoes and separate toggles with individual adjustments provides a single expanding shoe, thus giving equal pressure at all points and contact throughout most of the entire circumference. One simple adjustment of the toggle joint makes all necessary changes.

The transmission gears are heavier, being 3-16 inch wider. A lock is placed on the second gear to hold it in engagement. Taper roller bearings are substituted for ball-bearings at the rear axle differential. This is also true of the wheel bearings on the front steering knuckles for the 45-horsepower chassis.

The radius or distance rods, previously used on all Ramblers, are replaced by a combined distance and torsion rod. At the axle end these rods are secured to a forged bracket above and below the axle, rigidly holding the axle in place and relieving the drive-shaft housing of torsional strain. At the other end these torsion rods are secured in ball and socket joints to brackets bolted to the frame side members. Heretofore the brackets for the forward end of the radius rods were bolted to a cross frame member. The change gives increased rigidity. The re-enforcement in the tubular front axle for the 45-horsepower models is treble its former thickness, giving proportionately greater strength.

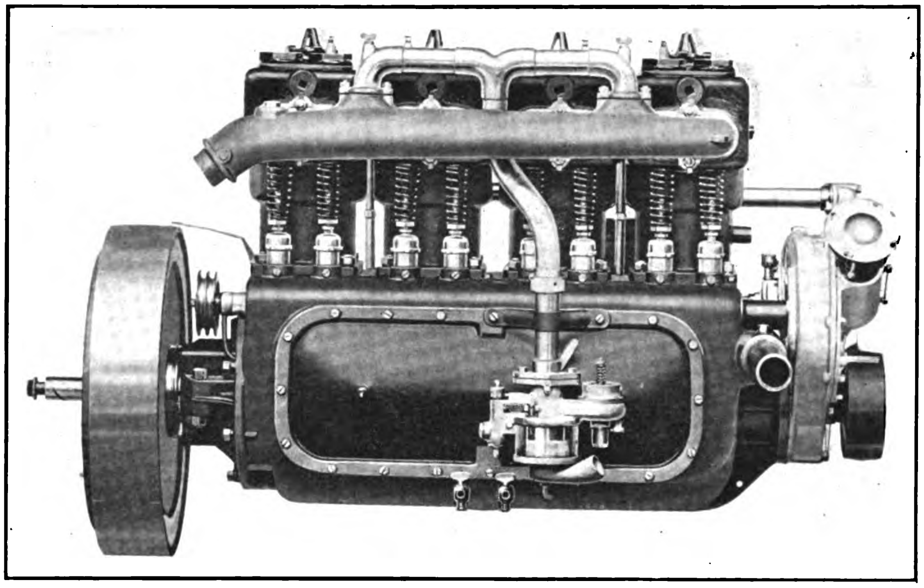
The knuckle pin for the larger chassis is secured in the steering knuckle to prevent wear between knuckle and pin. Hardened and ground bearings are placed in the knuckle yoke and the pin is hardened and ground at the point of contact with these bearings. The wear is divided between these bushings and the ball thrust bearing on top of the knuckle.

The appearance of the car viewed from the front is quite materially changed. The radiator is supported on an aluminum girder of new and neat design, well harmonizing with the other parts. The brass corners of the radiator, formerly polished, are now japanned and the crown sheet which extended forward from the radiator is now finished with a heavy roll flush with the radiator. Brackets containing sockets for the front guard braces, located at the side of the radiator and on top of the frame side members, gracefully complete the finished effect.

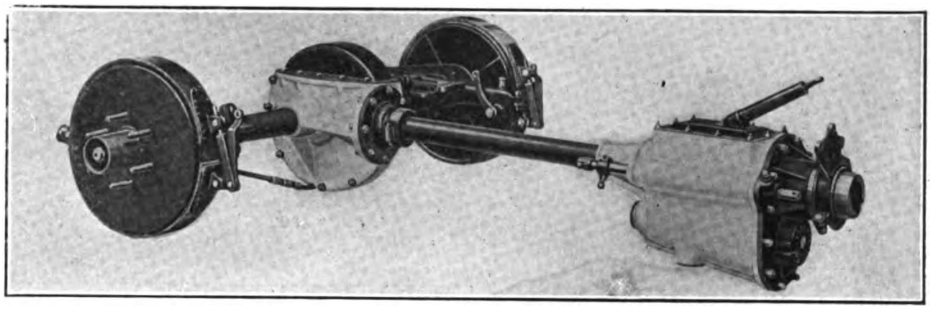
The screw and nut principle for steering is continued, the nut being somewhat longer to give greater wearing surface and the steering parts in general are slightly heavier and stronger. The guards are carefully shaped to obtain the most harmonious appearance. The guard fillers extend to the top of the frame, entirely covering the running board supports. These fillers are secured to the frame by acorn nuts and bound at the running board edge by an aluminum strip. An aluminum toe guard protects the filler on the forward left side.

The interior of every tonneau is completely trimmed with leather; commodious pockets are attached to the doors; the surface of the front seat back, usually varnished, is protected by a leather pad and the space below is utilized as a pocket for the top side curtains. Seat backs of Rambler Sixty-five are higher.

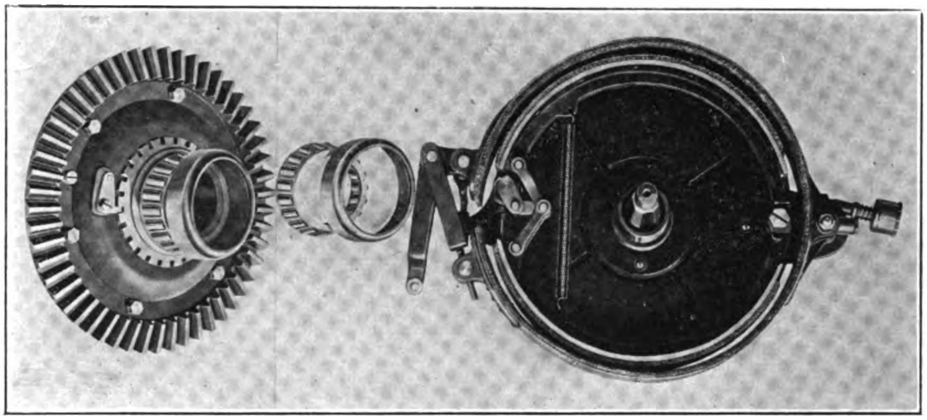
The headlights on the 45-horsepower chasses are one size larger than last year, being 8- and 9-inch sizes for the five- and seven-passenger models. These and the side lamps are placed higher, adding to the appearance and affording better light. Side and tail lamps for all models are combination electric and oil. The current of these lamps is furnished by 6-80 storage battery and they are operated by a three-point push switch.



Model 64 and 65 engine, showing new carbureter and location, new intake pipe with priming plugs over intake valves



Transmission and rear axle construction showing new style brakes



1911 Rambler brakes and squared rear axle, also differential

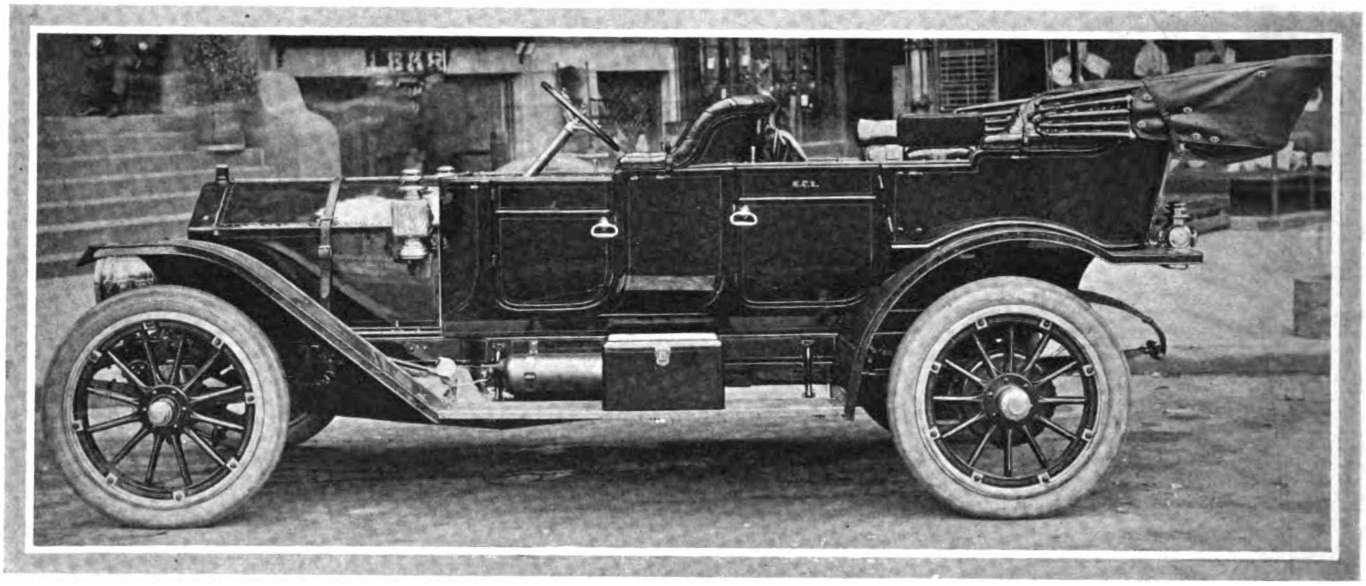
Methods of Testing

The final completion of the laboratory, some of the details of which were described in THE AUTOMOBILE some time ago, consummated the plan that assures detailed and exact testing of every Rambler car manufactured in addition to a proper investigation of the units of each automobile before they are assembled into the respective cars. This laboratory situation is of far-reaching importance. It may not be generally understood that the testing out of a considerable number of automobiles every day demands the use of a vast amount of equipment, and a large number of skilled men, under ordinary conditions, the cost of which becomes so great that it is something of a question as to whether or not this part of automobile building, taking it in general, has been afforded the care and attention it naturally deserves.

The new laboratory in the Rambler plant possesses several innovations that are labor-saving, hence the more accurate, it being the case that the "personal equation" is the most to be feared in any test room. It is not impossible to find here and there a skilled man who will do good and accurate work every day, but it is substantially impossible to rely upon the skill, judgment, and reliability of a plurality of men. In the Rambler test room every motor is brought in and put down on a stand, there being enough of these stands to handle the daily output of the plant with sufficient promptness to prevent a slow-down in the regular shop work while tests are being made. The test stands are provided with electric motors, one for each, which motors are so designed and connected up that they will run either as dynamos delivering current for storage batteries, or as motors deriving electrical energy from the same storage battery, in which event the motors drive the gas engines to be tested.

As each motor is delivered to its test stand it is profusely lubricated, and the electric motor is connected up to a tumble shaft, all of which is done in a moment, and the motor to be tested is driven by the electric motor until the electrical instruments employed for measuring show that the friction of the motor to be tested is down to its proper level. After this, the motor to be tested is made the driving unit, and the electric motor is turned into a dynamo by means of which the motor to be tested is loaded and the current delivered from the dynamo is passed through measuring instruments for the purpose of determinating the amount of a load. The electric energy thus generated by the motors undergoing the test is utilized to charge the storage battery, and in this way every motor that is tested is put through its paces speedily; moreover, the actual waste of energy in the whole system is limited to that which is dissipated by friction and heat losses.

Each motor, before it is permitted to do any work at all, must show on the electrical instruments that the friction losses, internal within itself, are down to a certain standard; it must also be shown that the motor is in a good state of kinetic balance, and the performance of the mechanisms must be noiseless with entire freedom from gas leaks and other recognized indications of poor mechanical work. As the motors come off the test stand they are checked up as to timing and thermic performance generally; in this class of testing the manograph is employed as the sole guide, it being understood that it is utterly impossible to reach a conclusion of any worth from the thermic point of view without employing the manograph. It was found, after some experience, that the ordinary forms of manograph, while they evolved a certain amount of accuracy, were far too slow.



Model M 1911. Fore-door type of touring car, seating seven passengers, showing a well-fitted top folded down, and other advanced features

Pullman 1911 Announcement

TWO INCHES ADDED TO THE WHEELBASE OF ALL MODELS; MATERIALS USED ARE MUCH REFINED.

SO entirely satisfied is the Pullman Motor Car Company, of York, Pa., that its 1910 product was close to perfection that in the output for 1911 will be incorporated only those minor mechanical changes and refinements in design which the natural progress of a year would seem to demand. The numerous road and track successes of the Pullman during the past year would seem to warrant this course.

As was the case in 1910, the 1911 list will include Models K, O, and M—Model K registering 32.4 horsepower (A. L. A. M.); Model O, 26 horsepower, and Model M, 44.1 horsepower. Of Model K there will be three body models—touring car, seating seven; roadster, three, and toy tonneau, four. There will be the same number and types of body designs of the O model—seating four, three and two, respectively. Model M will be represented by a touring car with a capacity of seven and a toy tonneau seating two. The upholstery is luxurious, hand-buffed leather is used, and comfort is looked to with care and precision.

In the matter of wheelbase length, all three models have been added to to the extent of 2 inches as compared with last year—K to 114 inches, O to 110 and M to 126. The tread has been reduced in all three models 1-2 inch to 56 inches.

Information in Relation to Model K 1911 Motor

This motor is shown in two views, Fig. A being the left-hand side and Fig. B being the right-hand side. Referring to Fig. A, the magneto M1 rests on a shelf S1 in front of the arm A1. The magneto is driven from the shaft S2, which extends out of the half-time gear box B1, but the water pump W1 intervenes and takes its power from the same shaft. Both the magneto and the water pump are flexibly mounted, and Oldham joints J1 and J2 are utilized to bring about the condition of flexibility desired and to compensate for minute differences in alignment, it being the case that absolute accuracy cannot even be found in a chronometer. The water pump has a drain cock D1 at the lowest point in the water system, and the water intake passes up to an enlargement around the shaft, while the water manifold M2 flanges off of an extension from the pump in the upward direction, leading the water into the cylinders at a point just under the exhaust manifold E1. Attention is called to the accessibility of the exhaust manifold flange bolts B2, of which there are two for each leg. The cylinders C1, C2, C3 and C4 are cast individual of the T-type, bringing the inlet and exhaust valves on opposite sides, but there is one point which should not be overlooked in scanning the scenery of this motor; the cylinder jackets are cast open on adjacent sides, so that the respective cylinders are flanged F1 to each other, the two outside cylinders having covers C5 and C6. This school of design affords certain advantages. A trip to the foundry where the cylinders are cast, and a short study of the ramifications in the foundry, will lead up to knowledge of the fact that good, sound castings are only to be had if the gases are tapped away, and it is a recognized fact in foundry work that to be able to dispose of the gases it is necessary to provide an exit for them. When the water jackets are cast all around it is extremely difficult to keep the gases from shooting through the solidifying metal instead of passing around to the small holes that are left from core prints, etc. But by casting the cylinders in the manner as here shown a large opening is afforded on each side of each cylinder for the disposal of the gases that form, and bolting the cylinders to

MODELS	Price	H.P., A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	
Pullman K-11...	$2000	32.4	Tour'g.	7	4	4½	4¾	Single.	Tubular.	Cent'fl...	Bosch...	Battery.	[illegible]
Pullman K-11...	2000	32.4	R'ster..	3	4	4½	4¾	Single.	Tubular.	Cent'fl...	Bosch...	Battery.	[illegible]
Pullman K-11...	2000	32.4	T.Ton...	4	4	4½	4¾	Single.	Tubular.	Cent'fl...	Bosch...	Battery.	Pump
Pullman O-11...	$1650	26.	Tour'g.	4	4	4 1/32	5	Pairs..	Tubular.	Cent'fl...	Bosch...	Battery.	Pump
Pullman O-11...	1650	26.	R'ster..	3	4	4 1/32	5	Pairs..	Tubular.	Cent'fl...	Bosch...	Battery.	Pump
Pullman O-11...	1650	26.	T.Ton...	2	4	4 1/32	5	Pairs..	Tubular.	Cent'fl...	Bosch...	Battery.	Pump
Pullman M-11...	3500	44.1	Tour'g.	7	4	5¼	6	Single.	Cellular..	Cent'fl...	Bosch...	Battery.	Pum
Pullman M-11...	3500	44.1	T.Ton..	2	4	5¼	6	Single.	Cellular..	Cent'fl...	Bosch...	Battery.	Pum

each other in this way lends extra stability to the structure, nor can it be claimed that the cost or complication is increased at all.

Referring to Fig. B of the right-hand side of the motor, it shows the Stromberg carbureter C1 with its manifold M1 and an accommodation piece A1 intervening. This brings the carbureter on the side opposite to the magneto, which is as far away from the source of an ignition spark as it is possible to get. This view offers a chance to appreciate the accessibility of the timer T1, which is between the third and fourth cylinder and above them, taking power from the vertical shaft V1. Breathers B1 and B2 for the crankcase come up out of the arms through a tortuous passageway so that the lubricating oil within the crankcase is prevented from shooting out through the orifices of the breathers. The flywheel F1 is of sufficiently large diameter considering its face and the thickness of the rim to afford the fullest measure of "flywheel effect" without reaching into the danger zone from the point of view of extreme fiber strain in the rim section due to centrifugal force. The four cylinders of the motor, in view of the method of flanging, occupy the minimum space, and the motor is rated at 35 horsepower by the maker, the cylinders having a bore of 4 1-2 inches and a stroke of 4 3-4 inches. The magneto is a Bosch with a battery auxiliary, and lubrication is by means of a circulating pump. The cone clutch C2 shows nested in the flywheel, and the actuating mechanism, including the clutch spring, are within the housing H1.

Lay-out of the Model K 1911 Chassis

In this view the radiator R1 is on the center line of the front axle A1, and the motor M1 occupies a position which brings the flywheel F1 at the point of narrowing N1 of the chassis frame. The universal joint U1 is between the motor and the transmission gear G1. The propeller shaft P1 is provided with universal joints U2 and U3, the latter being close to the live rear axle A2, and torsion is compensated for by a torsion rod T1, which is anchored to the cross-member C1 with a shackle S1. Both front and rear springs are of the half-elliptic type, and the rear springs S2 and S3 are unusually long with wide plates, thus inducing the fullest measure of flexibility, coupled with the proper snubbing function, so that the car rides with freedom from undue vertical bounce. The live rear axle is of symmetrical exterior, of great strength, but light, and by a study in straight-line design it was possible to make the links and levers controlling the brakes in the drums of the rear wheels straight and fair. The equalizer E1 for the service brake comes inside the chassis frame, and the rods for both the service and emergency brakes are dead straight, due to the use of extension pieces E2 and E3, which are flanged and bolted to the chassis frame at a point just in front of the front anchorage of the rear springs. The front axle is of the I-section, with stout knuckles and through pins, and the steering drag-rod D1 comes in a protected position above the axle, while the cross-rod C2 is straight and behind the front axle. There are other nice features of design that will be apparent to the reader upon inspecting the plan view.

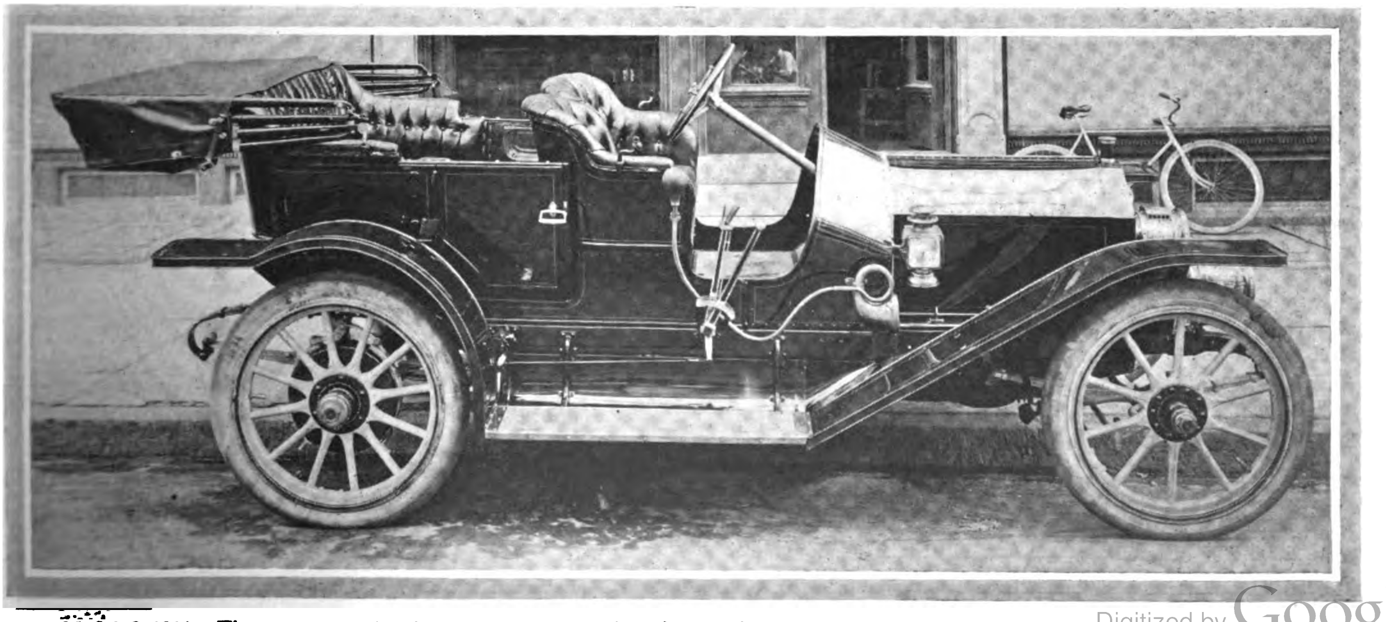
Design of Model K 1911 Transmission Gear

This gear is of the three-speed and reverse selective type with flanges F1 and F2 on the sliding gear and final drive shafts, respectively. A universal joint is used between the transmission gear and the clutch, one member of which, U1, is shown, indicating a mating flange and the method of bolting. The sliding gear shaft S1 has integral flutings, and the sliding gears G1 and G2 are splined to match. The sliding gear G1 meshes with mating gears G3 and G4 on the lay-shaft S2, while the sliding gear G2 meshes with the gear G5 on the lay-shaft S2, and in the opposite direction a dog clutch D1 is brought into engagement, making the high-speed direct-drive. Motion is imparted to the lay-shaft S2 by means of the master gears G6 and G7. The sliding gears G1 and G2 are actuated by forks F3 and F4 and motion is imparted to these forks by means of the selector bars B1 and B2. The shafts float on Hess-Bright annular type ball bearings B3, B4, B5 and B6. The gears are six diametral pitch with wide faces and are turned from bars of chrome vanadium steel, after which they are hardened and subsequently heat-treated to impart kinetic qualities without destroying the hard shell. The prime and lay-shafts are of chrome vanadium steel also.

The fenders are rakish, made from pressed steel, with the running boards enclosed. Dashes are mahogany, brass bound.

The bodies are of wood and aluminum, upholstered in hand-buffed leather. The gasoline tank is located underneath the front seat. Each

TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
Type	Speeds	Loca-tion	Drive				Crank-shaft	Trans-mis'n	Axle		Front	Rear
Selecti'e.	3	Frame..	Shaft...	114	56	Steel....	5 Plain.	Ball....	Roller..	....	34x4	34x4
Selecti'e.	3	Frame..	Shaft...	114	56	Steel....	5 Plain.	Ball....	Roller..	....	34x4	34x4
Selecti'e.	3	Frame..	Shaft...	114	56	Steel....	5 Plain.	Ball....	Roller..	....	34x4	34x4
Selecti'e.	3	Frame..	Shaft...	110	56	Steel....	3 Plain.	Ball....	Ball ...	....	34x4	34x4
Selecti'e.	3	Frame..	Shaft...	110	56	Steel....	3 Plain.	Ball....	Ball....	....	34x4	34x4
Selecti'e.	3	Frame..	Shaft...	110	56	Steel....	3 Plain.	Ball....	Ball....	....	34x4	34x4
Selecti'e.	4	Frame..	Shaft...	126	56	Steel....	5 Plain.	Ball....	Roller..	....	36x4½	36x4½
Selecti'e.	4	Frame..	Shaft...	126	56	Steel....	5 Plain.	Ball....	Roller..	....	36x4½	36x4½



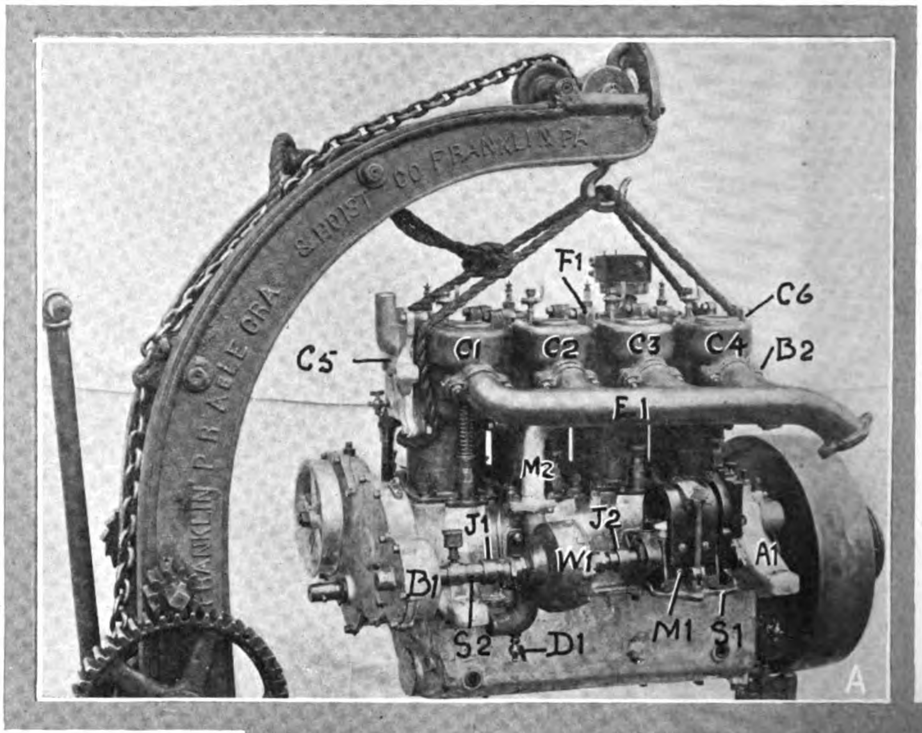
Model O 1911. Five-passenger touring car with an overhanging cowl, fitted with a top folded down, showing a roomy tonneau car comes equipped with two gas headlights, gas generator, two oil side lamps, an oil tail lamp, horn, tools, coat and foot rails.

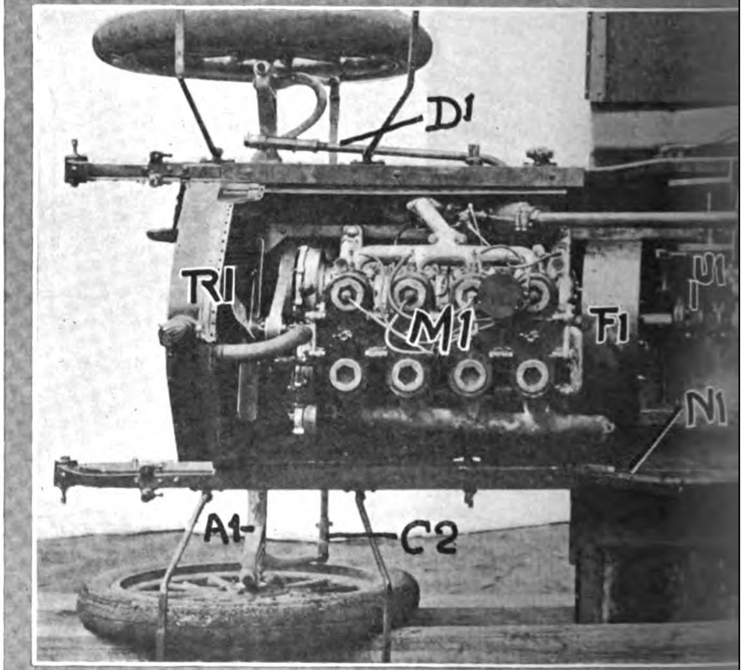
The standard color is "Pullman red," a very durable and distinctive shade. Dark blue with straw-colored wheels or black with wheels of similar tint are among the options.

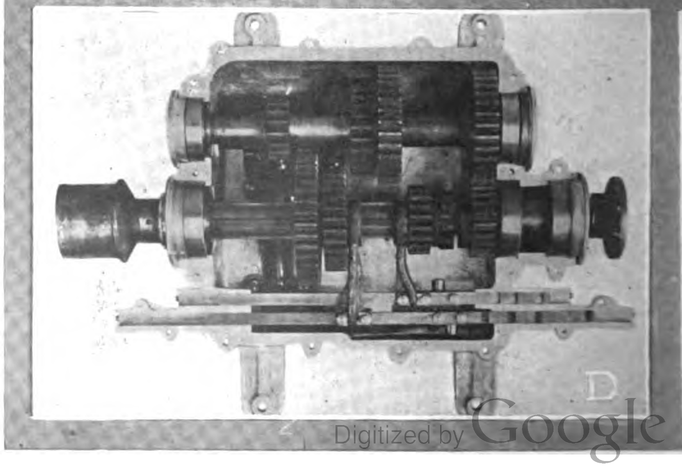
The tire equipment of Models K and O calls for 34 x 4 front and rear, the Model M cars being equipped with 36 x 4 1-2 front and rear.

From the price standpoint, the Pullman 1911 proposition is identically the same as that for 1910—$1,650 for Model O, $2,000 for Model K, and $3,500 for Model M.

The illustrations as presented on this and the following page, if subjected to a close examination, will disclose to the interested reader many points of mechanical refinement on a basis of harmony that were not fully disclosed by discussion, and it is pointed out that the motor as it is here shown is picked up by a system of travelers that indicate in a small measure the excellence of the equipment that is used at this plant in the manufacture of automobiles, moreover, it is fitting to state that the cars are very completely made by the company, rather than to be classed as a product that is assembled from parts that, for assembled automobiles, are purchased elsewhere.







Automobile Colors

By M. C. HILLICK

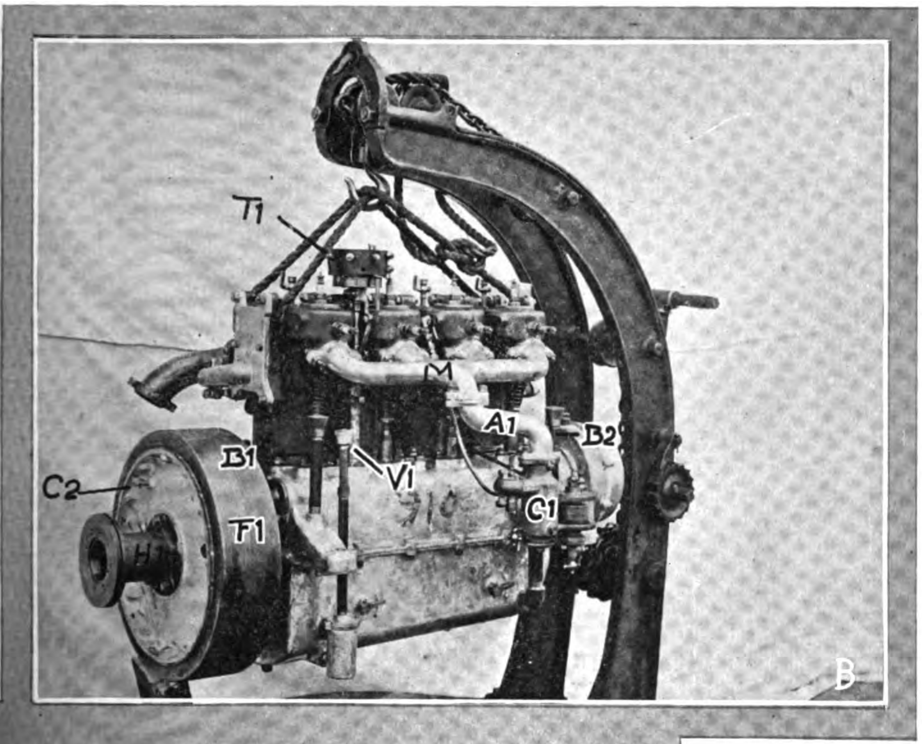
Doubtless the automobile owner as well as the automobile painter will be interested in the subject of popular colors for the season of 1911. With the march of the season, of course, will come not a few color novelties intended to appeal to a class of buyers intent upon securing decidedly unique or sensational pigment effects. The great majority of colors, however, destined to be in evidence upon the horseless carriage next year will be the colors that have found favor this year, or pigments closely related to them.

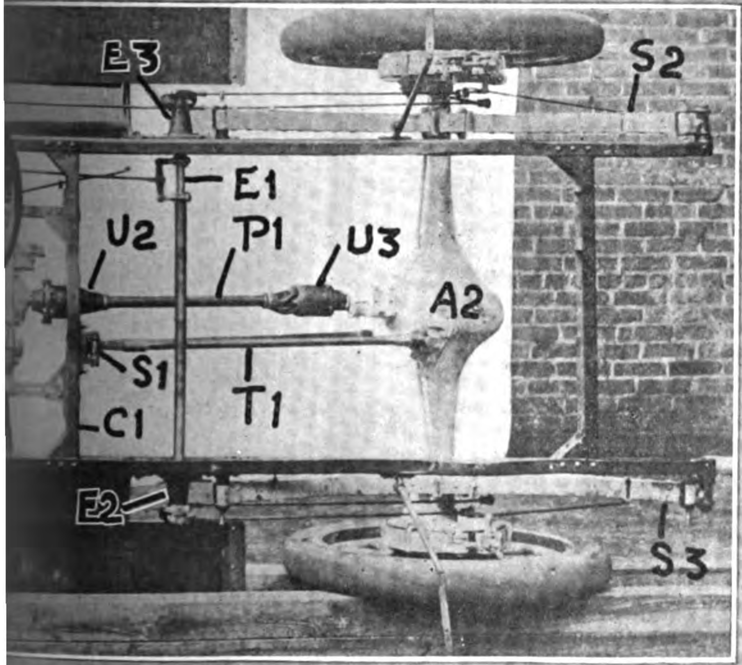
Among such colors the lakes must be reckoned with. The lakes comprise an interesting and numerous family of pigments, many of them rare and costly, and all of them charming in their wealth of color effects.

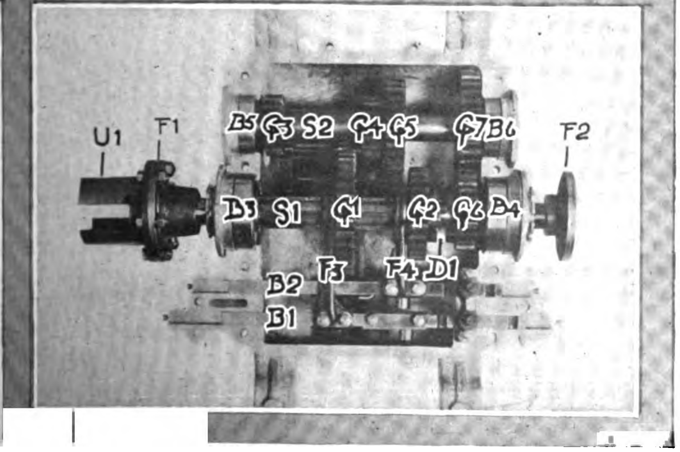
The principal lakes are maroon, crimson, Chatimuc, carmine, Munich, scarlet, mauve, madder and purple. As illustrating the extent to which many of these lakes are now being used in automobile work a color salesman recently stated to the writer that whereas he formerly sold lakes in one-pound lots he is now selling them in 50-pound lots, and that, too, on a basis of from $3 to $5 per pound.

The first step in preparing the surface for the lake has to do with working out a fine, smooth surface condition. It is an axiom that the finer the surface the richer the color effect, which in large part is true. To get this fine, level and smooth surface is not always easy over a surface holding its old paint structure in fair condition, and upon which it is not feasible to apply roughstuff. In case of the application of the roughstuff over the old paint fabric puttying should at least be done upon the first coat of surfaces in order to fill up all fractures, cavities and shattered bits of wood. Then apply over this putty a couple of coats of roughstuff, which, in due course, are rubbed down to a level and smooth surface. The work is now ready to be coated in with color.

Should the surface be a new one from the wood up it is first primed, then coated with two good coats of lead, next puttied,







and then bodied up full and strong with four coats of roughstuff and capped off with a stain coat for the guidance of the workmen invested with the duty of rubbing the stuff out to the proper surface. Having reached this point we are ready to convey either the old or the new surface forward to a finish in practically the same order, and as follows:

For Munich lake first lay on a coat of Indian red saddened a bit by adding a little drop black. Then apply a coat of medium wine color thinning the color out to dry down flat. The following day take some of the lake proper, break it up in turpentine alone, and continue to thin to the proper working consistency with this fluid. With this flat color the surface, laying the pigment on with a camel's hair brush. Permit the coat to dry until the day following whereupon break, say, an ounce of the lake up finely in turpentine, and then to the mass use a full pint of elastic rubbing varnish, stirring all the ingredients thoroughly. With a half elastic, fine bristle brush, flat, flow the surface with a generous coat of the lake. After two days, rub the gloss from this coat with water and No. 0 pulverized pumice stone, using a felt 1-2 inch perforated rubbing pad. Then to a pint of the elastic rubbing varnish add a bare half ounce of the lake, stirring to an intimate incorporation of all the ingredients. Allow three days for this coat to nicely harden after which flat down uniformly as above. Then stripe, if so desired. The day following apply a clear coat of the elastic rubbing varnish which, after four days of drying out, may be nicely and uniformly rubbed down, washed up, touched up where necessary, and then finished with a strictly high-class finishing varnish.

English scarlet lake may be provided for by first using a peach blow colored pigment on top of which apply a coat of English vermilion made up with enough varnish to hold the pigment intact and give it the right working property. Make a glaze coat of the English scarlet lake and apply directly over this. English crimson lake works nicely and with admirable effects over quite the same ground, or with a ground of Tuscan red.

In the line of beautiful pigments none surpass No. 40 carmine, a lake of such magnificent effects that it is the popular idol.

This color is obtained in at least three different shades, this feature alone being important when arranging to try the pigment out. The one shade, say that of deep carmine, may over different grounds be made to show both light and dark color. For a deep No. 40 carmine build a ground of English Indian red. Over this ground next lay a coat consisting of one part deep wine color and two parts of the carmine, thinning the two pigments down to a brushing consistency with turpentine, adding as a binder a teaspoonful of new linseed oil to a pint of the thinned color. Over this color flow a glazing coat made up of elastic rubbing varnish stained with No. 40 carmine in the proportion of 3-4 of an ounce of pigment to a pint of varnish.

For a medium deep shade of carmine use light Tuscan red, laying the first coat of carmine as a flat color, then glazing.

For a light carmine lay the carmine first as a flat color then as a glaze color over a ground of English vermilion. In the use of carmine success depends in no small degree upon the quality of the pigment. Not a little of the No. 40 French carmine being sold to automobile painters and manufacturers, while chemically pure, has a muddy, lusterless tone, a defect which condemns it for good work. The carmine pleasing alike to critical buyers and connoisseurs carries a striking blood red

Digest

EXTRACTS FROM BEST FIFTY FOREIGN JOURNALS DEALING WITH SUBJECTS RELATED TO AUTOMOBILE ENGINEERING—A FORMULA FOR CRANKPINS—HEATED SCRAPER FOR REMOVAL OF PAINT

D. O. Barrett gives a series of formulas and diagrams for the calculation of crankshafts for single-cylinder motors of the four-cycle type and up to 75 horsepower. These have been applied in practice to motors of up to 60 horsepower and no failings have been noted in the shafts so calculated.

(1) *Shaft Diameter.*—The shaft's resistance to torsion is proportional to the cube of its diameter D, while the torsion moment applied to the shaft by the force of the explosion is proportional to the product of the bore B squared and the eccentricity of the crankpin, the latter being one-half of the length of the piston stroke S. From this:

$$\frac{B^2 \times \frac{1}{2} S}{D^3} = c.$$

The safety factor c, as used in practice, varies from 10 to 19 and averages 15.

The stroke S may be considered as a linear function of the bore B; S equals aB. Hence:

$$\frac{B^2 \times \frac{1}{2} aB}{D^3} = c = 15.$$

This gives for the diameter:

$$D = \sqrt[3]{\frac{a \times B}{30}}$$

In motors of the powers under consideration the stroke usually averages 1 1-2 times the bore, but it varies from 1 1-4 to 2 times the bore. For a equal to 1 1-25, D becomes 0.347 × B. For a equal to 2, D becomes 0.405 × B.

(The original here gives a diagram showing the shaft diameter for various bores and strokes, in inches.)

(2) *Dimensions of Crankpins and Bearings.*—In order to obtain the best results the mean pressure on the pin must not exceed 28 kilograms per square centimeter of projected surface. There is here allowed a mean pressure of 27.3 kilograms. Let l be the length and D the diameter of the pin, P_1 the mean pressure, of 27.3 kilograms. The total mean pressure equals the piston pressure per square centimeter multiplied by the bore B. Hence:

$$P_1 \times ld = 0.7854 \times B^2 \times \text{mean total pressure.}$$

Assuming this mean total pressure to equal 5.25 kilograms per square centimeter, one has:

$$ld = \frac{0.7854 \times B^2 \times 5.25}{27.3} = 0.151 B^2.$$

Usually l is made equal to d, and this means that d^2 equals $0.151 \times B^2$, or d equals 0.39 B.

If this formula gives d a smaller value than that of D, it should not be made smaller than D, but at least equal, and better, as high as 1.125 D.

For the bearings the dimensions should be:

The diameter, $d_1 = 1.1\,D$ and the length $l_1 = (1.75 \text{ to } 2) \times D$.

(3) *Dimensions of the Crankcheeks.*—Generally rectangular, these work against a beam fixed at one end. The resistance is directly proportional to the width b and to the square of the thickness t and inversely proportionate to the length, which latter is a direct function of the stroke S. The stress on the end of the cheek is proportional to the square of the bore, hence:

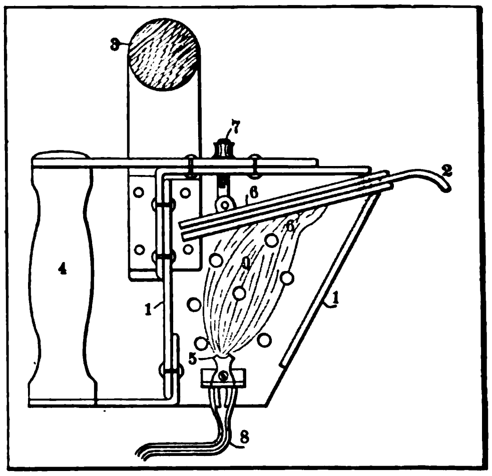
$$\frac{bt^2}{B^2 S} = c_1.$$

The constant c_1 obtained by averaging the values found on a number of motors, equals 0.045. The thickness t is usually 2.2 b and S equals aB. Hence:

$$\frac{t^3}{2.2 \times aB^3} = 0.045 \text{ or } t = B\sqrt[3]{0.999 \times a}$$

It is now easy to trace a diagram showing the value of t, as expressed in functions of the bore and the stroke, for the various customary values of a.—From *Technique Moderne* as quoted in *La Technique Automobile et Aérienne,* Sept. 15.

For the removal of paint or enamel from large metal surfaces, for which work either the blowtorch or a special chemical lye is usually employed, unless a sandblast is available, a method is recommended which is said to offer the advantage of always leaving the metal surface uninjured and in suitable condition for a new coat of paint. It also has the advantage of being less messy than other processes; it develops no fumes and may be carried on at any place in a factory and by unskilled workers. It consists simply in using a heated scraper. In the accompanying illustration 1 represents the sheet iron boxing, 2 the scraper, 3 and 4 the handles for operating the tool, 5 a gas flame jet, 6 guide irons for holding the scraper, 7 a screw and nut for adjusting the angle of the guide irons, 8 a flexible tube to the gas supply, 9 ventilation holes in the sides of the box.—*Metall Technik,* Aug. 27.



Heated scraper for removing old paint

Braking with the Motor in the Hills

An old tourist who has traveled much in the Alps and Pyrenees, in Italy, Switzerland and Tyrol, describes how he utilizes the compression in his motor for braking without drowning the spark plugs in lubricating oil and inviting fouling. He has a 20-28 horsepower vehicle weighing in touring condition and with two travelers 1,980 kilograms. At the top of the admission tube which comes from the carbureter he has made an opening one centimeter wide and three centimeters in circumference, which opening he can open and close from his seat. When he sees that he is going to reach the top of a hill and it dips down on the other side, he closes his gasoline pipe—from the seat—about fifty meters before reaching the top and relies on the fuel in the carbureter to take him up. Now, to descend, he drops to low gear (or second), opens the above-mentioned opening in the admission tube and leaves the contact of the magneto as for ordinary driving. Despite the excess of air he may have one or two explosions from the remaining gasoline in the carbureter, and he withdraws the magneto contact but restores it when the explosions cease for want of gasoline.

Selden Mechanically for 1911

PRESENTING THE MOTOR IN DETAIL, AFFORDING DIMENSIONS OF THE CRANKSHAFT AND THE AXLES, ETC.

THIS coming year the Selden car will be placed at the disposal of the clientèle of the Selden Motor Vehicle Co., of Rochester, N. Y., in five models, ranging in price from $2,250 for the Model T touring car to $2,600 for the Model 40-S fore-door touring car, the details of the respective models being given in the table as herein presented. Dismissing the commercial situation as it involves the body types, color of paint, and other matters, which the customers will readily be able to dispose of themselves if they inspect the cars, it will be the purpose here to show in precise detail some of the important mechanical details of design of the machinery part of the Selden make of automobiles.

The motor is identical in the several models of cars and is presented in a part-sectioned elevation in Fig. 1. This motor has four cylinders, cast in pairs, with T-heads, bringing the valves to one side. It is rated at 36.1 horsepower (A. L. A. M.) and the cylinders have a bore of 4 3-4 inches, with a stroke of 5 inches.

As Fig. 1 shows, the motor is of the water-cooled type, with integral jackets, excepting that the top is open and a separable top piece is bolted to flanged faces, so that the exterior of the domes of the cylinders may be gotten at and cleaned off, even to the extent of scraping, if in the course of time scale should form over these surfaces. The water is circulated by means of a centrifugal pump, the latter being gear driven, taking power from the half-time gear train. Ignition is by the type Bosch DR-4 magneto, with a storage battery as a source of auxiliary supply; the details of the ignition system will require no further attention here, it being the case that the interested reader may glean a better insight into the magneto ramifications by studying the literature as issued by the Bosch Company direct, which covers the subject much more thoroughly than is possible here, where the magneto is but one of the many details of construction to be considered.

Lubrication is by splash with a means for maintaining a constant level. Among the important details of the motor as shown in Fig. 1, mention will be made of the fact that the cylinder castings are of close gray iron, symmetrical in design, and are machined and otherwise brought to a precision of bore that assures tightness of compression, this condition being accentuated by the use of well-designed piston rings, that are fitted on an interchangeable basis. The valves are of the bevel seat type,

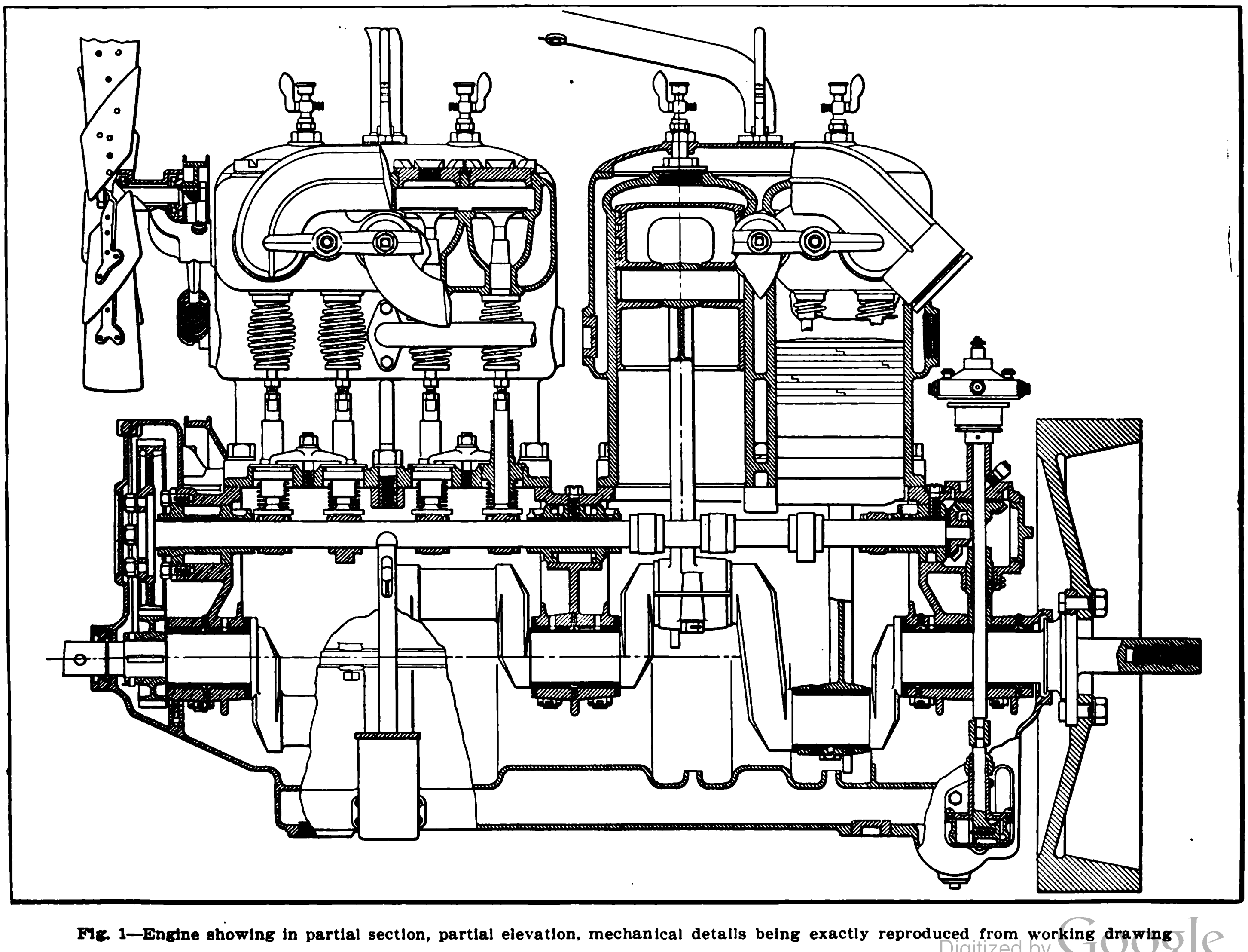


Fig. 1—Engine showing in partial section, partial elevation, mechanical details being exactly reproduced from working drawing

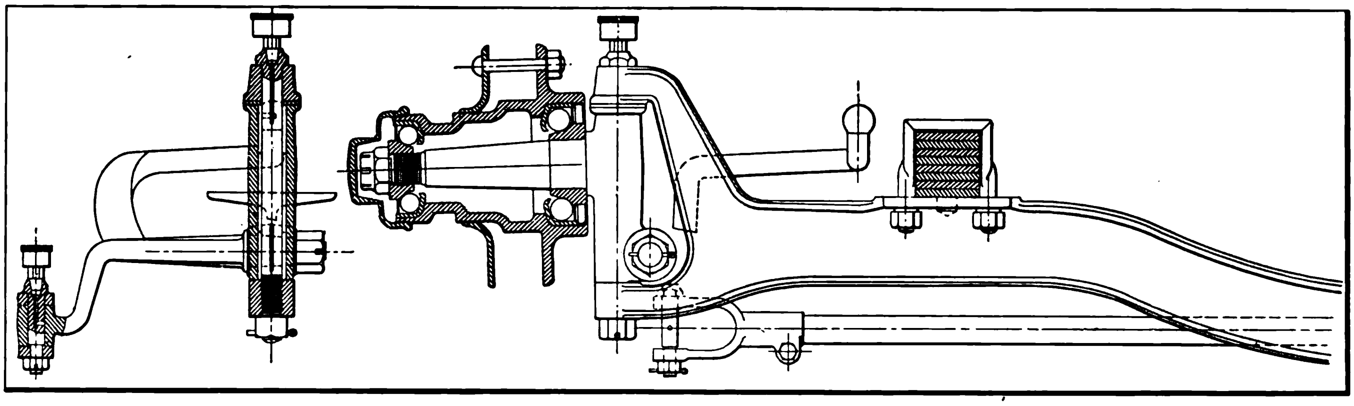


Fig. 4—Front axles are mounted on ball bearings of large diameter placed wide apart, and arranged to take thrust, also

and the water-jacketing around the valve seats is such that a uniform temperature obtains at every point. The valve stems are of large diameter, and at the point of intersection of the mushrooms with the stems extremely liberal fillets are provided, so that the heat that is wiped out of the contacting gases by the mushrooms is permitted to travel down the large area steps, from whence it is tapped away by the cold walls over a considerable area. This is a point that would escape the notice of a novice, until, in the course of time, the valves, if otherwise designed, would warp and resist being ground into tightness, due to the fact that the stems would curl up in response to unequal heat conditions, and it would be impossible to grind the valves into a condition of tightness. The valves are of large diameter, relative to the bore of the cylinders, so that at each inspiration the amount of gas taken in is relatively high, and the compression is so regulated that the power stroke is vigorous, but care is taken to maintain a condition of harmony of relation from a thermic point of view. The result, in practice, is that the motor has life, accelerates smartly, but the curve of torque is flat top, which has the advantage of affording a substantially constant range of power over a wide range of performing speed, and a thermal efficiency that makes it mark favorably on the fuel consumption. By carefully regulating the compression the troubles due to carbon precipitations are eliminated, but by using large area valves, and looking sharply to the condition of carburetion in the presence of efficient cooling the weight of mixture that is taken in per inspiration is relatively high, and the power of the motor is not only marked but this power holds over the wide range of speed that good practice demands. It is common opinion that silence of performance is due to mechanical accuracy in the machining and assembling of the parts; it may be as news to some, even discriminating automobilists, to learn that silence of performance depends upon the harmony of thermic relations as well as upon mechanical accuracy.

In view of the considerable cost of a crankshaft, and the importance of the service it renders in the motor, coupled with the fact that if it fails in service it is almost like losing a whole automobile, it is preferred to reproduce the crankshaft with all its dimensions just as the drawings are sent to the shop where the crankshafts are made, and in this way it will be possible to show not only the dimension of the sections and the bearings but the limits of tolerance within which the workmen must stay in the production of crankshafts. The main bearing is 5 5-16 inches long by 1 7-8 inches in diameter, so that the projected area of this bearing is sufficient and to spare to handle not only the torquing of the motor, but the gyrations of the flywheel as well. The bearing at the opposite end, since it has to do very much less work, is reduced to 1 3-8 inches in length, by 1 7-8 inches in diameter. The mid bearing is 3 3-8 inches in length by 1 7-8 inches diameter; this bearing has to shoulder a somewhat greater responsibility than the front bearing, but it has to do considerably less work than the bearing which supports the flywheel. The connecting rod bearings, that is to say the crankpins, are 2 7-8 inches long by 1 7-8 inches in diameter, and since

SPECIFICATIONS OF SE

MODELS	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION	
			Type	Seats	Cyl.	Bore Inches	Stroke Inches	Cyl. Cast.	Radiator	Pump	Magneto	Battery
Selden 40 R.....	$2500	36.1	R'dster.	2	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage..
Selden 44.......	2500	36.1	Fd.Rst.	4	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage..
Selden 46.......	2600	36.1	Fd.To..	6	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage..
Selden 40 S.....	2600	36.1	Fd.Tg..	7	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage..
Selden 40 T.....	2250	36.1	Tour'g..	5	4	4½	5	Pairs..	Tubular.	Cent'fl...	Bosch...	Storage..

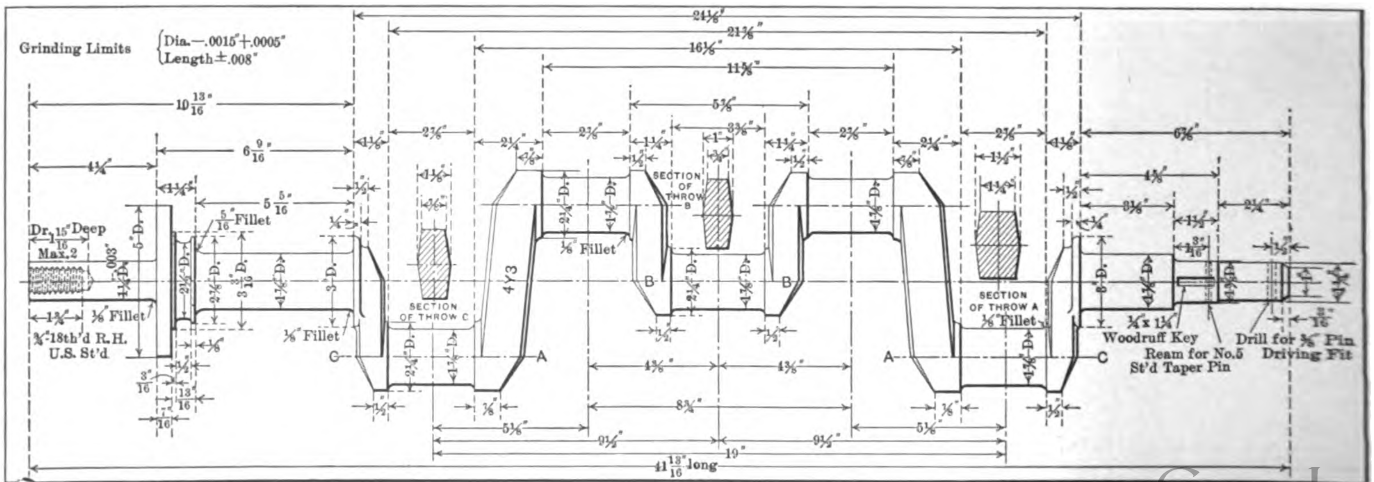


Fig. 2—Crankshaft of the Selden engine, showing liberal diameters and lengths with compactness and light weight

the work coming on each of them is the same they are all made alike. An examination of the section of the throws at A, B and C will afford information as to the rigidity of the crankshaft, especially if account is taken of the excellence of the material employed therein. At the upper left hand corner of this illustration it states that the grinding limits are, for diameters, from minus 0.0015 to plus 0.005, whereas, the limits of tolerance for lengths are plus or minus 0.008 (inches in each case). It is not impossible for good machinists on proper grinding equipment to keep within these limits of tolerance but it is not to be expected that the ordinary run of work, in the absence of a rigid inspection system, will adhere to this exacting standard.

As the tabulation shows, the transmission is of the three-speed and reverse selective system. Fig. 3 is a plan in part section of the same, in which the ratios of gears are given, indicating that the direct drive comes on high speed, which is obtained by sliding the sleeved second speed gear, the latter having backed off dog projections on its face, which engage with similar projections on the face of the master gear in juxtaposition. The master gears have 18 and 33 teeth respectively so that the layshaft travels at a little over half the speed of the main shaft. The low speed pinion has 18 teeth, and a reverse pinion has 14 teeth with a 16-tooth idler. The spindles are short in centers, made of a selected grade of material, and roll on Timken Roller Bearings with closures to prevent dust from coming in or oil from seeping out. The universal joint at each end of the main shaft slips over a squared end, and the block of the joint is broached square, and scraped to a press fit. The gears, besides being of large diameter, have liberal faces, and the material used is that which responds to heat-treatment on a basis to afford a glass-hard surface, supported by an elastic core. The shell is of aluminum, has a symmetrical exterior and is oil-tight.

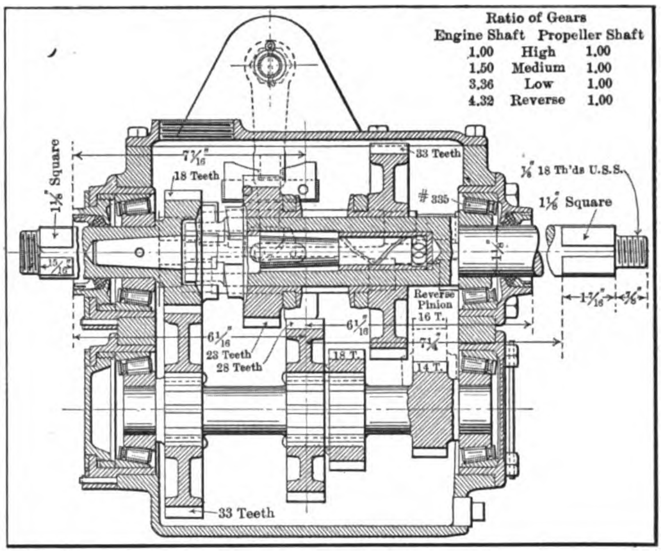


Fig. 3—Sectional drawing, showing transmission details

:ARS AS OFFERED FOR 1911

	TRANSMISSION							BEARINGS				TIRES	
Clutch	Type	Speeds	Loca-tion	Drive	Wheelbase	Tread	Frame	Crank-shaft	Trans-mi.'n	Axle	Weight	Front	Rear
ne....	Selecti'e.	3	S. Fr'me	Shaft...	125	56	P. Steel..	3 Plain.	Roller..	Line....	2700	36x4	36x4
ne....	Selecti'e.	3	S. Fr'me	Shaft...	125	56	P. Steel..	3 Plain.	Roller..	Line....	3000	36x4	36x4
ne....	Selecti'e.	3	S. Fr'me	Shaft...	125	56	P. Steel..	3 Plain.	Roller..	Line....	3100	36x4	36x4
ne....	Selecti'e.	3	S. Fr'me	Shaft...	122	56	P. Steel..	3 Plain.	Roller..	Line....	3000	36x4	36x4½
ne....	Selecti'e.	3	S. Fr'me	Shaft...	116	56	P. Steel..	3 Plain.	Roller..	Line....	2900	34x4	34x4

Referring to Fig. 4 of the front axle, which is of the I-section drop-forged in one piece from a suitable grade of steel, it will be observed that the knuckle has a long bearing, a through pin with a locking nut on the under side, and a grease cup is placed at the top by means of which the long pin bearing is maintaine din a profuse state of lubrication. The hub is sufficiently long to fix the centers between the ball bearings used so great that wobbling of the front wheels is prevented, and this desirable condition is further assured, due to the length of the steering knuckle arms, and the fact that the motion is straight line. While the subject of steering is up it will be apropose to examine the details of the steering gear as shown in Fig. 5, in which the spark and throttle to levers above the large diameter steering wheel, noting the excellence of mechanical detail and the care with which the work is executed.

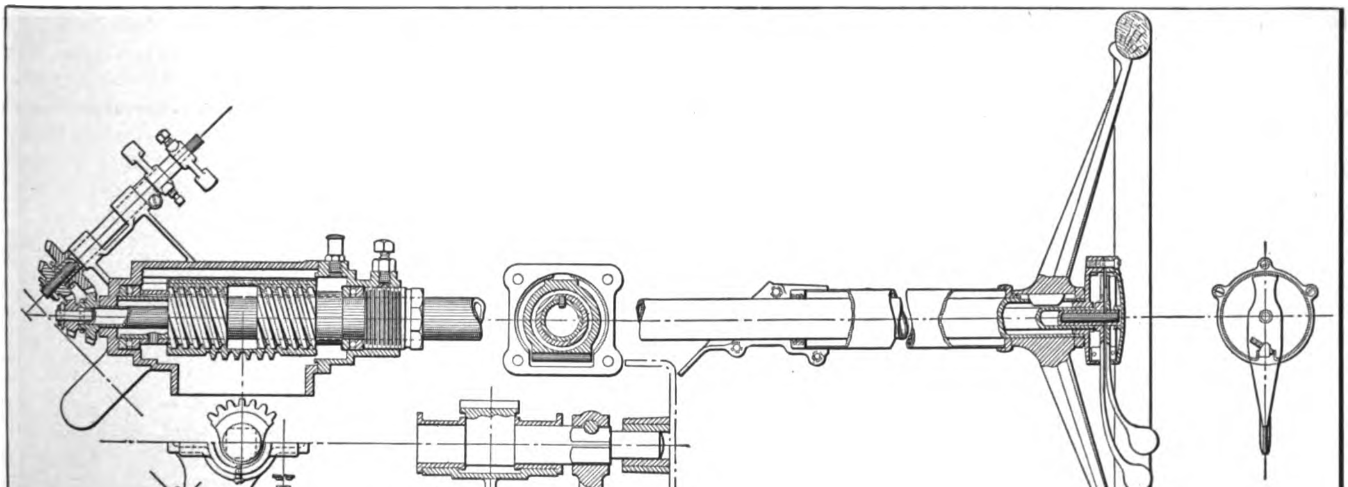


Fig. 5—Section through complete steering gear, showing double worm, hand wheel, and spark and throttle arrangement

McCord Solderless Radiator

DESCRIBING AN ELECTROLYTICALLY FORMED RADIATOR PATENTED BY "SOCIETE DES RADIATEURS ET REFRIGERATEURS"

ATTRACTED by the nice theory which underlies the construction of the radiator as patented by the "Societe des Radiateurs et Refrigerateurs of St. Ouen, France," and manufactured abroad by this company, remembering that this type of radiator has made its mark, it being used on such cars as Clement-Bayard, DeDion-Bouton, and Delaunay-Belleville, the McCord Manufacturing Company of Detroit, Mich., acquired the American rights to the patents of this system, and it is now manufacturing this type of radiator along the same lines as mark the products of the French firm, producing identical results, so that a description of this product in general will be precise for the McCord make as well as for the parent company. Fig. 1 shows one of the radiators as produced in the McCord plant, and before passing on to a description of the process of manufacture attention is called to the high finish, excellence of general appearance, and the substantial nature of the details involved.

Referring to Fig. 2 which is a section of a radiator of this type, mutilated to show the cells, and to bring out the waterway Wl, it will be observed that the thicknesses of the walls are just enough to afford stability, and the ratio of the thickness of the sheet of water as compared with the body of air that sweeps through the air cells is so regulated that a balance is obtained between the specific heat of air on the one hand, and the specific heat of water on the other, taking into account the controlling conditions, among which will be mentioned the better conduction of water for heat than that which obtains for air. Fig. 3 presents quite another view of the structural detail of the cellular part of the radiator, and the water passage-ways Wl are here brought into relatively bold relief, showing great uniformity of the thickness that obtains for the sheet of water, although in tearing the radiator apart the metal was somewhat damaged in the process, and to this extent allowance will have to be made for some variation in the apparent thickness of the water space. The process utilized in the manufacture of the cellular set being electrolytic, there are no joints to be solered at any point, and the passage-ways for water are entirely free and uniform with no chance at all of having portions of the passage-ways stopped up by accumulations of solder or other debris. The only point at which soldering is done is where the cellular set is inserted into the shell, resulting in the seams S1 and S2. These seams are riveted at A1, etc., around the whole distance after the meal is tinned over, so that the process of soldering is a mere matter of heating the metal to the melting point of solder when the tinned surfaces adhere to each other, but there is no excess of solder to run and clog up the waterspace.

Referring to Fig. 4, it will be observed that the water pipe M1 sleeves over the water pipe N1, and a joint is formed at the point F1 to afford mechanical strength. The water enters in the direction of the arrow, passes into the distributing pipe as shown, and is distributed out through holes H1 on the underside of this pipe, there being a sufficient number of these holes to deliver the total supply of water without undue friction, but the area of the holes as combined is just enough below the area of the pipe to cause the water to spray, and as it sprays out of the holes. It is delivered uniformly over the whole top of the cellular set, thus inducing a condition of uniformity of the cooling process that bespeaks efficiency on an accentuated basis, due to the elimination of cold zones in the body of the radiator. This illustration has the further value of showing how the radiator is put together with a double seam at the joint K1 and an overlap at the joint K2; the front joint K1 is so made as to avoid the necessity of riveting, but the joint K2 at the back, and its mate K3 below, are riveted R1 and R2 as well as being sweated and soldered. This view presents additional evidence of the uniformity of the water space, and it shows, in some measure, the strength of the metal obtained by the electrolytic process, the evidence of strength being in the tearing of the metal during the process of sectioning the radiator for the purpose of presenting it here.

In the manufacture of this radiator a pattern is first turned out, and from this pattern a casting is poured, using a lead composition for the same. The lead casting is subjected to a cleaning process such as will brighten the surfaces and permit of utilizing the electrolytic process which follows. In the electrolytic process, copper is deposited over the lead casting until the entire surface of the lead is covered with a homogeneous coat of copper to a sufficient depth to make a series of stout walls forming the cells of the radiator as shown in Fig. 2. After the copper is coated over the lead to the required depth, the electrolytic process is stopped off and the unit in this state is transferred to a heating bath which is maintained at the temperature of melting lead, and since this temperature is below the temperature of melting point of copper the lead casting is reduced to the molten state and the lead is thus gotten rid of, leaving the copper in the form as shown in Fig. 2. There are a series of nice ramifications, and to some extent, trade secrets, that have been worked out during the evolution of this type of radiator, but the result in practice is entirely commercial, and the radiators so made are found to be not only uniform in construction, but entirely free from the annoying leaks that abound when joints are poorly soldered; moreover, the surfaces are highly efficient because the wall thicknesses are uniform, and there are no accumulations of solder to impede the flow of water or stop up the passageways. These radiators have been made for some time in France and are in common use there, and the McCord Manufacturing Company expects that this latest move on its part marks a new era in radiator work in this country.

A Word to Car Owners

Owners of automobiles can save themselves money and annoyance by providing their men with a few extra tools that are not usually found in the ordinary kit supplied with the car; they will facilitate the man's work and be an incentive for him to better look after the small troubles that cars are prone to.

A man who comes home after a long day's work late at night, having been driving from early morning, has little inclination to start work on the car and it cannot be expected of him. What time has he for such things as valve grinding? The act of valve grinding takes a comparatively short time compared with the taking out of some types of valve springs. Men do not consider that they are paid to make tools for the car as well as drive it, although some men take a delight in inventing special tools for their cars, and such men should be encouraged. A simple tool would greatly facilitat the removal of valve springs and he man would then have time to grind say one or two a day as they wanted it. This can be made with a piece of steel rod by bending it at ont end to enter the valve plug after same has been removed so that it touches the valve head. Two elbow bends can then be made in the rod so that it follows the shape of the exterior of the cylinder casting dropping perpendicularly to just above the height of the valve cotter; here a hook is made to act as a leverage for a lever with a forked end to place under the spring cup.

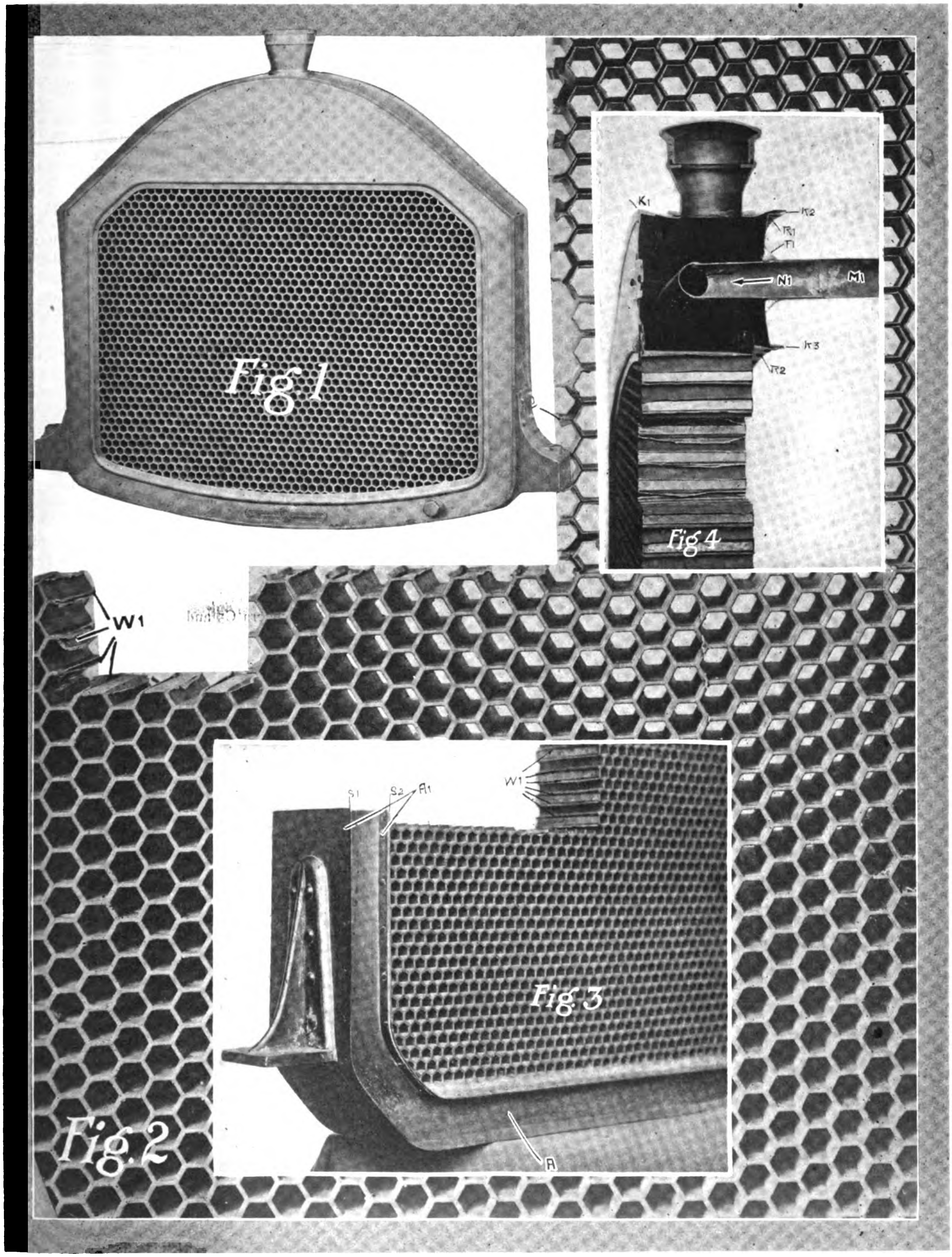


Fig. 1—Front view of McCord Solderless Radiator

Fig. 2—Section of radiator cut in half to show passage of water and cleanliness of construction

Fig. 3—Side view of De Dion Bouton Radiator, showing solid ends of tubes

Fig. 4—Water inlet showing continuation pipe over entire surface of plate with spray holes underneath

Two-Cycle Elmore

THE 1911 ELMORE OUTPUT INCLUDES THE PERFECTED HIGH-DUTY MOTOR, MANY MECHANICAL REFINEMENTS, AND UP-TO-DATE AUTOMOBILES

THE most important single feature of the 1911 announcement of the Elmore Manufacturing Company, of Clyde, Ohio, is that which conveys the news that, in response to an insistent public demand, a new model—No. 25—has been placed on the market. The company calls it "the small car," but it is small only when compared with the regular line—Models 46 and 36. The new car has a four-cylinder motor rated by the makers at 30 horsepower, and is made in four-passenger tonneau and two-passenger runabout types.

The regular Elmore models, which have made the two-cycle valveless engine famous, will be continued, but with not a few important changes, among which may be mentioned a change in the design of the 36-B body and the installation of the new "High Duty" type of four-cylinder motor of 50-horsepower in place of the 36-horsepower motor of 1910, with identical changes in the 46-B model, with the exception that the 1911 motor will deliver 70 horsepower.

The 1911 wheelbase lengths have been increased as follows: Model 46-B, from 120 to 124; Model 36-B, from 110 to 114. The new Model 25 has a wheelbase of 108 inches. The 46-B seats seven; 36-B five; the two No. 25 models, four and two, respectively, for touring car and roadster.

The tire equipment of the Elmore calls for 36x4 front and rear for the 46-B, 34x4 front and rear for 36-B and 32 x 3 1-2 for the new Model 25.

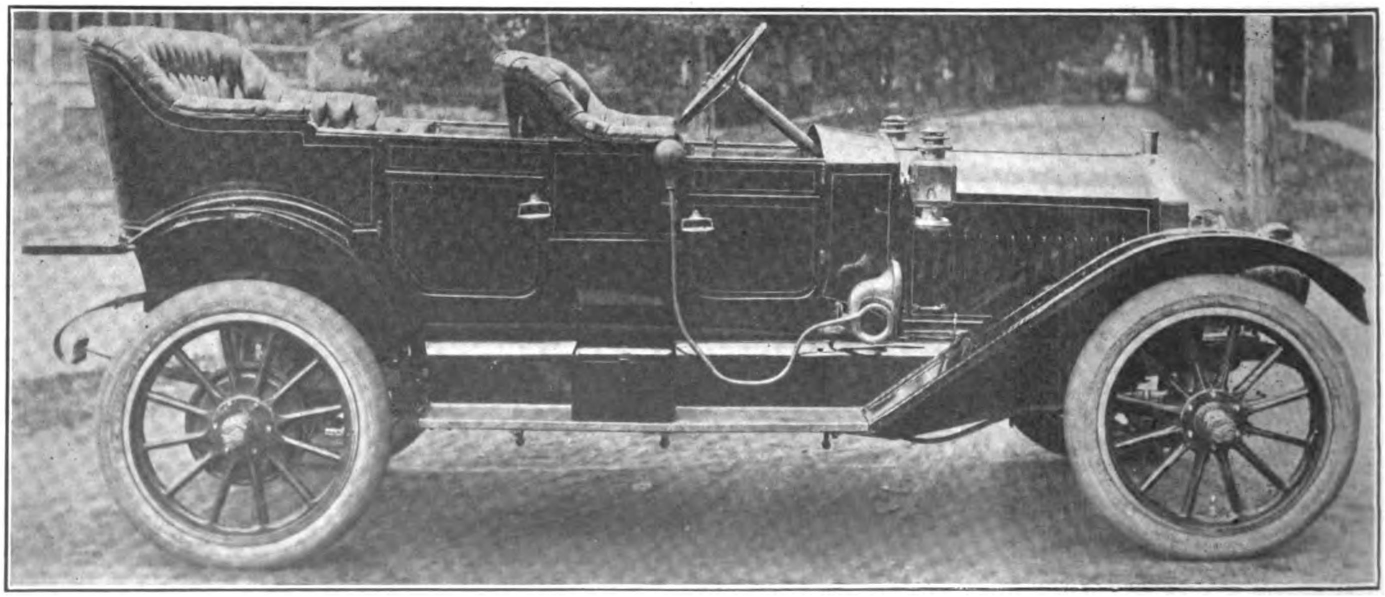
Those who have not followed Elmore practice closely will have to be told that the "high duty" motor is a wide departure from former Elmore practice. The earlier types of motors of this make were of the crankcase compression type, whereas, in the "high duty" type as it is employed in 1911 work, the initial compression is brought about by employing compression chambers and a double-diameter type of piston as here illustrated.

Exhaust Side of Model 25 High Duty Motor

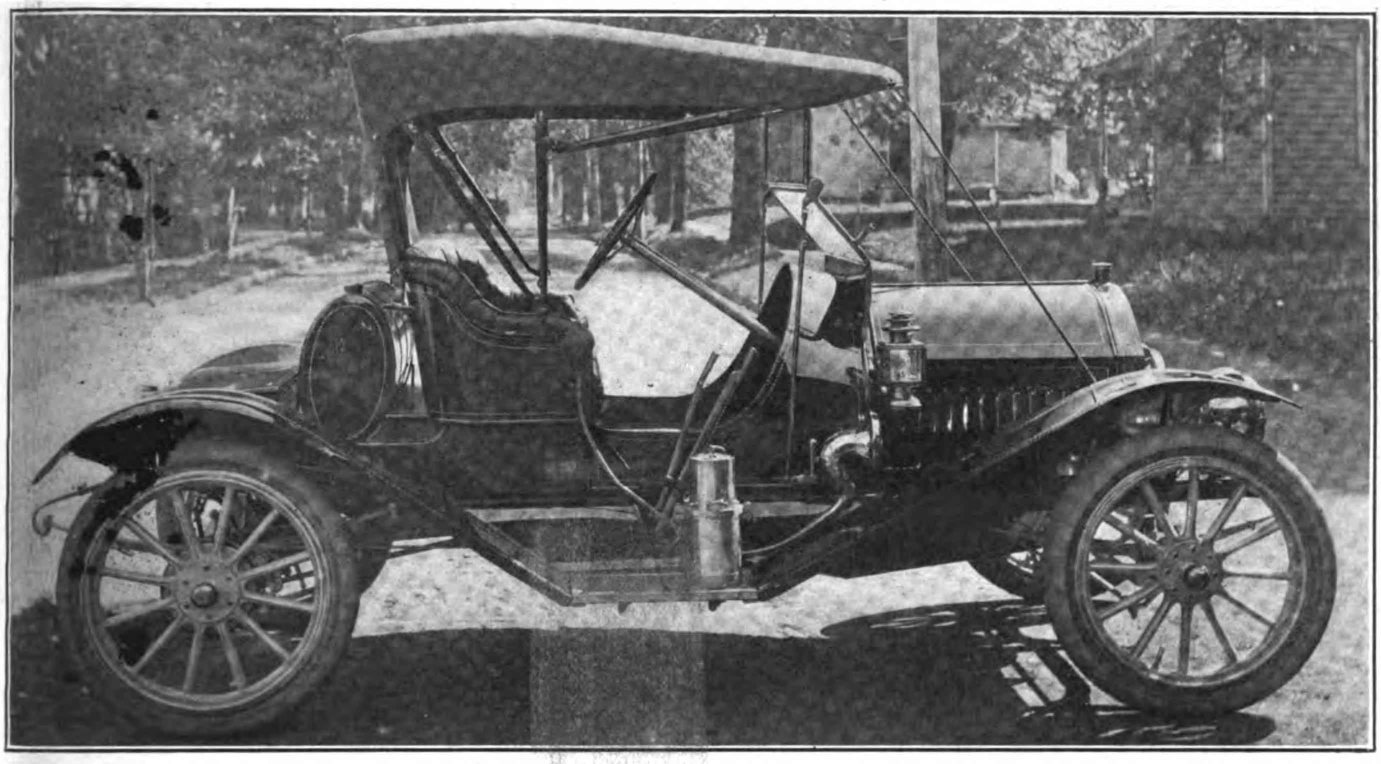
An examination of the exhaust side of this motor shows the four individual cylinders C1, C2, C3 and C4 with an equal spacing between them and a symmetrical water manifold W1 with a leg connecting to a header at the top of each cylinder, utilizing holding-down bolts B1, B2 and B4 to hold the manifold in place with a flexible connection (hose) between the radiator, which is placed at the front of the fans, and the extremity of the manifold E1, which is so shaped as to serve as a secure anchorage for the hose. The remaining water manifold, W2, has a leg terminating at the low level of the water in each cylinder, and the method of bolting this manifold is somewhat different from that of the manifold W1, it being the case that the lower water manifold N1 and the exhaust manifold N2 are pressed against the flange faces on the cylinder by means of yokes Y1, Y2, Y3 and Y4. The studs that hold the yokes pass between the two manifolds and the nuts N1, N2, N3 and N4 on the studs are out in the open so that suitable pressure can be applied without difficulty. The fan F1 is driven by a belt which passes over a grooved pulley from a grooved driving pulley G1, the latter being actuated by power taken from an extension from the distributor shaft. This view of the motor shows the oil connections O1, O2 and O3 between the points of distribution of lubricating oil within the crankcase and the oil pump P1, which is sunk in the oil well between the last cylinder and the flywheel F2. The pump is of the force-feed type, and the supply of oil is taken from the sump S1, which, as will be observed, is commodious. By means of covers C5 and C6, which are readily removable, access may be had to the lower part of the crankcase, through large handholes, for purposes of cleaning.

SPECIFICATIONS FOR ELMORI

MAKES AND MODELS			BODY		MOTOR				COOLING		IGNITION		
	Price	H. P.	Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast.	Radiator	Pump	Magneto	Battery	Lubrication
Elmore 25......	$1200	30	R'ster...	2	4	4	3½	Single.	Tubular	Syphon..	At-Kent.	Dry......	Pum
Elmore 25......	1250	30	Tour'g.	4	4	4	3½	Single.	Tubular	Syphon..	At-Kent.	Dry....	Pum
Elmore 36 B....	1750	50	Tour'g	5	4	4½	4	Single.	Tubular	Syphon..	At-Kent.	Dry....	Pum
Elmore 46 B....	2500	70	Tour'g..	7	44	5	5	Single.	Tubular	Spvhon..	At-Kent	Dry....	Pum



Model 46-B—Fore-door type of five-passenger touring car with straight-line effect, overhanging cowl, protective mudguards and other nice relations



Model 25—Roadster, seating two persons, with an overhanging cowl, open entrance, commodious oval gasoline tank back of the seat and a tool box on the deck at the back

The view of the Model 25 motor shows the carbureter C1 with its manifold connection M1 terminating in an orifice with a flange face F1 on the top of the crank case in a position half way between the two extremities of the motor, so that the four cylinders C1, C2, C3 and C4 are in a position of vantage as respects the supply of mixture and the carbureter is permitted to work with the greatest possible facility. The lever L1 is connected to a motion which is under the control of the driver, and this lever is pressed over the end of the shaft S1. This shaft connects with the mechanism that controls the shifting of the distributor, the office of which is to distribute mixture to the respective cylinders on the two-cycle principle.

CARS AS OFFERED FOR 1911

	TRANSMISSION							BEARINGS				TIRES	
Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crank-shaft	Trans-mission	Axle	Weight	Front	Rear
Disc	Selecti'e.	3	Amid'p	Shaft...	108	56	P. Steel..	Plain..	Ball.....	Ball....	2000	32x3½	32x3½
Disc	Selecti'e.	3	Amid'p	Shaft...	108	56	P. Steel..	Plain..	Ball.....	Ball....	2200	32x3½	32x3½
Disc	Selecti'e.	3	Motor..	Shaft...	114	56	P. Steel.	Plain..	Ball.....	Ball....	2750	34x4	34x4
Disc	Selecti'e.	3	Motor..	Shaft ..	124	56	P. Steel..	Plain..	Ball.....	Ball....	3200	36x4	36x4

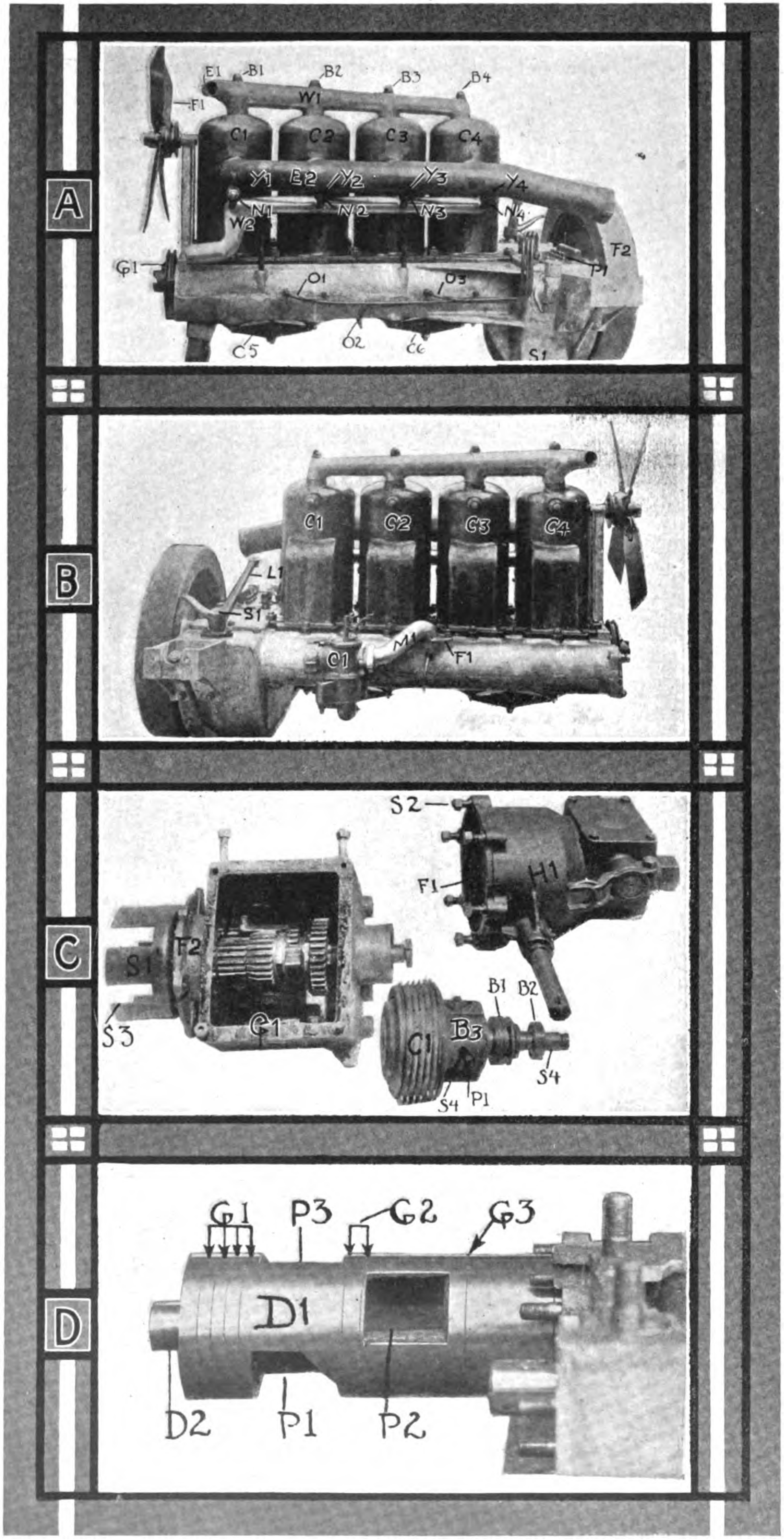
The design is cleverly worked out in practice and is quite free from parts that are likely to become deranged.

Utility of the Distributor in Model 25 High Duty Motor

Referring to Fig. D of the distributor of the Model 25 motor, it will be observed that the distributor D1 is partly withdrawn from its housing, disclosing the reduced diameter D2, which accommodates the annular type ball bearing, also the ports P1, P2 and P3. It will be understood that there are a sufficient number of these ports disposed over the length of the distributor to serve for the control of the incoming mixture on the one hand and the exhaust on the other, working on the two-cylinder principle, which gives a power stroke per revolution of the crank shaft for each cylinder of the motor. The distributor is ground to exact size and floated on the ball bearings, care being exercised not to permit the diameter of the distributor to touch the bore of its housing at any point. The clearance is regulated through the thickness of the sheet of lubricating oil that is used in maintaining proper lubrication of the motor, and it has been found in practice that the distributor is packed to absolute tightness by cutting grooves G1, G2 and G3 around the diameter of the distributor between each pair of ports, with the exception that there are four such grooves at the extremities of the distributor. It was pointed out that the distributor is connected with a shifting mechanism through the good office of which the distributor is not only moved in the axlewise direction, but it is given an angular displacement as well. The object in thus manipulating the distributor is to regulate the inflow of mixture at the will of the operator so that the compression may be increased or decreased, as the exigencies of service would seem to indicate. Because of this facility, it is possible to run under conditions of low compression, if the occasion requires, without suffering the inconvenience of "crankcase shots." It will be worth explaining that in the older forms of two-cycle motors it was not possible to utilize large transfer ports and take advantage of low conditions of compression, due to the fact that crankcase shots were invariably present as the speed was increased, the latter being the basis of decreasing compression on account of wire drawing of the mixture. Then, too, increasing speed brought on its measure of decreasing scavenging perfection, and in the long run it was deemed expedient to so design the conventional types of two-cycle motors that the transfer ports were of relatively small area, and the power delivered from motors so designed was below the best expectation. It is the fair claim of the Elmore company that the use of this distributor, combined with a method of timing it, corrects the evil tendency as noted, so that the power of the motor is very materially increased and the flexibility of its performance is also brought to a satisfactory level.

Assembled Crankcase of Model 25 High Duty Motor

A study of the crank case will show the crank shaft C1 with six main bearings M1, M2, M3, M4, M5 and M6, five of which



A—Exhaust side of Elmore engine
B—Carbureter side of Model 25 engine
C—View of gearbox and clutch forming a unit.
D—View of distributor as installed on Elmore engines

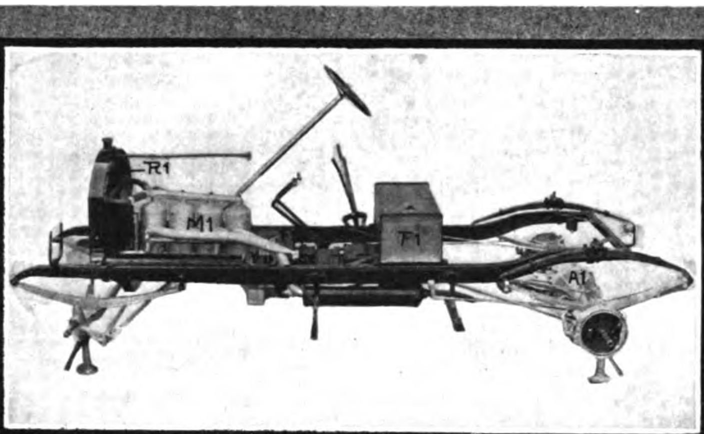
support the load as it is delivered by the four crankpins P1, P2, P3 and P4, and the sixth bearing carries the weight of the flywheel which is pressed onto the end of the shaft at E1. The distributor is in the rounded portion of the crank case R1, and is carried by annular-type ball bearings, one of which is pressed onto the end of the shaft at B1, from which the cover has been removed for purposes of explanation. The intake manifold flanges to register with the orifice O1. From the distributor mixture passes to the cylinders through the ports as shown at P5, P6, P7 and P8, but it will be observed that there are two ports at each point, and it will be enough to state that the remaining port is for the exhaust. It is important to understand that the incoming mixture is always impelled in one direction only, so that there is no inertia to overcome, but this property does add to the potential which moves the gas into the cylinders so that the supply of mixture to each cylinder per cycle is greater than would be true in the absence of this principle of design. The distributor is driven by means of the gear G1 on the crankshaft, which meshes with a mate G2 on the distributor shaft. The distributor is given axlewise motion by the level L1, and is rotated through a certain angular displacement due to the conformation of the gear G3.

Details of Model 25 High Duty Motor

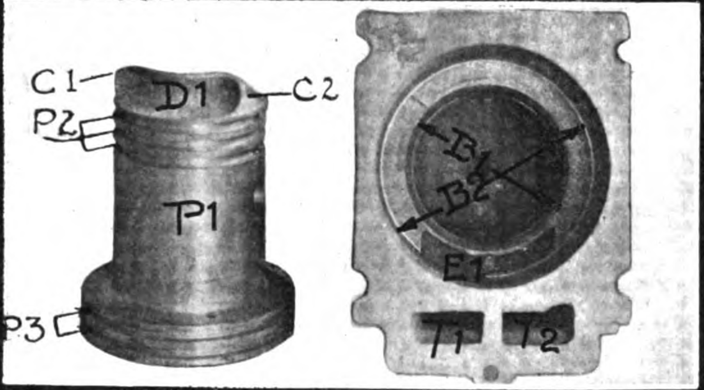
This motor, instead of utilizing crank-case compression, is so designed that the cylinders have two bores. The piston P1 has a small diameter which fits in the smaller of the two bores B1, and the enlarged extremity of the piston fits in the larger of the two bores B2. There are three packing rings P2 for the small bore and two packing rings P3 for the enlarged portion. Mixture and exhaust enter and pass out of the transfer ports T1 and T2, entering the enlarged part of the cylinder at E1. The head of the piston is provided with a deflecting plate D1, which contacts with the bore of the cylinder at C1 and C2. The four cylinders of the motor are identical as to design and in explanation of the flange it is enough to state that there are really eight single-acting cylinders, utilizing four double pistons under conditions as follows: The large diameter pistons work as air compressors, taking in mixture on the suction stroke, compressing and delivering it to the power cylinders on a 2-cycle basis. Since there is no leakage to speak of in connection with the air compressor portion of the cylinders, it is possible to definitely figure upon the supply of mixture that will enter the power cylinders: moreover, the compression in the power cylinders may be nicely regulated by fixing the compression in the air compressor division of the cylinders. As the result of a long series of experiments extending over two years on an energetic basis, the best air compressor compression was arrived at and the proportions of the transfer ports were so fixed as to bring about harmony of the relations. It was also found by experiment, trying many successive methods, that the shape of the deflector plate D1 follows no definite law that can be discovered, but there is a shape for each size of motor that does deliver the best result, and this shape has been adopted in the Elmore type of motor. A study of the piston P1 will disclose its niceties of design; it is long, affording an adequacy of bearing surface, and the walls are designed for lightness without sacrificing strength sufficient to prevent deformations. The piston rings are of the compound type; one master ring fits in the groove in each case and it has a pair of auxiliary rings encompassing it so that tightness is the result of the combined action of the nest of rings in each case. This plan has proven to be thoroughly good in every way, and it has the further advantage of longevity, which is something worth counting in a motor.

Features of Model 36-B Axle

In order to obtain a clear idea of the details of design and construction of the semi-floating type of live rear axle of the Model 36-B car, it will be necessary to study the cross-section (page 589). Power is transmitted to the axle from the propeller shaft through the driving spindle pinion S1, thence to the pinion P1, which meshes with the bevel gear G1, the latter being flanged to the differential housing H1, which rotates with the gear. The differential system is made up of a nest of bevel gears comprising a pair of suns S2 and S3, engaging with planets P2 and P3. The jackshaft members J1 and J2 engage with the suns S1 and S2 by means of square extremities on the jackshaft members which fit snugly in broached square holes in the suns S1 and S2. As the torque of the motor is delivered through the propeller shaft and the relating members to the bevel gear G1, the housing of the differential system is given rotation in the right or left-hand direction, depending upon the position of the sliding gear lever. The torque is delivered to the planets G2 and G3 and is weighed out to the jackshafts J1 and J2 in proportion as the tractiveability of the two rear road wheels is present. If one of the road wheels offers a better tractiveability than the other, the torque of the motor is delivered to it on an increasing basis. In going around a curve the two road wheels are free to turn at their respective indicated speeds, it being the case that the outer wheel must travel a greater distance in a given time than the inner wheel. The differential system is capable of weighing out its torque to the respective wheels despite the fact that they do not rotate at the same speed. Glancing at the

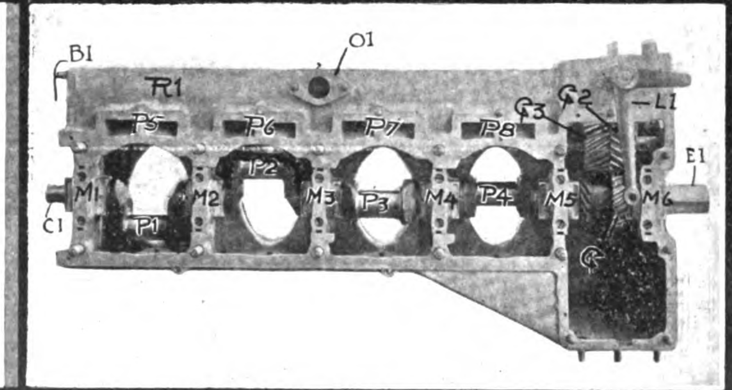


E



F

G



H

E—View of chassis, showing exhaust side of motor
F—View of piston and cylinder section.
G—Surfacing of crankcases at Elmore plant
H—View of crankcase, crankshaft and gears

outer extremity of the jackshaft J1, it will be observed that it is finished with the shoulder S4, against which the inner raceway R1 presses, and the diameter of the shaft over which the ball bearing is driven is ground to a size which assures a sucking fit. Just outside of the ball bearing the shaft is again reduced to a size that makes a press fit for the thinner extremity of the hub H2, with a clearance C1 between shoulder and the final diameter of the shaft, in which the keys K1 and K2 are fitted, there being keyways to match in the hub H2. When the hub of the wheel is pressed on, the hub nut N1 is screwed on and a cotter pin C2 is then pressed through the hole, engaging one of the castellations of the hub nut. The hub cap C3 is then screwed over the enlargement of the hub; a relatively fine thread is chased in the hub cap so that when it is screwed into place and brought up firmly against its shoulder the cap will then remain as put until it is removed by the operator. The flange F1 of the hub, which is integral with the same, is of relatively large diameter so that the spokes at the miter are firmly clamped by means of the bolts B1 with the brake drum D1 serving as the inner clamping member. The brake drum is of unusual merit, due to the fact that it has a double rim, the inner portion of which R2 serves as the face for the internal expanding brake, and the outer portion R3 serves as the face for the external expanding brake, the band B2 of which being shown in section with a fire proof fabric for a facing, the latter character of material also being used for the facing of the inner brakeshoe system. The inner brakeshoe is expanded by applying torsion to the shaft S5 by pulling on the lever L1, and the outer brakeshoe is contracted by applying torsion to the shaft S6 by pulling on the lever L2. The woodwork in the wheel is of second growth hickory selected from well-seasoned stock and suitably treated in the process; bastard spokes are entirely eliminated, and care is exercised to cast out wormy and discolored wood. An examination of the tube T1 will show that it is of good diameter and fair thickness of wall, that it telescopes the relating members sufficiently to make a long snug bearing and rivets are placed at points of vantage to prevent the tube from withdrawing. The ball bearings throughout are designed to take thrust and radial load simultaneously and closures C3, C4, C5 and C6 are so placed as to prevent foreign matter from entering the bearing enclosures, while grease cups are located so that all the moving parts as well as the bearings are maintained in a state of profuse lubrication. The exterior appearance of the axle is agreeable, the design is symmetrical, the quality of the material is selected with discriminating care, heat treatment is resorted to on a basis of intelligence and the machining porcess is conducted with sufficient precision to assure that the parts will pass a rigid inspection.

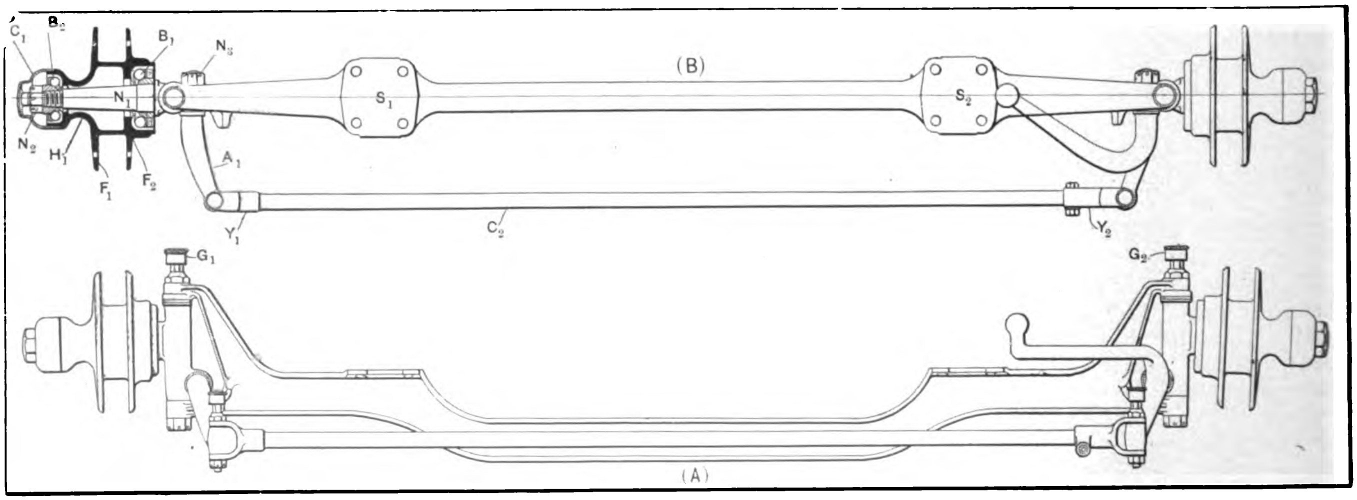
Model 36-B I-Section Front Axle and Scheme of Design

Referring to the illustration of the Model 36-B front axle, A shows the same in elevation and B is a plan. The axle is of the drop type with spring perches S1 and S2 with flanged holes for a pair of U-bolts, by means of which the springs are clamped into secure relation. Glancing at the cross-section of the hub H1, it will be observed that the fixed flange F1 is to the outside, and the movable flange F2 comes to the inside. Cup and cone type ball bearings B1 and B2 are used, and they are separated by a distance sufficient to support the load and prevent wobbling of the wheel. The knuckle N1 is drop-forged from a suitable grade of steel and properly treated to induce kinetic quality. The inner races of the ball bearings are pressed on sufficiently to prevent them from working loose, and the hub and nut N2 is screwed up tight and is prevented from backing off by a cotter pin which passes through a hole in the end of the spindle and engages with the castellations in the nuts. The hub cap C1 matches with the hub caps on the rear wheels, and the general appearance of the axle is in keeping with the art motive of the design. The steering arms A1 are drop-forged from special steel and are prevented from turning by suitably disposed keys, and are also prevented from coming off by the nut N3, which is also locked on by means of a cotter pin. The cross rod C2 is a tube and straight threaded at its extremities to accommodate the yokes Y1 and Y2. The bearings at all points are proportioned in view of the results of experience and grease cups G1 and G2 afford a means for suitably lubricating the knuckle pin.

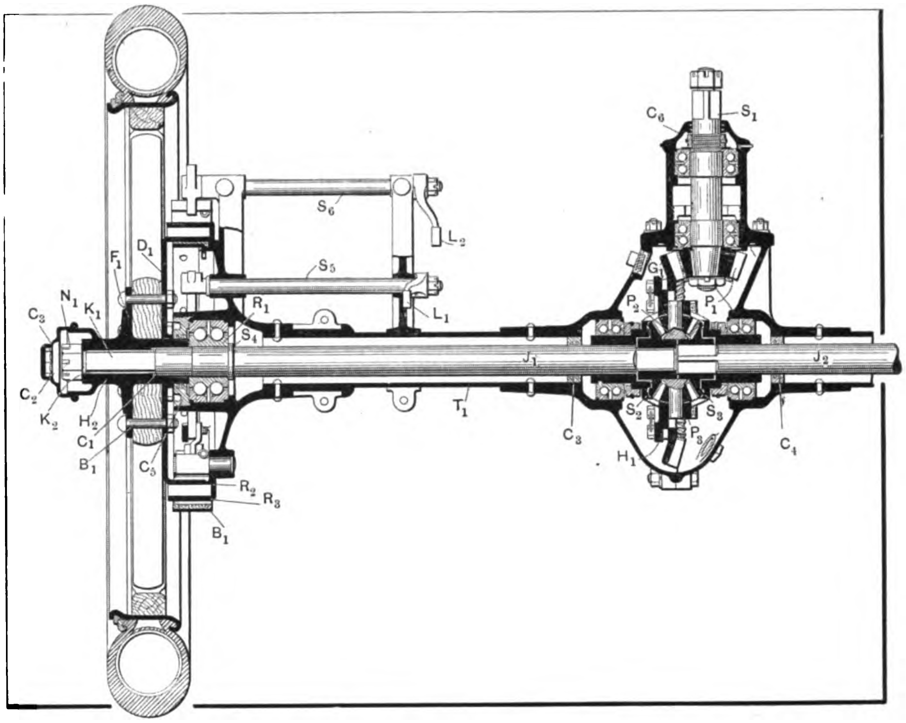
It is recognized that cost of maintenance is too high if the questions of lubrication are not properly cared for and that these questions of lubrication are of far more importance than is generally well appreciated.

Clutch and Transmission Combined in a Unit

From the clutch point of view there are three principal schemes of design in vogue, placing the clutch either in conjunction with the motor as a unit with the transmission gear, the latter being separate, or incorporating the clutch into the gear system and combining the latter with the rear axle. In the Model 25 Elmore system the clutch is combined with the transmission, making a unit in common for the two, but this unit is placed amidship on the chassis frame, separated from both the motor and the live rear axle. Referring to Fig. C, the transmission gear system G1 of the three speed and reverse selective type is provided with a clutch spider S1 at the front end, into which the clutch C1 is nested and the cylindrical housing H1 encloses the clutch, the flange face F1 bolting against the flange F2, being held in place by six studs S2 in the manner substantially as shown. The multiple-disc clutch has 13 plates, 6 of which engage in the slots S3, so that they are prevented from rotating, excepting with the spider S1, seven of which are splined to the shaft S4. Axlewise thrust is compensated for by the ball thrust bearing B1, and radial work is cared for by annular type ball bearings, one of which, B2, is indicated. The clutch is engaged when the block B3 is given an angular motion, due to the travel



Plan and elevation of the I-section front axle as used on Model 36-B car, showing symmetry of design, carefully worked out details, and the elements of a harmonious relation to the rear axle design



Cross-section of the Model 36-B semi-floating type of live rear axle showing a bevel differential, bevel drive, ball bearings designed for radial and thrust loads, double-faced brakedrum and other appropriately designed members.

of the pins P1 in the cam slots S4. The entire construction is noted for its substantial character, simplicity reigning throughout.

General Relations in Model 25 Chassis

The chassis frame is of the channel section steel, with a kick-up at the rear, thus bringing the power plant low down and making the center of gravity of the car as low as it is possible to have it so that the road performance of the car is on a high plane and the turning over speed on a curve is maximum. Referring to Fig. E the radiator R1 is placed on the chassis frame in the plane of the front axle and the motor M1 is suspended so that the flywheel is given adequate ground clearance, making the transmission a substantially straight line in the plane of the crankshaft back to the live rear axle A1 when the springs are depressed the amount due to the weight of the machinery, chassis, body and passengers. The rear springs are of the full-elliptic (scroll) type, related to the chassis frame through trunnions, utilizing double U clamping bolts, and provided with rubber bumpers, which, however, do not come into play, excepting under overload condition, traveling at very high speed and in an emergency at that, involving an abrupt change in the road level. The front springs are half-elliptic, provided with rubber bumpers, are fastened to perches with double U-bolts and are clamped down tight. The fuel tank F1 is rectangular, placed above the top of the chassis, coming under the front seat of the car, so that it is high enough to take advantage of a gravity feed to the carbureter. There is an entire absence of castings and irregularly shaped parts; the chassis presents a clean appearance at every point and care is exercised to make the fit of the relating members so close as to prevent noise and rattle without, at the same time endangering the freedom of motion of the relating parts.

Important Variations from Four-Cycle Practice

It will be understood that the principle of the 2-cycle motor is substantially a revel in simplicity, but there are certain characteristics of this type of motor that have ever been stumbling blocks to those who, laying great stress upon absence of complication, overstep the bounds to the extent that they more or less disregarded the mechanical problems involved. Referring to Fig. G, it will illustrate the point here to be made; in this illustration the surfaces of the crankcases are worked down to a level far more perfect than will be possible by any machining process whatsoever. It may not be generally understood, but if two pieces of metal are perfectly smooth when they are brought together, they will resist being separated. This adhesive tendency is due to the fact that the perfectly surfaced parts when they are brought into contact with each other exclude the atmosphere when the atmospheric pressure, which will be on all the surfaces, excepting the surfaces of contact, will hold the two members in contact with each other, and the force of the engagement will be that due to a pressure of 14.7 pounds per square inch. The illustration shows how this process is conducted on the machine faces of the crank case in which S1 is the surfacing block, which, when it is blued over and motion is imparted to it so that it traverses the machine surfaces of the crankcase, the high spots over the machined surfaces will partake of the blue and the next operation is to use a scraper S2 in the process of removing the high spots. This operation is continued and repeated a sufficient number of times to bring about the desired perfectly straight surfaces so that the cylinders, which are given the same treatment, will make tight joints with the crankcase. The success of the Elmore type of 2-cycle motor is a legitimate dividend of the care with which the machine operations are conducted, remembering that the simplicity of the 2-cycle type of motor does not serve as a license to disregard the necessities.

There will be no change in the prices as compared with 1910. Models 46-B and 36-B will remain at $2500 and $1750 f. o. b. factory, respectively, while the new Model 25 will be listed at $1250 for the touring car and $1200 for the roadster. Elmore equipment includes lamps, horn, tools, etc., of a grade in keeping with the rest of the car. Top and windshield are extra.

Foreign Motor Car Imports and Exports

From the figures published the exportation of French cars shows an increase in value. Up to the end of August of this year the exports were $23,568,800.00, as compared to $19,274,400.00 for the same period of 1909. Great Britain heads the list as the largest consumer, the exports to that country having increased from $8,591,415.00 to $9,678,600.00. The following countries also show an increase: Germany, Belgium, Switzerland, Italy, Austria, Russia, The Argentine, Turkey and Algeria. But the number of cars shipped to Spain, United States and Brazil show a decrease. The imports also show an increase from $976,000.00 to $1,166,000.00 for the first eight months of this year over a like period of last year.

Some interesting figures concerning the motor car imports and exports of Great Britain have just been published by the Board of Trade of the British Government.

Besides the actual exports, the cars and parts that were imported and re-exported are taken into consideration, as they should be, to find out the state of the actual position of the country's business.

The imports for the month of August, 1910, shows an increase over other years of $50,000.00 and less cars were re-exported by $219, which shows a larger proportion of home purchases. The net exports of British made cars was $1,065.290.00, against net imports $259,395.00. For the eight months ending August 31, 1910, the total imports of cars and parts was $17,127,970.00, against a net exportation of British cars of $7,483,220.00, being an increase over last year's figures of $2,970,940.00.

Letters

COMMUNICATIONS FROM READERS MAINLY ALONG TECHNICAL LINES: HOW TO REMEDY LOSS OF COMPRESSSON; COASTING DOWN HILL; CONSTRUCTION OF AUTOMOBILE AXLES; STRAINS ON WHEELS

Loss of Compression

Editor THE AUTOMOBILE:

[2,379]—With reference to your answer to Question No. 237 in last week's issue I have a motor fitted with four piston rings to each cylinder, these constantly move around in the manner you describe. Cannot something be done with the present rings to keep them in place without buying 16 new rings and having them specially cut in the manner you suggest? W. H. T.

Trenton, N. J.

Yes, another method sometimes employed is to pin the piston as shown. The positions as marked in the accompanying sketch, Fig. 1, you will find a great improvement in the compression. The iron from which pistons are made is very brittle, consequently tapping should be very gentle and the pins should be inserted so that there is no fear of them coming out either inside the piston or out against the cylinder walls. One pin dislodging itself is sufficient to spoil an engine.

Worn Valve Stems and Guides

Editor THE AUTOMOBILE:

[2,380]—I have a motor four years old and the guides and valves are badly worn. Can this wear be remedied without rebushing? T. R. T.

Allentown, Pa.

After considerable use the hammering on the base of the stem of the valve causes wear and the distance between the lifter and the valve will be too great and prevent the valve opening to its full extent. In older models of gasoline motors where adjustable lifters are not employed, two methods may be used to overcome this fault without purchasing new valves or lifters. Small caps should be made to fit under the feet of the valves and afterwards case-hardened. Amount of clearance between valve and lifter should not be more than the thickness of a visiting card.

Another way is to take the valve to a competent man and let him heat the stem near the base and draw it out slightly. Great care, however, should be taken that it is perfectly straight afterward, otherwise it will not pass through the guide.

When the valve guide is badly worn the following method may be resorted to in order to temporarily overcome this. A small collar should be made and drilled to a good working fit for the valve stem, as the sketch shows (Fig. 3). In the case where the guide is cast with the cylinder it requires great care and the use of special tools and jigs not everywhere obtainable to rebush, otherwise the holes would be almost certain to be out of alignment with the valve seating. A good permanent job can, however, be made in the following manner when special tools are not obtainable: Turn the old guide below the line C-D away, also above A-B. A guide similar to E and E1 in Fig. 2 should be made from phosphor bronze with a slightly tapered head. The cylinder should be bored to accommodate this, allowing for an infinitesimal amount of side play. The conical fit will allow the valve to find a perfect seating as the spring's action will keep the new part in position.

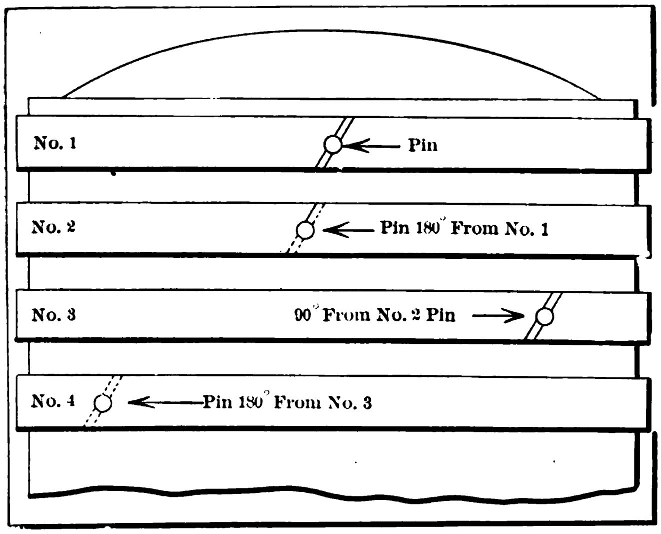


Fig. 1—Illustrating methods of keeping pistons in place

Castor Oil Will Silence Noisy Gears

Editor THE AUTOMOBILE:

[2,381]—The gears of my —— car have become noisy lately yet seem to be in good mechanical order. Can you suggest anything to quiet them? A SUBSCRIBER.

St. Joseph, Mo.

Provided the bearings are all tight and filled with oil-retaining discs of felt castor oil should overcome the noise. Under no circumstances use it for the engine, but in the gear box and rear construction it will work wonders if you can keep it in.

Piston Clearance in Cylinders

Editor THE AUTOMOBILE:

[2,382]—Will you kindly explain through your columns if your answer to letter No. 2,361 relative to piston clearance is correct? In this answer, you state that the clearance at the top of piston should be about half as great as on the bottom. This is exactly opposite from what we have always understood to be common practice, that is to say, the top of the piston being hottest should require the greater clearance. This subject is a very interesting one and the writer would be glad to read your explanation.

Quincy, Mass. FRANK T. CABLE.

The reason for the larger clearance of the piston and the cylinder at the top than at the bottom, is according to the figures taken not being as small as they might be, but nevertheless such that work well in ordinary touring cars that do not need excessive compression, to prevent excesses of oil passing by the piston. The amount of expansion of cast iron from which pistons are made is 1:909 at 212 degrees Fahr., does not perceptibly effect the amount of clearance, but by having the top larger than the bottom the lubricant is sucked up in the form of a cone with the apex towards the top and less likely to pass than if the apex was the other way as it would be if the bottom of the piston was larger than the top.

Freewheeling Down Hills

Editor THE AUTOMOBILE:

[2,383]—I have arranged a magneto cut-out on a high-grade six-cylinder touring car; the engine has a bore of 4 1-2 inches and a stroke of 4 3-4 inches. I make a practice of stopping the engine by short circuiting the magneto at the top of long hills, and coasting down with the transmission in direct drive and clutch disengaged. Near the bottom of the hill I crank the engine with spark retarded and throttle nearly closed, by gradually engaging the clutch. Is this practice hard on the car? R. R.

Park Row, N. Y.

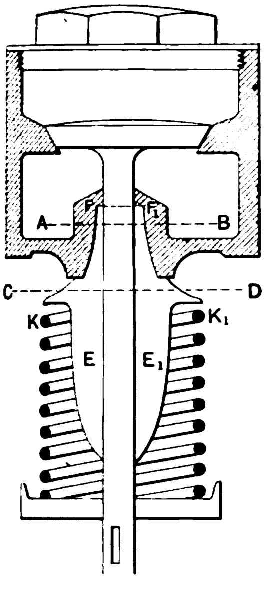


Fig. 2—Method of repairing worn valve stems.

The practice of cutting the engine out and coasting down long grades has a beneficial effect on the car because the engine can then be used as a brake as well as receiving a cooling through the inrush of air through the radiator while no heat is being generated. It is preferable, however, to start the engine with the spark half advanced instead of fully retarded. As long as the engagement is effected gradually no harm can be done to the car. Great economy in gasoline will be noticed if this method of driving is carried out. On long hills you should alternate the use of the foot brake with the hand brake and not use one all the time; far too many people rely on the foot brake to do all the work of stopping and when they require the side brake in a case of emergency they forget they have such a thing on their car.

The Construction of Automobile Axles

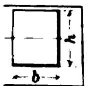
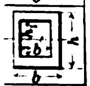
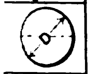
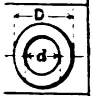
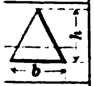
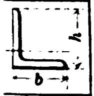
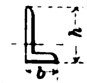
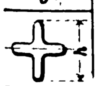
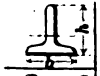
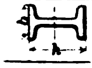
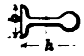
Editor THE AUTOMOBILE:

(2,384)—What are the different considerations to be taken into account in the construction of an axle? ENGINEER.

Williamsport, Pa.

Elements of usual sections:

A = area of section. b = breadth. h = depth. D = diameter.

	Shape of Section.	Moment of Inertia	Moment of Resistance	Square of Least Radius of Gyration.	Least Radius of Gyration
	Solid Rectangle.	$\frac{bh^{2*}}{12}$	$\frac{bh^{2*}}{6}$	$\frac{\text{Least}^{2*}\ \text{(Side)}}{12}$	$\frac{\text{Least side*}}{3.46}$
	Hollow Rectangle.	$\frac{bh^2-b_1h_1^{3*}}{12}$	$\frac{bh^2-b_1h_1^{2*}}{6h}$	$\frac{h^2+h_1^{2*}}{12}$	$\frac{h+h^1}{4.89}$
	Solid Circle.	$\frac{AD^{2*}}{16}$	$\frac{AD^*}{8}$	$\frac{D^{2*}}{16}$	$\frac{D^*}{4}$
	Hollow Circle A, area of large section; a, area of small section.	$\frac{AD^2-ad^2}{16}$	$\frac{AD^2-ad^2}{8D}$	$\frac{D^2+d^{2*}}{16}$	$\frac{D+d}{5.64}$
	Solid Triangle.	$\frac{bh^3}{36}$	$\frac{bh^2}{24}$	The least of the two: $\frac{h^2}{18}$ or $\frac{b^2}{24}$	The least of the two: $\frac{h}{4.24}$ or $\frac{b}{4.9}$
	Even Angle.	$\frac{Ah^2}{10.2}$	$\frac{Ah}{7.2}$	$\frac{b^2}{25}$	$\frac{b}{5}$
	Uneven Angle	$\frac{Ah^2}{9.5}$	$\frac{Ah}{6.5}$	$\frac{(hb)^2}{13(h^2+b^2)}$	$\frac{hb}{2.6(h+b)}$
	Even Cross.	$\frac{Ah^2}{19}$	$\frac{Ah}{9.5}$	$\frac{h^2}{22.5}$	$\frac{h}{4.74}$
	Even Tee.	$\frac{Ah^2}{11.1}$	$\frac{Ah}{8}$	$\frac{b^2}{22.5}$	$\frac{b}{4.74}$
	I-Beam.	$\frac{Ah^2}{6.66}$	$\frac{Ah}{3.2}$	$\frac{b^2}{21}$	$\frac{b}{4.58}$
	Channel.	$\frac{Ah^2}{7.34}$	$\frac{Ah}{3.67}$	$\frac{b^2}{12.5}$	$\frac{b}{3.54}$
	Deck Beam.	$\frac{Ah^2}{6.9}$	$\frac{Ah}{4}$	$\frac{b^2}{36.5}$	$\frac{b}{6}$

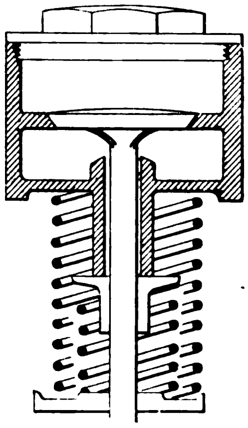


Fig. 3—Method of temporary repair for worn valve guides

The usual form of axle used in the construction of automobiles of the present day is the I-section stamped from the solid bar of steel of adequate strength. The construction of the axle is only one factor that has to be taken into consideration; the other is the quality of the steel employed. In order to determine the dimensions of the section we must first of all take a weight that it has to carry, and as all cars vary in this particular, suppose that this is represented by the letter W. The strains an axle has to bear are the superweight, torsion strain rounding curves and the shocks occasioned by impact with obstacles on the road surface.

The form the axle is usually stamped is shown in Fig. 4, the boss at the point F being particularly adaptable for the shape of the mould; to determine the sizes of A B and C the angle G and the width of D and E it is necessary to resort to the known formulæ on the matter.

First to find the safe load in pounds that the axle can support the following table, compiled by the Pencoyd Iron Works, gives the following, where the load is distributed:

Where L = length in feet between supports.
A = sectional area of beam in square inches.
D = depth of beam in inches.
a = interior area in square inches.
d = interior depth in inches.
w = working load in net tons.

1. $\frac{1{,}880\ Ad}{L}$ 2. $\frac{1{,}880\ (AD-ad)}{L}$ 3. $\frac{1{,}400\ AD}{L}$

4. $\frac{1{,}400\ (AD-ad)}{L}$ 6 and 9. $\frac{1{,}860\ AD}{L}$ 10. $\frac{3{,}560\ AD}{L}$

11. $\frac{3{,}200\ AD}{L}$ 12. $\frac{2{,}900\ AD}{L}$

based on fiber strains of 16,800 pounds for steel (see table).

After the weight the axle has to carry has been determined the modulus of the section can be found from

$$\frac{D \times (A+B+C)^3 - (D-E) \times B^3}{6\,(A+B+C).}$$

The modulus of the section or the value of the section for purposes of calculation of the moment of resistance multiplied by the strength in pounds per square inch in tension with elastic limit of the material of which the axle is made will give the bending moment or corresponding moment of resistance.

Supposing the axle to have a superweight of 2,000 pounds and from the modulus of the section (which are usually supplied

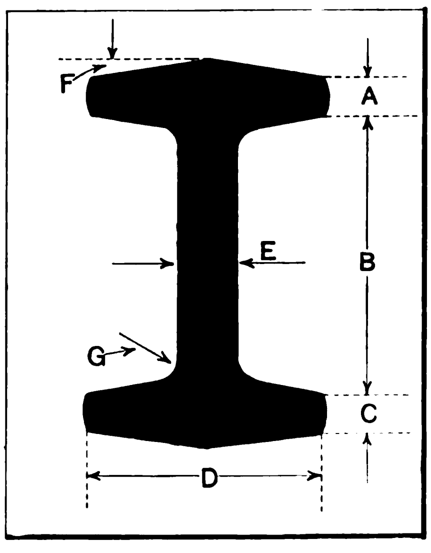


Fig. 4—Section of I-type axle; the arched tops are used to suit the moulds in stamping

by the makers of the steels) the dimensions necessary for the axle to carry this weight can be found. But besides the superweight there is to be taken into consideration the force exerted by the weight behind the axle when the wheels come in contact with obstructions on the road.

If the weight behind the axle is say 2,500 pounds, when it strikes the obstacle the bending arm between the spring clips and the center of the wheel will be subjected to side torsion strains which will effect the moment of resistance in proportion to the speed at which the car is traveling.

The height of the center of gravity of the car in respect to the height of the axle will also have to be taken into consideration, as the higher the center of gravity is placed so is the forward thrust changed to a twisting strain.

To arrive at this calculation the axle is considered equivalent to a beam fixed at one end and loaded at the other, or the section should equal the length of the bending arm multiplied by the load on the axle multiplied by the pressure due to extreme impact in pounds per square inch divided by the strength in pounds per square inch in tension with the electric limit of the material of the axle.

Outside Wheel Subject to Greatest Strain

Editor THE AUTOMOBILE:

[2,385]—Have heard the matter discussed as to whether the strain is on the outside or inside wheels of an automobile when turning a curve, and the matter is not settled in my mind. Can you tell me upon which wheels the strain really is in turning a curve, say around a one-eighth mile circular track?

Meadville, Pa. J. H. PARDEE.

The greater strain is undoubtedly on the outside wheels, which ever direction the car is going. The reason for this is that centrifugal force tends to throw all the weight and strain upon the outmost point of contact which is the tires, and it is for this reason the outer tires always wear out in races on circular tracks quicker than the near side ones. The off-side front wheel receives the greater part of the strain, as it is on this wheel that the strain caused by the centrifugal force added to the forward push is impinged. To clearly show this one only has to take the example of a side slip on a greasy road; if the brake is applied in rounding a curve the slip throws the car outward, forcing the back round and making the outside front wheel the center of the arc of the circle described.

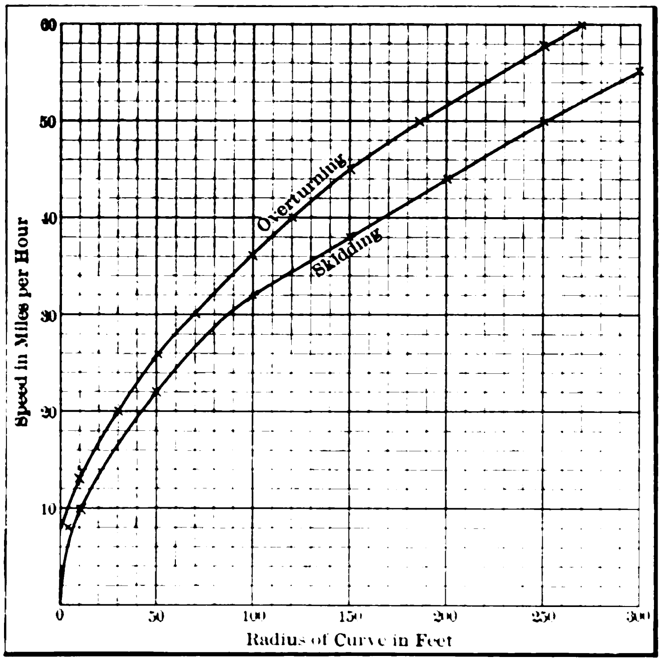


Fig. 5—Diagram showing critical speeds of road curves of different radii

Taking the weight of the car and passengers as 2,240 pounds, the height of the center of gravity 2 feet 6 inches, the wheel track of 4 feet 6 inches and 0.66 pounds coefficient friction or adhesion of the weight on the tires,

$$F = \frac{2{,}240 \times 2.25}{2.25} \;.\; 2{,}016 \text{ pounds,}$$

2.25 being half the wheel gauge of 4.6, therefore, 2,016 pounds is the amount of centrifugal force necessary with the dimension given to commence overturning.

On a curve of a given radius, *e.g.*, 100-feet, radius of one-eighth mile circular track = 105 feet

$$\text{we have } \frac{g = \sqrt{2{,}016\,gr}}{w} \div 1.46.$$

R = radius of curve in feet gravity or 9 = 32.2 and w = 2,240 weight of car.

$$V = \frac{\sqrt{2{,}016 \times 32.2 \times 100}}{2{,}240} \div 146 = 36.69 \text{ miles per hour.}$$

The speeds are shown in curve in Fig. 5.

Magnetos Don't Break Crankshafts

Editor THE AUTOMOBILE:

[2,386]—Will you kindly answer the following for me: Is it possible to break the crankshaft of a four-cylinder motor with a make-and-break spark if the timing is not set as it should be set, the cylinder having a bore of 3 3-4 inches, with a 1 1-4 inch diameter crankshaft, or if two cylinders were timed right and the third cylinder timed so it fired far in advance, would this cause the crankshaft to break? INFORMATION.

Newark, N. J.

Chauffeurs' Lot in Honolulu

Editor THE AUTOMOBILE:

[2,387]—I have been reading THE AUTOMOBILE a long time and take the liberty of asking you what you know of the automobile proposition in Honolulu in the Hawaiian Island.

I have heard that drivers get good pay there (that is, American drivers).

I have had over seven years' experience, three and one-half years in the East and a little over four years in the West.

Canon City, Colo. BARRETT E. SIBLEY.

With reference to your inquiries respecting the automobile proposition in Honolulu, we have pleasure in informing you that place is growing with the advancement of the sugar-growing industry. The officials of all these concerns own automobiles; besides these gentlemen most of the government officials run cars as well as the better-class natives. There is a motor carnival held in Honolulu each year as well as a battle of flowers. Most of the cars are of American manufacture, and there are probably fifty that take part.

The cost of living is high, and it is not thought advisable to go out on speculation unless money is no object, and it is infinitely better to obtain some sort of employment before arriving.

Automobile driving is about the hardest work that is done by whites, all manual labor being done by natives.

Why Is There Such a Great Difference?

Editor THE AUTOMOBILE:

[2,388]—I took a demonstration in an automobile; it was satisfactory, and I then purchased one of this make and model, but now that I have it I find that it does not ride nearly as well as the demonstrating car. The tires are of the same diameter, but I notice that the tires on my car are 3 1-2 inches in section, whereas the tires on the demonstrating car were 4 1-2 inches in section. Would this make any great difference? ED. C. ATKINSON.

Chicago, Ill.

The difference will be in proportion to the square of the section.

Questions That Arise

CONCERNING TEMPORARY REPAIRS TO A LEAKY GASOLINE TANK; CAUSE OF EXCESSIVE WEAR ON FRONT TIRES; HOW TO COUNTERACT SIDE-SLIP; HORSEPOWER FORMULAE, ETC.

[239]—What is the best way to get home if the gasoline tank leaks?

A flexible metal pipe about six feet long is a very useful accessory to always carry on the car, to replace a defective or broken gasoline or oil pipe. A case came before our notice some time ago where the small pipe conveying the gasoline inside the tank (under pressure) from the bottom to the connection at the top became unsoldered, making it impossible for the car to proceed, although the tank was full.

To take the tank off, walk several miles with it and wait while the fumes evaporated would have taken too long; so some method had to be devised to temporarily overcome the trouble.

The only means possible was to fix up a gravity siphon. The only piping on the car was the copper tubing for the acetylene headlights, and this was clogged with a high explosive composition caused by the action of the acetylene on copper. The driver's companion held an emergency can of gasoline in his arms and the pipe was introduced into the gasoline tank; then the regular gasoline feed pipe was cut by a file (the only cutting tool on the car), near the carbureter and a joint was made between the emergency and regular pipes with the rubber connections from the headlamps.

Before this last operation was effected the driver placed the end of the pipe out of the tank in his mouth and sucked through it, causing the siphon to work, coupled up and ran for 70 miles.

When coming to solder the pipe in the tank afterwards he learned to his cost the necessity of leaving a tank that has had gasoline in it for a very long time without putting a flame to it. The tank was left overnight with both connections undone (top and bottom).

Air was pumped through the tank next morning for two hours with a tire pump and when a flame was then put to the tank a terrific explosion took place.

[240]—What is the cause of excessive wear on front tires?

It is not necessary for the tires to be bad or faulty for abnormal wear to show under 1,000 miles. It is probably due to the front wheels not being in alignment with the rear wheels; or it may be caused through some defect or backlash in the steering preventing the wheels from falling to the proper angle which they should when turning a corner.

[241]—How can a punctured float be repaired on the road without solder?

As a temporary method of repairing a punctured carbureter float, the use of sealing wax may be cited. In cases where the float has flooded, through the perforation of the solder, the first thing to be done is to bore a small hole in the float, in order to let out the accumulated liquid, and the surface should be carefully cleaned round the puncture. A piece of sealing wax should then be obtained, and a few drops melted over the hole, and pressed well down, in order to fill it up. It will then be found that the float is again good for any number of miles. One advantage of this method is that the wax adds little weight to the float. It is advisable to moisten whatever article is used for pressing in the melted wax, in order to prevent its sticking.

[242]—What is the weight of cast-iron compared with that of deal patterns?

Multiply the weight of the pattern by 17.

[243]—Why does the spark plug in the back cylinder of a four-cylinder motor become sooty and covered with oil while the other three remain clean and fire perfectly?

The cause of this is either the oil feed to the back end of the base chamber is allowed to run too fast, or the baffle plate dividing the front pair of bases from the back pair is not high enough to prevent the oil from flowing back while the car is going up hill. It would be thought, however, that in going down hill the return flow would equalize itself; the reason it does not is that going down hill the motor is not usually working fast, whereas going up hill the speed of the motor is increased on account of driving on a lower gear.

To overcome this fault empty the bases of all oil and pour in fresh to an equal level and adjust the lubricator so that the front base feeds faster than the rear. If this does not stop the backward flow it is necessary to fit higher baffle plates. The oil in the base chamber of a gasoline motor that depends upon splash lubrication becomes more like a vapor than a liquid after the motor has been running for a short time, and the faster the speed of the engine the smaller the particles become.

[244]—How is the action of a side slip to be counteracted?

To take it for granted that a side slip is inevitable under certain conditions is a very poor excuse after an accident has happened. In the first place most side slips are due to carelessness and miscalculation; of course a driver of an automobile cannot be held responsible for the idiosyncrasies of other users of the highways, and what would be considered a safe speed on a clean road would be highly dangerous if other traffic were about.

Supposing the driver of another vehicle immediately ahead of you pulls out without warning across your path while you are traveling at 12 miles per hour on a greasy road, you have no alternative but to apply your brakes or smash into him. This operation, however, is often the cause of a side slip, but if carried out in the following manner the slip will be greatly minimized:

The moment you perceive the vehicle in front of you begins to deviate apply a hard pressure on your brake, temporarily locking your back wheels and at the same time turning your steering wheels in the direction the obstruction proposes to go. (For this illustration it is to be understood that you are following the correct rules of the road as regards passing and that there is no obstacle coming in the opposite direction.) The harsh application of the brake should be only momentary and the steering should then be thrown over to the opposite side to counteract the effect of the first brake effect. The brake should be applied till the momentum of the car is brought to the required speed, but in jerks and not by continual pressure. The movements of the steering wheel must be decisive, because slow movements or greasy roads are liable to cause a front-end skid, which is infinitely worse than a rear skid; the car becomes as uncontrollable as a boat without a rudder. The action of turning the front wheels quickly squeegees the moisture from under the tire and gives it a temporary purchase which is in most cases sufficient to alter the course of the motion.

Applying the brake in jerks is certainly not good for the car but infinitely better than a collision.

If you find yourself sliding toward the curb, so that the rear will strike first, turn your steering wheels toward the curb also, as perhaps by the time you reach it the front wheels will have changed the motion of the slip and allow you to graze it with a forward slide instead of a direct blow that often causes a broken wheel.

[245]—What are the formulæ for figuring horsepower used by the various automobile associations?

A.L.A.M. $D^2 \times n -:- 2.5$.

Royal Auto Club of Great Britain. $(D+L)^2 \times n -:- 9.92$.

$D =$ Diameter of cylinder in inches.

$L =$ Stroke of piston in inches.

$R =$ Revolution per minute of crankshaft.

$n =$ Number of cylinders.

Dont's

INJUNCTIONS COVERING A VARIETY OF SUBJECTS BEARING UPON THE AUTOMOBILE FROM THE SEVERAL POINTS OF VIEW AND SAGE ADVICE TO THE MAN WHO WOULD ENTER WHERE ANGELS FEAR TO TREAD

Don't come back from the races and bore your neighbors about your hair-breadth escapes; a miss is as good as a mile.

Don't catch the racing fever so badly that you will have to apologize to every policeman that you meet on the roadside; your brand of enthusiasm may not be as catching as the smallpox.

Don't forget that racing cars frequently wear out a few thousand dollars worth of tires in a single day; speed is what does it.

Don't overlook the fact that these large tire bills are generated by this high speed, despite the fact that the road is especially prepared for the purpose; even less speed on a bad road will have substantially the same effect.

Don't let the claws out from under the velvet. If you do persist in abusing your tires and then ask the maker to replace them on the ground that they were defective. just be nice when he tells you that he knows better.

Don't display the cloven hoof to the fellow who walks; if you meet him on the road it will cost you nothing to slow down to a respectable pace, and he will think that you are a white man.

Don't stop at a small garage by the wayside, have the radiator of your car filled with water, borrow tools with which to make repairs and go away without showing a little appreciation.

Don't hypnotize yourself into believing that a fore-door type of car will be too warm for Summer time; it certainly will be comfortable in the Winter time, and when the dog days arrive you can throw the fore-door away if you want to.

Don't abandon a top because it is travel-stained; it may be coaxed into first-rate shape by the sparse application of a little good leather dressing, but it will be a grave mistake to apply this dressing. copiously. A little dressing and a little work, that's all.

Don't put your automobile out of commission and figure upon using the tires as a savings bank for mud; they should be cleaned and stored in a well-ventilated, dark place. Castile soap and tepid water will make a good solution with which to clean them.

Don't overlook the fact that the lining of an automobile top will present a better appearance than otherwise if it is occasionally brushed. A whisk broom is a satisfactory instrument.

Don't delay polishing the brass work with the understanding that you will do a good job when you get at it; there will be an entire absence of good brass work when you start on a delayed basis.

Don't give the brass work a "lick and a promise": the lick is all right, but the verdigris that forms continuously will get the best of your promise.

Don't lay too much stress upon "selling points" that may not exist in the car you are talking about; for all you can tell, the "prospect" might be endowed with sense enough to look into the matter.

Don't sandpaper the lacquer off of your new lamps; it is transparent coating that will prevent the lamps from tarnishing for a long time. When it becomes shabby, it will be time enough to dissolve the lacquer by applying alcohol.

Don't acquire the hallucination that there is a material defect at some point in the car you are paid to dispose, and then work the salesman's trick of bragging about it on the ground that it is a particularly new and brilliant idea; fools rarely have money enough to buy an automobile.

Don't put protectors over the lamps to hide the dirt that you failed to take off; for all you know a rainstorm might come along and wash them for you.

Don't be the character of salesman who jabbers about the kind of steel that is used in the car you are trying to unload; if you know anything about the material used, it will be time enough to say so.

Don't work overtime trying to carry conviction; you don't have to; just tell the truth.

Don't forget that a prospective really wants to know how bad the car is, not how good; tell him.

Don't make a $500 automobile out to be a $5,000 affair; if a prospective comes along with $500, why not give him what he wants?

Don't talk to the prospective while making a demonstration; he may not care to listen to your version of the last scandal; what he wants to know is, how will the automobile perform? Show him.

Don't do "stunts" with the car you are demonstrating; you take an undue chance with your prospect; the customer is not entitled to a car that will do any more than perform well.

Don't exaggerate the speed possibilities of the car; it will be a pleasant diversion to find a demonstrator who will not lie about the speed. Sensible customers much prefer to merely realize that the performance is satisfactory.

Don't squander your time lolling around in front of a garage waiting for a call; it will be more profitable all around if you will put in your idle moments lubracting the bearings of the automobile.

Don't own a garage that is not provided with a room for the accommodation of the chauffeurs; a gang of them hanging around the front of the building will drive your best business away.

Don't overlook the fact that ladies do not enjoy stopping at a garage that has a gang of loafers standing around in front of it.

University Professor Wanted as Chauffeur

workrooms, 6th floor.

CHAUFFEUR wanted, experienced, safe, careful; excellent mechanician, ready and able to make repairs and take care of machine; willing worker all hours, polite, neat; single, young; speaking fluently Spanish, French, English; able act employer's valet, secretary; if have knowledge typewriting, stenography, the better; give references. Diplomat, 511 Herald.

CHAUFFEUR, coachman wanted; one who had experience Packard cars and car driving state exper

The above advertisement in the help wanted columns of a New York newspaper recently has attracted an immense amount of notice in motordom of the metropolis. The requirements are so clearly stated that no mistake could be made. The main difficulty about the whole matter would be to find any human being who possessed all the essentials asked for by the would-be employer.

If the advertiser was really looking for such a paragon as he describes, he would better gain entree to Heaven first off, for as a leading member of the chauffeur industry expressed it: "There ain't no such thing possible."

It would be illuminating to know if this advertiser ever considered what he was asking for. According to his advertisement, he wants an experienced driver. As a driver the applicant must be careful and safe. Under the beneficent Callan law, that is all attended to by the searching (?) examination to which the chauffeurs were subjected prior to being invested with the dignity of a license. If the man does not get panicky while driving twenty-five miles an hour he may be considered a safe driver. If he can go thirty miles an hour without cutting down an undue number of telegraph poles he may be designated a careful driver. It is of course understood that "if one can not be safe one might as well be careful." Careful drivers retail at about $30 per week. So much for the driving.

Then he must be an excellent mechanician, ready and able to make repairs and take care of a machine. It is to be assumed that a license granted by the sovereign State of New York presupposes some knowledge of the automobile, but where a chauffeur gets only $30 a week the question would be raised immediately: "How on earth are the garages going to break even if a $30 man really makes all the repairs himself?"

Naturally it is to be surmised that the advertiser intended to make some sort of monetary provision for mechanical repair work, in the shape of additional emolument to the chauffeur-mechanician—say $10 a week.

Then, this workman must be a willing laborer and hold himself in readiness to labor at all hours. He must be polite, neat, single and young. Middle-aged, married men are not to be considered no matter how neat and polite their domestic condition presupposes. Of course no married man could hold himself in readiness to work at any hour of the night or day outside of his own domain; nobody but reporters and Pullman car porters ever do that.

But listen! In addition to those other qualities, the applicant must have a fluent speaking knowledge of French, Spanish and English. Any man who has such knowledge of languages can pull down at least $25 a week tutoring. So up this stage the applicant ought to be good for at least $65 a week.

But now the conditions of the race begin to draw. Beside all the sterling qualities insisted upon in the foregoing, the advertiser states that this wonder among chauffeurs shall be able to act as valet. That ought to be worth at least $10 a week of any man's money. But hark! This chauffeur-mechanician-linguist-valet must be able to act as secretary to his employer. Now a secretary who is a secretary at all and not a blackmailing menace cannot be had under $40 a week at an inside tip-over figure. So all told the weekly insult to be handed to the successful applicant would now total $115 a week.

Just at the end of the advertisement it is stated that a knowledge of typewriting and stenography is to be desired in the applicant. Thus a dividing line may be reached by the advertiser in sorting out his flood of answers. All the chauffeur-mechanician-linguist-valet-secretaries who can work the typewriter and take short-hand dictation will be preferred over the chauffeur-mechanician-linguist-valet secretaries who are not so liberally endowed. If they are, the successful one ought to get at least $10 a week more, because a knowledge of typewriting and stenography is a merchantable asset and deserves to be paid for.

Finally this modest advertiser wants references.

The questions that immediately obtrude themselves are:

First—Is it possible for one single human being, and young at that, to have all the qualities, at any price?

Second—If there is such an individual, would he consent to work for any other human being alive?

Third—If he was found to exist and willing to work, how much would he be able to demand in the way of salary?

Fourth—If he agreed to go to work, being fully equipped according to specifications, how long would it be before his mentality, knowledge and remarkable qualifications would raise him vastly higher than the man who had the nerve to employ him?

Fifth—How he would shine in comparison with his employer?

But to get back to earth again. The leading members of the Professional Chauffeurs' Club of America, sober professionalists who are not in business for fun or for health, declare that the brain that conceived such an advertisement as appears above is fully capable of offering $20 a week for a duly qualified man. If the applicant accepts, the employer will get the worst of it; but he will never know, according to the clubmen.

What Two Polecats Had to Say

First skunk: "Say, Andy, what is that odor?"

Second skunk: "Why, Sam, don't you know?"

First skunk: "No, Andy; it beats all the smells I know of. What can it be?"

Second skunk: "Why, Sam, I am greatly surprised; don't you really know?"

First skunk: "Honest Injun, Andy, it beats me. What is it?"

Second skunk: "Why, Sam, that's the Callan automobile law."

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL CLIMBS, ETC.

Oct. 18	New York City, Madison Square Garden, Electric Car Day at the Electric Show.
Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11.	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 15-21, 1911	Detroit, Wayne Gardens, Detroit Automobile Dealers' Association.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4,'11.	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11,'11.	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Mch. 4-11, 1911	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.

Races. Hill-Climbs, Etc.

Oct. 6-8	Santa Anna, Cal., Track Meet.
Oct. 7-8	Los Angeles, Cal., Speedway Meet.
Oct. 8	Philadelphia, Fairmount Park Race, Quaker City Motor Club.
Oct. 14-18	Washington, D. C., Start of Washington Post Reliability Run to Richmond, Va.
Oct. 15	Long Island Motor Parkway, Grand Prize, Automobile Club of America.
Oct. 15-16	Philadelphia, Roadability Run, Automobile Club of Philadelphia.
Oct. 15-18	Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.
Oct. 27-29	Dallas, Tex., Track Meet.
Oct. 28-29	New York City, New York "American's" Motor Truck Contest.
Oct	Exhibition Auto vs. Aeroplane, Dutchess County Fair, Poughkeepsie, N. Y.
Nov. 3-5	Atlanta, Ga., Speedway Meet, Atlanta A. A.
Nov. 5-6	New Orleans, La., Track Meet.
Nov. 10-12-13	San Antonio, Tex., Track Meet.
Nov. 24	Redlands, Cal., Hill Climb.
Nov. 24	Savannah, Ga., Road Race, Savannah Automobile Club.

THE AUTOMOBILE

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LET there be no mistake; the "Sixth Annual Vanderbilt Race" is the finishing touch to what has been a long-drawn-out struggle betwen the classes of cars that are made on a stock basis and the character of automobile that is specially made.

* * *

PROOF is now at hand that the special car is a nondescript; it is just what experience teaches that it must be, *i.e.*, the embodiment of freak ideas; expression of the man who thinks that an automobile must be a squawking rooster to be the "cock of the walk."

* * *

NOTHING can be plainer than the record as it stands; "despised" stock cars crowded each other at the finish; special construction automobiles went down before the onslaught, and were responsible for slaughter.

* * *

EVOLUTION, not revolution, wins. The stock car is the product of evolution; the special car is the instrument of revolution. Revolution beggars description; it has beggared the South American Republics; it will beggar the automobile makers who tolerate it, and it will thrice beggar the citizen who invests in one; nor does it matter whether it is a revolution that has the smell of burnt powder or one with the odor of partly burned gasoline.

DESTINY jokes with the joker; the wise purchaser, after witnessing the Vanderbilt Cup Race, will very properly decide that the stock car, as bad as the maker thereof thinks it is, is far better than the same maker's specially constructed car, on which he has wasted so much time and money that he is compelled to either perpetrate a fraud upon his own stockholders or pass the annual dividend.

* * *

WISDOM is a stowaway in the frock of cupidity; it is a strange brand of cupidity that is present when a maker of automobiles fits out his plant with special forms of machinery that will further the building of automobiles on a standard basis at a low cost, and then tries to beat his own good method; resorting to model-making in the process.

* * *

THINGS are not always what they seem. It is model-making when one model is hand-whittled; nor does it make any difference as to the shop in which the model is developed. Few models ever work satisfactorily; model-makers of the greatest competence invariably claim that models have to be put through a refining process to ultimately realize good results.

* * *

THE deceiver deceives himself. Instead of taking advantage of the refinements that naturally creep into a stock model as it is refined on a basis of necessity from year to year, the maker, not knowing his own business as well as one would reasonably expect that he should, thinks to do better, but, by a poorer way, and ends up by making the sad discovery that he is not even a good model maker.

* * *

WHEN railroad trains get off the track they go to smash; the same results accrue to the makers of automobiles when they risk their reputations in the keeping of poor special models instead of good stock automobiles. The makers with special models are bumping along the ties.

* * *

MODEL-MAKING should be confined to a small plant devoted to nothing else; when models are sufficiently revised and refined they have the qualities that belong in stock products. What chance is there then for a mere model in competition with a stock proposition?

* * *

FROM this time on purchasers of automobiles will shun special cars; they will know that they are crude models; it will be easy for them to appreciate the fact that it is in regularly made automobiles that habit lurks—the habit of accomplishing all that is good.

* * *

LOOKING backward affords the perspective necessary to convince man that improvements are wrought as time goes on. It is a little difficult, however, to discover any sign of improvement in the method that was adopted for the management of the Vanderbilt Cup Race. Perhaps the management was a little absent-minded; or maybe the investors wanted to get their money back

General Motors Finally Gets Support

$15,000,000 First Lien, Five-Year, Sinking Fund, Gold Notes, Issued—J. & W. Seligman & Co., New York, and Lee Higginson & Co., Boston, Underwriting the Issue.

Settles the Immediate Future of Twenty-one Component Automobile Companies, and Blows Away the Clouds That Threatened the Whole Industry for Several Months.

DEFINITE announcement of the financial plan adopted to solve the tangled problem of the General Motors Company was made late Wednesday afternoon, when it was officially stated that J. & W. Seligman & Co., of New York, and Lee, Higginson & Co., of Boston, had underwritten an issue of $15,000,000 6-per cent. first-lien, five-year gold notes based upon all the assets of the twenty-one component companies represented in the holdings of the General Motors Company. These companies are: Buick Motor Co., Cadillac Motor Car Co., Olds Motor Works, Marquette Motor Co., Cartercar Company, Oakland Motor Car Company, Rapid Motor Vehicle Co., Northway Motor & Manufacturing Co.. Elmore Manufacturing Co., Reliance Motor Truck Co.. Welch Company of Detroit, Weston-Mott Company, Randolph Motor Car Co., Welch Motor Car Company of Pontiac, Jackson-Church-Wilcox Co., Michigan Motor Castings Co., Champion Ignition Co., Michigan Auto Parts Co., McLaughlin Motor Car Co., Ltd., General Motors Company of Michigan, Oak Park Power Co.

The total issue authorized was $20,000,000, but the remainder not included in the terms of the underwriting may only be issued with the aproval of the company's finance committee which is to be nominated by the bankers.

The issue is designated positively as sinking fund notes. The assets of General Motors are estimated by the bankers at $37,383,000, about $12,000,000 of which is represented by real estate holdings and equipment of plants, subject to real estate obligations aggregating $266,500.

The funded debt and capital stock of General Motors, including the new issue, will be as follows:

$15,000,000 first-lien, 6 per cent., five-year, sinking fund, gold notes.

$17,835,400 7 per cent., cumulative, preferred stock, $2,800,000 of which is held by the company or its subsidiaries.

$20.835,030 common stock.

The Central Trust Company of New York has been designated as trustee, and mortgage notes and shares of stock of subsidiary companies securing the issue will be deposited under the trust deed which has been executed.

The majority of the stock deposited under voting-trust agreement will be voted by the trustees designated by the bankers to nominate a majority of the board of directors of the company within three weeks. This applies also to the subsidiary companies. Six out of seven members of the finance committee of General Motors and a comptroller for each of the component companies will also be selected.

The whole transaction simply means that the control of General Motors, with all it represents, has passed into the hands of a board of directors and a finance committee named by the financial interests who have underwritten the notes.

They will administer the properties for the next five years, and if at the expiration of that period the notes have been taken up, control of the property will revert to the present owners.

In the preliminary statement issued by the bankers, a most rosy view of the future of the company is taken.

To the trade, the settlement of the financial troubles of General Motors is of prime importance. The clouds that have beset that company for months have darkened the horizon of the whole business and the storm that has been averted by the consummation of this deal has been a very real menace to a number of companies not directly involved.

The talk of ruinous cutting of prices which has been heard at intervals recently will be stilled and the danger of the crumbling of a giant fabric, the falling of which must inevitably have buried dozens of companies in its ruins, has been averted.

In their statements to the public the bankers declare that the trouble with General Motors in the past year has been over-enthusiastic production and they assert that with conservatism as the keynote of the new régime, the business has a profitable future.

A damper was cast over the whole trade when it was announced recently that the Buick Motor Company, one of the largest of the members of the General Motors, was obliged to offer to sell one-year 6 per cent. notes at 85. This deal, which meant that the company would have to pay 21 per cent. for the use of money, is nullified by the huge underwriting plan that has been accepted.

It is planned to settle all outstanding obligations of the companies under the supervision of the new finance committee and then to provide a fund of at least $3,000.000 as working capital.

Flight at High Altitudes

BY MARIUS C. KRARUP. TRANSLATION AND REVIEW OF AN ARTICLE BY HENRY PETIT CONSIDERING EFFECTS OF ALTITUDE ON MOTOR AND AEROPLANE FUNCTIONS

ACCORDING to a fable dating back to remote antiquity the birds of the air once upon a time held a contest to determine which could fly to the highest altitude, and he was to be acclaimed as the king of their tribe. The eagle flew far up above the mountain peaks and none could follow him, but when he had reached as far as he could and surveyed all the rest far below a little tom-tit who had alighted on the eagle's back farther down, unnoticed, swung himself still a hundred feet higher into the atmosphere and chirped merrily, and he was chosen to be the king of fliers.

And this fable shows not only that altitude was considered a good test of flying ability long before the mechanical flier was invented, but also that tricks were counted good sport and that the originator of the fable had an instinctive understanding of the requirements, for he seems to have guessed that if the tom-tit had no real ability to compete with the eagle in thin air he could overcome this deficiency for a few seconds by saving his muscular power for one supreme effort. Fitness of the supporting surfaces, relatively small weight and relatively high power are the interchangeable qualities which enable the flier to rise into rarefied air, and, at least for all military purposes, these qualities, which also make for high speed, must determine the strategical superiority of one mechanical flier over another. If the dirigible balloon can be made dirigible indeed and can fly one thousand feet higher than the aeroplane—its worst enemy under war conditions—the latter will not be able to overtake it and harm it, though endowed with four times greater speed in the lower strata, and there will be room for both balloons and aeroplanes in whatever warfare may be necessary for preserving peace. The curious anomaly will then be witnessed of two kinds of war instruments, both effectively at work but neither able to injure the other, because one can get away horizontally and the other vertically.

But with regard to aeroplanes mutually the competition for instilling into them the ability to fly high must become as keen as the love for gold. No other quality, excepting only a perfected equilibrium, will be sought so ardently by constructors, since it will mean speed and safety, whether in peace or war, and will command the highest price for either purpose. And the competition will be saved from becoming a one-sided development of freakish machines by the necessity of preserving to the utmost possible extent the capacity for carrying the fuel for prolonged flights and a maximum of useful or warlike load. Having somewhat lightly set aside for the present the problem of equilibrium as one too difficult for immediate solution, the world of aeroplane constructors seem to have, as of one mind, comprehended the importance of altitude competitions and are straining their mental vision to perceive clearly the mechanical requirements for reaching great heights.

To this end it is, of course, necessary first to perceive what the effects of a rarefied atmosphere must be on each and all of the elements of an aeroplane machine. A synopsis of these effects is presented by H. Petit in *La Vie au Grand Air* for September 17 and, as an introductory to the study of the problems involved, this synopsis is reproduced in substance and with a few annotations in the following.

The elements and functions considered separately are: The motor, under which the carburetion, the compression, the ignition, the cooling, and the power; the propeller; the sustentation; the propulsion; the pilot.

The Motor.—The air's density diminishes with increasing altitude. At a height of 5,500 meters its specific gravity is reduced to one-half. The height record achieved by Chavez before his tragic death was already 2,600 meters. At this altitude the barometric pressure equals that of a column of 560 millimeters of quicksilver. To illustrate the problem, a pressure of 500 millimeters may be assumed which corresponds to a height of about 3,000 meters, a height which may now be reached almost any day. The normal pressure at the level of the sea is 760 millimeters; so the pressure at 3,000 meters is practically two-thirds of the normal. The effects of this reduction on the functioning of the motor may now be followed step by step from the entrance of a cylinderful of the rarefied air in the air channel of the carbureter until its exit through the exhaust tube.

Carburetion—The quantity of gasoline drawn in is practically a function not of the absolute pressure of the air, but of the difference in pressure above and below the jet. This difference and consequently the discharge from the jet will remain practically constant. But the mass of the vapor drawn in diminishes in the proportion of 3 to 2, and the mixture will therefore be too rich. This may be remedied by opening the additional air intake more widely, but in that case the automatic carbureter must be renounced. It is also to be noted that the effect mentioned is produced in equal measure when the gasoline is injected in liquid form. In all cases the discharge must be subject to regulation. (The fact that the lowered pressure will have the effect of depressing the gasoline in the jet might also be considered, as well as possible changes in the velocity of the air current. Possibly these factors have a tendency to maintain the quality of the mixture. But only definite and systematic experiments can probably settle these questions).

Compression—Suppose that the motor's normal rate of compression is 6 atmospheric pressures. The air admitted at 3,000 meters is no more at a pressure of 1 atmosphere and the final compression will be at the rate of 6 times 2-3 instead of 6 times 1; that is, 4 atmospheric pressures. By this reduction the efficiency and power of the motor are reduced to about 3-4 of what they were at the level of the sea, according to the accepted tables scheduling the effects of various rates of compression. A 50-horsepower motor will then from this cause alone be reduced to an output of 38 horsepower at an altitude of 3,000 meters. Only a motor whose compression may be varied at the will of the operator would remedy this effect, and none such has as yet been perfected, though it may shortly appear.

Ignition—The explosive mixtures burn so much more rapidly as they are more compressed. To get complete combustion when the compression is reduced it will therefore be necessary to vary the timing of the spark accordingly.

The explosion and the exhaust will apparently take a normal course, but the cooling of the motor will be affected.

Cooling—If air-cooling is employed, it seems that the motor will tend to heat up, as thin air will remove fewer calories than air of greater density. (At this point the heat loss due to radiation should really be considered as well as that due to convection). The effect of reduced heat convection should be so much more pronounced as the thermic efficiency is reduced from the other causes mentioned, leaving more waste calories to be carried away. On the other hand, the fuel charge is also somewhat reduced. An example will illustrate the proportions. Suppose the gasoline burned at sea level in a given length of time develops 100 calories and that the thermic efficiency of the motor is 30 per cent. There will then be 30 calories transformed into work, 35 carried away in the exhaust and 35 removed by the cooling air. At a height of 3,000 meters, if the carburetion remains normal through suitable provisions to this end, the burned gasoline will develop only 100 multiplied by 2-3, say 66 calories. The efficiency, reduced 1-4 by the diminished compression, will be 22 per cent. instead of 30 per cent. Hence only 14 calories out of the 66 will be transformed into work. There remain 52 calories, of which 26 will be passed with exhaust and 26 are to be carried away in the air. Will the motor heat? The answer is easy. At the sea level the air at normal density carried away 35 calories. At a density reduced to 2-3 it will carry away in proportion; that is, 23 calories, which is only slightly less than the 26 which should be carried away. (When radiation of heat is also considered it seems probable that even this slight deficiency arrived at by Mr. Petit will disappear.) If water cooling is employed the same reasoning applies, since the air after all remains the last medium for absorbing the surplus heat. But the lowered boiling point of water at high altitudes is to be looked out for.

The Power—With the mixture at its best proportions the fuel charge is reduced to 2-3, and the reduced compression further reduces the efficiency to 3-4. The motor having 50 horsepower at the sea level will therefore at an altitude of 3,000 meters have 50 horsepower multiplied by 2-3 and this again multiplied by 3-4; that is 25 horsepower. The power is reduced to one-half.

The most obviously suggested remedy would seem to be the use of an air compressor for supplying the carbureter with air at a constant pressure.

The Propeller—Working in a thinner medium, the propeller at any given speed of rotation will of course produce a proportionately weakened thrust, and a motor adapted to maintain its power at the increased altitude and well proportioned for its work at sea level will tend to run wild at the higher speed produced by the reduced resistance. A motor which will maintain its torque under these conditions must be one of the requirements. And a propeller with variable pitch or otherwise adapted for variable speeds suggests itself. (As referred to later, the resistance to propulsion diminishes in the same ratio as the propeller thrust, and, so far as mere speed is concerned, the altitude should therefore make little if any difference, but the work of the propeller is to produce sustentation also, and for this purpose an increased forward speed of the aeroplane is required, and this in some manner must be produced by the propeller and by the motor. Mr. Petit presents his version of the requirements in this respect).

Sustentation—Long calculations would be required for arriving at definite conclusions with regard to the influence of the rarefaction of the air upon sustentation and propulsion. (And then the results would be extremely doubtful for lack of experimentally ascertained data.) Only the direction in which the various forces will tend can be indicated. The sustentation may be looked upon as an action of the planes upon the molecules of the atmosphere. When the number of the molecules is reduced by rarefaction, either the planes must be held and balanced at an increased angle of incidence so as to act against as many molecules in a given time as at sea level, or the forward speed must be increased, this resulting partly in attacking an increased number of molecules and partly in attacking them, each of them, more vigorously. (Mr. Petit here assumes that the planes, as ordinarily constructed, attack a maximum of air molecules for a given plane area and also that they attack these molecules as vigorously as possible. He is interested in speed.) The increased speed is evidently the more interesting alternative, since there is always a loss in departing from the normal tilt. As sustentation is proportionate to the square of speed, at equal densities of the air, the speed required for converting a 2-3 sustentation into one full sea level sustentation must be the speed at sea level multiplied by the square root of 3-2, or approximately 1-2.

Propulsion—With the speed increased in this proportion, it is interesting to determine what the value of the drift or horizontal thrust will be. It is increased by the higher speed, but reduced by the smaller density of the air. The inert portions of the machine, such as frame, motor and aviator's body, offer less resistance than at sea level. On the whole it seems that the drift, so-called, should remain about the same.

Summarizing at the high altitudes the power of the motor is reduced; to obtain support one must increase either the speed or the tilt and the propeller must turn more rapidly. A motor disposing over an excess of power is therefore indispensable so much more as the work expended in rising is far from being negligible. (The logic of this inference in favor of higher power does not seem clear. Even the power to rise is required as much near sea level as at greater heights. But the reasoning is an example of that which passes current at present in favor of high motor power. An excess of power is of advantage at all altitudes if it may be obtained without sacrifice at other points, but the author has scarcely shown that it is power which is required for producing the indispensable increase of speed in the thinner air. He has shown that the ordinary motors lose part of their power in the thinner air and that something must be done to obviate this loss. The increase of the original motor power represents only the readiest method for having enough power left after the loss is sustained).

The rise of an aeroplane weighing 500 kilograms, with everything on board, from sea level to a height of 3.000 meters necessitates an expenditure of 1,500,000 kilogrammeters of energy, and if the apparatus rises to the height mentioned in one-half hour not less than 11 horsepower is employed for rising only, representing a power requirement to be added to that necessary for propulsion and sustentation. (But for rising at the same rate to a height of only one thousand feet the same additional power is wanted. The difference is only one of the continuity of the effort).

The Pilot—Finally the flights at high altitudes already made by Chavez and others have shown that it is necessary to consider in the first line the influence of rapid changes in the density of the atmosphere upon the aviator, physically and mentally. With the reduced pressure from the outside the gases dissolved in the blood and contained in the vessels of the body tend to escape, and this tendency often causes grave troubles in the circulation, well known under the name of mountain fever and similar to those experienced by divers suddenly rising to the surface after working at considerable depths.

Recent Events Among Aviators

Arthur Brookins started in a Wright biplane from Chicago at 9:15 a. m., Sept. 29, descended at Gilman, Ill., 75 miles from Chicago, at 11:43 a. m., resumed flight at 12:41 p. m., descended at Mount Pulaski, 88 miles further, at 3:30 p. m., repaired a broken pump, ascended again at 3:48 and arrived at Fair Ground, Springfield, Ill., at 4:25 p. m., having covered a distance of 187 miles in all. The machine was provided with starting wheels, one of which was broken when the aviator made the ascent from Mt. Pulaski.

The French ministry of war offers to pay a premium of $20,000 to the constructor who furnishes an aeroplane capable of carrying a useful load of 300 kilograms at a speed of at least 60 kilometers per hour in a continuous flight of at least 300 kilometers. Competitors must sign a contract and are allowed $100 extra for every mile of average speed attained in excess of the minimum. In addition to the $20,000 premium the successful constructor receives an order for 20 aeroplanes of the same type at a price of $6,000 for each. If the State selects to manufacture the 20 aeroplanes by means of its own facilities, it will pay the constructor a royalty of at least $600 for each apparatus with an additional bonus for excess speed.

The number of entrants who are expected to start in the projected race from Chicago to New York has now been reduced to three, which is the minimum according to the rules laid down by the newspapers offering the prize of $25,000 for the successful completion of the flight. The three who still propose to try are Charles Foster Willard, J. A. D. McCurdy and Eugene B. Ely. The start is to take place from Hawthorne race track near the Indiana line at 10 a.m. on Oct. 8, if the weather permits, and the voyage must be completed by Oct. 15.

Fairmount Park Field Big

THIRTY CARS WILL FACE THE STARTER ON SATURDAY NEXT—PRELIMINARY PRACTICE SHOWS COURSE IS FASTER THAN EVER

PHILADELPHIA, Oct. 4—Now that the Vanderbilt Cup race is over interest centers in the Fairmount Park road race next Saturday, and it promises to be the greatest ever held over that historic course.

The entries for the race came in with a rush on Monday—two Nationals, two Stoddard-Daytons, Mercedes, Mercer, two Marmons, Simplex, Corbin and three Abbott-Detroits. With a field of thirty and the course faster this year than in the two preceding years, not only the record for the entire course, but the record of 8 minutes 47 seconds, for a lap, made last year by Len Zengle in a Chadwick car, should be broken.

There were about 5,000 persons out at sunrise Monday, the first morning scheduled for practice, and six drivers sped around the eight-mile course until 7:30, at which hour trials must stop. Being the first time, the drivers didn't cut loose and there were no speed thrills.

Every effort is being put forth to safeguard the public and the contestants and every precaution will be taken and ropes drawn on each side of the course and no one allowed to stray on the road. Similarly, a policeman is stationed at each entrance of the park to prevent the entrance of any vehicle between 6 and 7:30 a. m. This will be the rule throughout the week.

Instructions for contestants have been issued and cars will be examined for piston displacement Wednesday after practice.

Policing arrangements have been completed. Three thousand men, an average of one to every 100 feet, will be on guard and no one will be allowed to cross the track from start to finish. With the assurance of a clear track and with the improved conditions of the road a new record for the course is confidently anticipated. Parking places, boxes and seats are selling at a rapid rate, and there are indications that the beneficiaries of the proceeds, all of which go to charity, will derive a greater amount than at any of the preceding contests.

Beginning Monday morning the course will be open for practice from 6 till 7:30 a. m. every day. These early morning spins are a great source of interest in themselves, and have always attracted crowds of spectators. List of entries follows:

No. Car	Entrant	Driver
2—Chadwick	Chadwick Eng. Works	Lew Zengle
3—Chadwick	Chadwick Eng. Works	Al Mitchell
4—Benz	Benz Auto Import Co.	Irwin Bergdoll
5—Benz	Benz Auto Import Co.	Ed Hearne
6—Apperson	Apperson Bros. Auto Co.	H. M. Hanshue
7—Jackson	Jackson Auto Co.	E. F. Scheiffler
8—Cole "30	Cole Motor Car Co.	"Bill" Endicott
9—Cole "30"	Cole Motor Car Co.	Harry Endicott
10—Simplex	J. Fred Betz, 3d	Mr. Betz.
11—Simplex	John Megraw	W. C. Mullen
12—Ford	Ford Motor Co.	F. Kulick
13—Benz	Al Hall	Al Hall
14—Benz	C. A. Bergdoll	C. A. Bergdoll
15—Marmon	Nordyke & Marmon Co.	Harroun
16—Marmon	Nordyke & Marmon Co.	Dawson
17—Stoddard-Day.	Stoddard-Dayton Auto Co.	H. N. Harding
18—Stoddard-Day.	Stoddard-Dayton Auto Co.	T. De Hymel.
19—Mercedes	Mr. Jagersberger	T. J. Wosser
20—National	National Motor Car Co.	Aitken
21—National	National Motor Car Co.	Wilcox
22—Mercer	Mercer Motor Car Co.	H. Frey
23—Simplex	Robt. E. Hitemeyer	R. Beardsley
24—Corbin	Corbin Motor Vehicle Co.	Joe Matson
25—Abbott-Detroit	Abbott-Detroit M. C. Co.	....
26—Abbott-Detroit	Abbott-Detroit M. C. Co.	....
27—Abbott-Detroit	Abbott-Detroit M. C. Co.	....

Records Go at Winnipeg Meeting

WINNIPEG, Oct. 3.—New records for 1 and 25 miles were hung up here Saturday for the Dominion of Canada, at the fourth annual meet of the Winnipeg Automobile Club.

W. C. Power, in a McLaughlin-Buick "40," lowered the Canadian mile track record to 59 seconds, and in the Dunlop Trophy race of 25 miles he covered the distance in 25 minutes, 19 1-5 seconds. Owing to the number of entries in the last race, he was forced to keep entirely to the outside of the track, thereby covering more than the distance. His speed in this event was better than a mile a minute for the distance. The summary:

No. Car	Driver	Time
Dunlop Trophy Race, Twenty-five Miles—		
1—McLaughlin-Buick	W. C. Power	25:19
2—National	W. Guest	26:24
3—KisselKar	A. Moore	
One Mile Time Trial—		
1—McLaughlin-Buick	W. C. Power	:59 1-5
2—National	W. Guest	1:01 4-5
3—Knox	R. Husk	1:03
Five-mile Motor Cycle Race, Open—		
1—Indian, 7 h. p.	J. Baribeau	5:25
2—Indian, 5 h. p.	Burgess	
Five-mile race for cars up to 160 cubic inches—		
1—Maytag	Harn	6:25
2—McLaughlin	Cline	
Ten-mile race for cars from 161 to 230 cubic inches—		
1—Warren-Detroit	D. A. Brown	12:40
2—McLaughlin	J. Cline	
3—Maytag	Harn	
Ten-mile race for cars from 231 to 300 cubic inches—		
1—McLaughlin-Buick	W. Guest	11:19
2—Warren-Detroit	J. Brown	
3—Knox	Houghton	

Correction

In a recent issue of THE AUTOMOBILE it was made to appear that Velie car, Number 51, which took third place in the free-for-all at the Algonquin hill climb, was driven by Cooney. It appears that through a transposition in the program, the car carded to be driven by Cooney was driven by J. H. Stickney.

Accident Spoils Springfield Races

SPRINGFIELD, Oct. 3—The race program at the State Fair was sharply abridged Saturday afternoon by an accident in which Larue Vredenburgh, president of the Springfield Automobile Club, was killed while driving in competition.

The summary of events that preceded the mishap is as follows:

Car	Driver	Time
Five-mile race for fully equipped stock cars driven by amateurs—		
Jackson	Bisch	5:42
Stoddard-Dayton	Vredenburgh	
Chalmers-Detroit	Hicks	
Ten-mile race for cars under 600 cubic inches displacement—		
Falcar	Hughes	10:28 3-5
Cutting	Slagel	
Stoddard-Dayton	Vredenburgh	
Five-mile race for stock chassis of from 231 to 300 cubic inches		
Falcar	Hughes	5:15
Buick	Farr	
Staver-Chicago	Cheney	
Ten-mile race for stock chassis of from 161 to 230 cubic inches		
Buick	Farr	10:24 2-5
Staver-Chicago	Mounckmeier	
Chalmers-Detroit	Hicks	
Five-mile race for gasoline cars of from 301 to 450 cubic inches		
Falcar	Hughes	5:14
Buick	Slagel	
Stoddard-Dayton	Vredenburgh	
Ten-mile race for gasoline cars of from 451 to 500 cubic inches		
Knox	Oldfield	9:59 3-5
Stoddard-Dayton	Vredenburgh	
Jackson	Ellis	
Ten-mile free-for-all—		
Darracq	Kirscher	9:51
Hudson	Hickox	
Moon	Wells	
Five-mile free-for-all—		
Falcar	Hughes	5:13 2-5
Cutting	Tower	
Staver-Chicago	Cheney	
Australian pursuit race for cars under 600 cubic inches—		
Hudson	Hickox	Winner
Twenty-mile race for stripped stock chassis—		
Falcar	Hughes	20:03 3-5
Jackson	Ellis	
Moon	Wells	
Knox	Oldfield	

Good Roads Convention

THIRD ANNUAL MEETING IN ST. LOUIS A GREAT SUCCESS—MANY APPROPRIATE PAPERS READ AND DISCUSSED—ATLANTA NEXT CONVENTION CITY

ST. LOUIS, Oct. 3—Nearly 400 delegates from two-thirds of the States in the Union attended the Third Annual Good Roads Convention at the New Coliseum Wednesday, Thursday, and Friday.

Officers and delegates pronounced the gathering the most successful of good roads meetings. Atlanta, Ga., was selected as the next convention city.

The delegates were welcomed at the opening session by Governor Herbert S. Hadley, of Missouri. He pledged himself to the good roads movement and promised to use his official influence in aid of increased appropriations from both the State and Federal governments.

The official program at the first day's session was not followed. Charles D. Ross, of Newtcn, Mass., advocated legislation giving the automobile the middle of the road, with horse-drawn vehicles at either side.

A course of instruction in the public schools relative to the danger of children playing or walking in roads was advocated. "Convict Labor in Public Road Construction" was the title of a paper read by Joseph Hyde Pratt, State Geologist, of North Carolina. Major W. W. Crosby, of Baltimore, talked on "Modern Road Construction."

At the second day's session Prof. Arthur H. Blanchard, of Brown University, attacked the American system of permitting city or county engineers to lay out and build roads and then to leave their care in the hands of a different set of officials. Roads should be built and maintained by the same department, he said.

George R. Carter, of Marlin, Tex., told how the commercial bodies of that State organize tours of troupes consisting of six or more motor cars, carrying a complete moving picture show with thousands of feet of films, to be used to demonstrate the benefits to be secured by good roads. Harold Parker, chairman of the Massachusetts Highway Commission, criticised the system of supervising road building in his paper on "State Roads to Meet Modern Traffic Conditions." The list of papers read before the convention the second day included "High Altitude Roads," by F. L. Bartlett, Denver; "Treatment of Earth Roads," by D. Ward King, Jefferson City, Mo.; "Across Missouri Highways," Curtiss Hill, State Highway Commissioner of Missouri; and "Crest of Blue Ridge Highway," Joseph Hyde Pratt, Chapel Hill, N. C.

At the closing session the convention passed resolutions condemning poll-tax road labor.

This National Convention Committee was selected: George C. Diehl, Buffalo, N. Y., chairman A. A. A. Good Roads Board; N. J. Bachelder, Concord, N. H., Master National Grange; Charles S. Barrett, Union City, Ga., president Farmers' Union and Co-operative Association; Logan Waller Page, Washington, D. C., Director United States Office of Public Roads; L. H. Kittredge, Cleveland, President National Association of Automobile Manufacturers; R. D. Chapin, Detroit, chairman N. A. A. M. Good Roads Committee; Alfred Reeves, New York City, General Manager Association Licensed Automobile Manufacturers; Harold Parker, Boston, State Highway Commissioner of Massachusetts; Fred Atwater, Bridgeport, Conn., President American Wheelmen; C. J. Butler, Detroit, Motor and Accessory Manufacturers; S. Percy Hooker, Albany, N. Y., State Highway Commissioner of New York; Lewis R. Speare, Boston; Robert P. Hooper, Philadelphia; A. G. Batchelder and Charles Thaddeus Terry, New York.

Philadelphia Club Arranging Tour

PHILADELPHIA, Oct. 3—The fall tour of the Automobile Club of Philadelphia to Atlantic City and return, over entirely new route, will take place Saturday and Sunday, October 15 and 16.

The itinerary of the trip calls for a run of 126 miles the first day, from Philadelphia through Salem, Bridgeton, Port Elizabeth, Tuckahoe to Atlantic City, and a return journey of 86 miles through the Jersey pine lands. The entries already received are as follows:

No.	Car	Driver
1	Chalmers	Harvey Ringler
2	Jackson	Ira L. Brown
3	Cadillac	Henry Shock
4	Franklin	George Karlavghan
5	Winton	Paul M. Elsasser
6	Marmon	Joseph Hudson
7	Stevens-Duryea	Frank W. Hitchcock
8	Stanley	Frederic Wilcox
9	Cutting	Mrs. Charles A. Wolf
10	Marion	Allan Lund
11	Premier	H. E. Grant
12	Welch-Detroit	Edward Wilkie
13	Franklin	....
14	Premier	Carl Zentmayer
15	Buick	Edward Wilkie
16	Pierce-Racine	S. Walter Harper
17	Locomobile	Howard McTurk
18	Pullman	W. C. Longstreth
19	Stanley	D. W. Harper
20	Mitchell	W. J. Vogler
21	Stevens-Duryea	F. W. Eveland

Grand Rapids to Have Auto Show

GRAND RAPIDS, MICH., Oct. 3—Grand Rapids' second annual automobile show probably will be held February 15 to 18 inclusive. This is the week following the big Chicago exhibition. As was the case last year, the show will be under the auspices and management of the Grand Rapids *Herald.*

Correcting a Wrong Impression

It was erroneously stated in some of the *newspapers* on September 29 that the Emil Grossman Co. will go into liquidation and wind up its affairs. There is no foundation in fact for this statement. The real situation is that the Eagle Co. of Newark, N. J., has taken over the wind shield and spark plug business of the Emil Grossman Company, and Emil Grossman is now sales manager of the Eagle Co., with headquarters at his old stand, 232 W. Fifty-eighth street, New York, where he is carrying on the business of the Emil Grossman Company, independent of the part of the business that was taken over by the Eagle Co. It will be remembered that Emil Grossman held a large interest in the Motor Car Equipment Co., which interest, as he now states, has been disposed of. Referring to the Eagle Co., which is controlled by the Standard Co., of Torrington, Conn., it is preparing to do business in a very large way with the Red Head spark plug and the wind shield enterprise as formerly carried on by Emil Grossman, utilizing the large building in Newark which was formerly occupied by the Domestic Sewing Machine Co. This plant is being fitted out in o most comprehensive way with the necessary special tools and equipment for the making of accessories.

Schacht Company Extending Plant

The Schacht Motor Car Company, Cincinnati, is building a new factory. The building is to be 500 feet long by 70 feet wide and three stories high. It is being constructed of buff pressed brick and will have offset boiler and engine rooms. Its cost will be $100,000 without equipment.

Vanderbilt Race Analyzed

The Vanderbilt Race by Laps

The race was started at 6 o'clock, National No. 1, driven by Livingston, leading the way. Oldsmobile No. 5 broke an oil pump before the start and did not appear on the line. All the cars got away in good shape except Marquette-Buick 29, L. Chevrolet, which stalled its motor just after passing the line. The first car to complete the round was Lozier 2, but it was not in the lead on a basis of elapsed time. Marquette-Buick 29, despite its mishap at the start, was pushed through the lap in 10:46, the fastest time ever made for a first lap under the circumstances. Knox 32 was second in 11 flat and the other two Marquette-Buicks were tied for third and fourth places, 3 seconds behind. Columbia 12 went out before the end of this round through a skid from a bridge caused by a bursted tire.

Lap 2—All of the cars remaining in the race completed the second lap, except the Royal Tourist, which broke a camshaft and retired. Marquette-Buick 29 held the lead with its stablemate, 27, in second place, and the Knox 3 close on their heels. Marmon 25, Alco 18 and Lozier 2 followed in close order. The Jackson 19 was reported with a broken rod somewhere up the stretch. The leaders were all driven at a terrific clip.

Lap 3—There was no change in the order of the first three

OFFICIAL TABLE SHOWING THE TOTAL AND LAP TIMES OF EACH OF THE THIRTY CARS THAT

No.	Car	Driver	Mechanician	1st Lap	2nd Lap	3rd Lap	4th Lap	5th Lap	6th Lap	7th Lap	8th Lap
				12.64 M.	25.28 M.	37.92 M.	50.56 M.	63.20 M.	75.84 M.	88.48 M.	101.12 M.
18	**Alco**	H. F. Grant	F. Lee	11:33 11:33	22:49 11:16	34:02 11:13	45:18 11:16	56:32 11:14	67:44 11:12	79:02 11:18	90:20 11:18
25	**Marmon**	Geo. Dawson	Bruce Keen	11:12 11:12	21:58 10:46	32:48 10:50	43:42 10:54	54:52 11:10	65:43 10:51	76:36 10:53	87:26 10:50
10	**National**	J. Aitken	Ed. Coddington	11:31 11:31	22:35 11:04	33:39 11:04	44:52 11:13	56:04 11:12	69:54 13:50	83:27 13:33	94:52 11:25
31	**National**	L. A. Disbrow	R. Albrecht	11:51 11:51	23:03 11:12	34:13 11:10	45:35 11:22	56:48 11:13	68:04 11:16	79:16 11:12	91:08 11:52
2	**Lozier**	Ralph Mulford	Joe Horan	11:14 11:14	22:08 10:54	33:04 10:56	44:04 11:00	55:05 11:01	66:07 11:02	77:05 10:58	87:59 10:54
17	**Pope-Hartford**	J. Fleming	C. R. Faeth	11:35 11:35	22:31 10:56	33:39 11:08	44:46 11:07	55:51 11:05	66:55 11:04	78: 11:05	89:07 11:07
11	**Simplex**	L. Mitchell	W. Driggs	11:46 11:46	23:19 11:33	34:41 11:22	46:07 11:26	57:24 11:17	68:41 11:17	79:57 11:16	91:15 11:18
7	**Benz**	E. A. Hearne	L. B. Randell	11:51 11:51	23:05 11:14	34:22 11:17	45:44 11:22	57:06 11:22	68:44 11:38	87:15 18:31	99:13 11:58
15	**Stoddard-Dayton**	H. W. Harding	C. Mason	11:54 11:54	23:26 11:32	34:51 11:25	46:19 11:28	57:46 11:27	69:08 11:22	83:02 13:54	94:22 11:20
22	**Pope-Hartford**	Bert Dingley	C. F. Ossgood	11:27 11:27	22:28 11:01	33:26 10:59	44:26 11:	55:32 11:06	66:34 11:02	77:40 11:06	88:41 11:01
20	**Oldsmobile**	H. B. Stillman	J. Schiller	12:37 12:37	24:46 12:09	36:51 12:05	49:11 12:20	61:08 11:57	73:13 12:05	85:04 11:51	96:57 11:43
16	**Benz**	D. Bruce-Brown	Fritz Cramer	11:29 11:29	29:43 18:14	40:53 11:10	51:59 11:06	63:08 11:09	74:12 11:04	89: 14:48	100:27 11:27
1	**National**	Al. Livingston	R. Vernon	11:34 11:34	34:01 22:27	50:39 16:38	67:10 16:31	83:20 16:10	99:23 16:03	110:24 11:01	121:45 11:21
9	**Amplex**	T. P. Jones	H. Warren	12:13 12:13	23:51 11:38	35:25 12:34	47:07 11:42	58:47 11:41	70:32 11:44	82:16 11:44	122:50 40:34
6	**Simplex**	R. E. Beardsley	Glen Ethridge	14:20 14:20	25:37 11:17	36:53 11:16	48:22 11:29	58:49 10:29	71:09 12:20	82:25 11:16	93:41 11:16
28	**Apperson**	H. Hanshue	W. Ferguson	16:32 16:32	57:02 40:30	74:40 16:38	86:33 11:53	98:38 12:05	110:37 11:59	122:52 12:15	142:30 19:38
4	**Mercedes**	S. E. Wishart	Dan Murphy	11:22 11:22	27:58 16:36	39:09 11:11	55:10 16:01	66:08 10:58	77:07 10:59	88:09 11:02	99:11 11:02
26	**Houpt-Rockwell**	C. W. Limberg	Wm. Horning	12:15 12:15	24:04 11:49	35:43 10:54	47:29 11:46	59:07 11:38	71:34 11:56	83:18 11:44	95:01 11:43
29	**Marquette-Buick**	L. Chevrolet	Chas. Miller	**10:46** 10:46	**21:01** 10:15	**31:13** 10:12	**41:46** 10:33	**52:07** 10:21	**62:40** 10:33	**73:11** 10:31	**83:45** 10:34
19	**Jackson**	E. B. Scheifler	J. C. Casey	102:09 102:09	115:22 13:13	128:03 12:41	140:23 12:20	152:37 12:14	164:53 12:16	177:12 12:19	189:27 12:15
21	**Marmon**	Ray Harroun	H. Goetz	35:27 35:27	46:21 10:54	57:00 11:39	67:38 10:38	78:20 10:42	89:05 10:45	99:58 10:53	116:47 16:49
24	**Stoddard-Dayton**	T. De Hymel	L. B. Nottingham	12:45 12:45	23:37 10:52	34:26 10:49	45:16 10:50	66:55 21:39	78:04 11:09	88:52 10:48	99:42 10:50
27	**Marquette-Buick**	R. Burman	Howard Hale	11:03 11:03	21:39 10:36	32:09 10:30	42:37 10:28	53: 10:23	63:40 10:40	75:51 12:11	86:32 10.41
14	**Corbin**	Joe. Matson	Lyman Alcott	11:48 11:48	23:36 11:48	48:30 14:54	74:34 26:02	86:52 12:20	98:57 12:05	119:42 20:45	137:37 17:55
3	**Marquette-Buick**	Arthur Chevrolet	Bob Evans	11:03 11:03	29:35 18:32	40:24 10:49	50:54 10:30	61:34 10:40	115:59 54:25	140:05 24:06	Transmission
23	**American**	W. Wallace	Chas. Nauber	11:28 11:28	22:34 11:06	33:42 11:08	45:08 11:26	84:02 38:54	98:04 14:02	Cylinders	
8	**Benz**	F. Heim	Frank Dillon	11:51 11:51	23:25 11:34	34:51 11:26	46:25 11:34	58:02 11:37	Caught Fire		
32	**Knox**	Fred Belcher	Jack Coffee	11: 11:	21:45 10:45	32:33 10:48	Valves				
30	**Royal-Tourist**	P. H. Jardine	E. Halvon	23:24 23:24	Cam-shaft						
12	**Columbia**	H. A. Stone	Wm. Bacon	Over Bridge on First Round							
5	**Oldsmobile**	Joe Nilson	A. C. Scherer	Broke Oil Pump before Start							

TABLE OF RESULTS IN THE MASSAPEQUA SWEEPSTAKES, WON BY THE COLE, AVERAGING 54.93 MILES AN HOUR

No.	Car	Driver	Mechanician	1st Lap 12.64 M.	2nd Lap 25.28 M.	3rd Lap 37.92 M.	4th Lap 50.56 M.	5th Lap 63.20 M.	6th Lap 75.84 M.	7th Lap 88.44 M.	8th Lap 101.12 M.	9th Lap 113.76 M.	10th Lap 126.40 M.
51	**Cole "30"**	"Bill" Endicott	Harry Endicott	14:06 14:06	27:38 13:32	41:07 13:29	54:40 13:33	68:22 13:42	81:52 13:30	95:10 13:18	110:35 15:25	124:13 13:38	138:04 13:51
53	**Abbott-Detroit**	M. Roberts	Hy. Maher	14:12 14:12	28:02 13:50	44:16 16:14	58:08 13:52	72:22 13:14	86:20 13:58	100:19 13:59	114:31 14:12	128:53 14:22	143:02 15:09
52	**Cole "30"**	Edmunds	James Heis	15:22 15:22	29:52 14:30	44:39 14:47	58:50 14:11	73:22 14:32	89:30 16:08	103:57 14:27	118:35 14:38	133:04 14:29	147:15 14:11
54	**Lancia**	Wm. Knipper	Aug. Guichard	12:35 12:35	24:45 12:10	36:49 12:04	49:06 12:17	61:21 12:15	73:24 12:03	85:32 12:08	Turned turtle		
55	**Abbott-Detroit**	Lee Oldfield	Jas. Hemstreet	Did Not Start.									
56	**Abbott-Detroit**	V. Padula	John Pavee	Hit Telegraph Pole									

STORY OF THE RACE BY LAPS, WITH TABLES SHOWING AT A GLANCE THE PERFORMANCE OF THE CARS IN THE THREE EVENTS

cars in this round, but the Lozier and Marmon 25 hung a trifle and the gap between them and the leaders was widened somewhat. The Alco made no effort to keep pace with the pacemakers, maintaining a steady rate of speed, about a minute slower for the round than the pathfinders. Marmon 21, Harroun, crossed the tape for the first time, having experienced mechanical troubles soon after the start.

Lap 4—The Knox went out in this round from valve troubles, leaving 28 cars in the race. The place of the Knox in the procession was taken by Marmon 25, while the Lozier and the two Pope-Hartfords trailed along in close company. They were all drawing away from the carefully driven Alco, the leader being over 4 minutes ahead.

Lap 5—Marquette-Buick 29 quickened the pace in this round and slipped away 49 seconds from the flying Marmon. It was followed in its spurt by its stablemate. The leader made the round in 10:21.

Lap 6—This circuit saw the last of Benz 8, Heim, as the car caught fire from a leaky gasoline channel and was retired. The order of the leaders was not changed.

Lap 7—The American 23 succumbed in this lap, a cracked cylinder putting the car out of the running. There were 26 cars

STARTED IN THE VANDERBILT CUP RACE—THE WINNING ALCO AVERAGED 65.18 MILES AN HOUR

9th Lap	10th Lap	11th Lap	12th Lap	13th Lap	14th Lap	15th Lap	16th Lap	17th Lap	18th Lap	19th Lap	20th Lap	21st Lap	22nd Lap
113.16 M.	126.40 M.	139.04 M.	151.68 M.	164.32 M.	176.96 M.	189.60 M.	202.24 M.	214.88 M.	227.52 M.	249.16 M.	252.80 M.	265.44 M.	278.08 M.
101:50	115:16	126:34	137:58	149:25	160:50	172:09	183:27	196:33	**207:57**	**220:51**	**232:06**	**244:36**	**255:58**
11:30	13:26	11:18	11:24	11:27	11:25	11:19	11:18	13:06	11:24	12:54	11:15	12:30	11:22
98:15	**109:25**	**120:17**	**135:23**	**146:42**	**158:13**	**169:45**	**181:02**	**192:32**	211:54	223:11	234:19	245:19	256:23
11:49	11:10	10:52	15:06	11:19	11:31	11:32	11:17	11:30	19:22	11:17	11:08	11:	11:04
106:58	117:43	129:02	142:32	152:03	163:38	175:03	186:26	198:08	211:21	222:56	234:27	246:03	257:29
12:06	10:45	11:19	13:30	9:31	10:35	11:25	11:13	11:42	13:13	11:35	11:31	11:36	11:26
102:18	113:43	125:10	136:32	149:17	160:41	176:28	191:34	203:03	214:43	227:51	241:04	252:27	264:08
11:10	11:25	11:27	11:22	12:45	11:24	15:47	15:06	11:29	11:40	13:08	13:13	11:23	11:41
103:25	114:23	125:34	139:23	157:36	168:42	179:46	191:09	206:38	218:02	231:27	242:34	253:38	264:33
15:26	10:58	11:11	13:49	18:13	11:06	11:04	11:23	15:29	11:24	13:25	11:07	11:04	10:55
102:12	120:12	131:35	142:50	154:10	165:35	176:52	188:11	201:43	216:42	229:32	241:09	255:04	266:47
13:05	18:	11:23	11:15	11:20	11:25	11:17	11:19	13:32	14:59	12:50	11:37	13:55	11:43
106:11	117:32	128:56	144:20	155:40	167:13	178:41	193:02	208:58	220:22	234:09	245:53	260:12	272:01
14:56	11:21	10:24	15:24	11:20	11:33	11:28	14:21	15:56	11:24	13:37	11:44	14:19	11:49
110:54	122:33	134:21	146:09	160:52	172:55	184:37	196:39	208:30	220:08	231:55	243:37	256:41	272:25
11:41	11:39	11:48	11:88	14:43	12:03	11:42	12:02	11:51	11:38	11:47	11:42	13:04	15:44
105:41	125:06	136:43	147:56	159:25	170:53	182:15	193:30	204:41	220:09	231:46	247:13	262:	273:34
11:19	19:25	11:37	11:13	11:29	11:28	11:22	11:15	11:11	15:28	11:37	15:27	14:47	11:34
102:32	117:20	128:35	146:10	162:24	176:04	187:27	202:17	215:44	227:03	238:32	252:51	265:17	277:33
15:49	15:48	11:15	17:35	16:14	13:40	11:23	14:50	13:27	11:19	11:29	14:19	12:26	12:16
108:45	120:30	132:10	148:47	163:25	179:01	191:12	203:13	215:23	227:20	239:36	253:32	265:36	
11:48	11:45	11:40	16:37	14:38	15:36	12:11	12:01	12:10	11:57	12:16	13:56	12:04 Running	
111:40	124:21	136:09	147:28	159:08	173:21	189:20	200:59	212:19	223:30	242:15	253:58	267:39	
11:13	12:41	11:48	11:18	12:20	14:13	15:59	11:39	11:20	11:11	18:45	11:43	13:41 Running	
132:55	144:08	155:34	166:54	178:15	189:30	200:49	212:15	223:57	238:49	250:10	261:30	273:	
11:10	11:13	11:26	11:20	11:21	11:15	11:19	11:26	11:42	14:52	11:21	11:20	11:30 Finished; no Time	
131:26	146:04	158:06	175:41	187:17	204:32	216:15	228:14	239:58	251:50	263:30	275:14		
11:36	12:38	12:02	17:35	11:36	17:15	12:43	11:59	11:34	11:52	11:40	12:44 Running		
105:	116:19	127:33	138:54	150:19	164:41	176:04	187:27	198:55	213:53				
11:19	11:19	11:14	11:21	11:25	14:22	11:23	11:23	11:28	14:58 Steering Gear				
155:	166:53	178:41	190:32	208:05	220:32	232:53	245:41	257:29	269:31				
12:30	11:53	11:48	11:51	17:33	12:27	12:21	12:48	11:48	12:02 Early Carburetor Trouble				
110:13	153:45	165:23	193:	204:19	215:22	226:30	237:36	259:					
11:02	43:32	11:38	27:37	11:19	11:03	11:08	11:06	21:24 Running					
110:43	122:33	134:17	156:57	170:24	219:59	231:36	250:13	265:33					
14:42	11:50	11:44	22:40	13:27	49:35	11:37	18:37	15:20 Brake					
103:04	114:11	125:18	136:11	147:13	158:13	175:23							
19:19	11:07	11:07	10:53	11:02	11:00	17:10 Accident on Back Stretch							
201:40	213:46	225:55	242:15	254:53	267:11								
12:13	12:06	12:09	16:20	12:38	12:18 Broke Radius Rod in First Round								
164:23	175:40	186:41	197:43	209:02									
47:36	11:17	11:01	11:02	11:19 Broke Shaft									
110:37	123:04	134:05	170:24										
10:55	12:27	11:01	36:19 Carburetor										
97:01													
19:29 Radiator													
149:45													
12:08 Cooling System													

[Note—Black figures indicate leader on each lap.]

SUMMARY OF RESULTS IN THE WHEATLEY HILLS SWEEPSTAKES, WON BY THE FAL, AVERAGING 58.45 MILES AN HOUR

No.	Car	Driver and Mechanician	1st Lap 12.64 Miles	2nd Lap 25.28 Miles	3rd Lap 37.92 Miles	4th Lap 50.56 Miles	5th Lap 63.20 Miles	6th Lap 75.84 Miles	7th Lap 88.44 Miles	8th Lap 101.12 Miles	9th Lap 113 76 Miles	10thLap 126.40 Miles	11thLap 139.04 Miles	12thLap 151.68 Miles	13thLap 164.32 Miles	14thLap 176.96 Miles	15thLap 189.60 Miles
46	**Fal**.....	J. F. Galnaw.....	13:24	26:40	39:48	52:53	67:35	79:46	93:48	106:38	118:54	130:59	143:06	155:49	168:49	181:47	194:39
		L. Folman......	13:24	13:16	13:08	13:05	14:42	12:11	14:02	12:50	12:16	12:05	12:07	12:43	13:	12:58	12:52
41	**Fal**.....	W. H. Pearce....	12:34	24:53	37:21	49:51	62:25	75:06	87:41	100:23	113:01	125:37	147:49	161:42	175:37	191:59	205:01
		Frank O'Brien....	12:34	12:19	12:28	12:30	12:34	12:41	12:35	12:42	12:38	12:36	12:12	13:53	13:55	16:22	13:02
45	**Marmon**	F. Heineman....	12:01	23:48	35:33	47:16	59:30	71:28	93:18	108:	122:18	137:10	152:04	166:50	182:34	197:59	Run'g
		H. B. Patten....	12:01	11:47	11:45	11:43	12:14	11:58	21:50	14:42	14:18	14:52	14:54	14:46	15:44	15:25	
42	**Mercer**...	E. H. Sherwood..	19:15	32:31	45:58	59:12	98:56	112:28	125:33	138:45	152:04	203:08	Running				
		H. M. Ozier.....	19:15	13:16	13:27	13:14	39:44	13:32	13:05	13:12	13:19	51:04					
49	**S. P. O.**..	J. Juhasz.......	14:11	28:03	41:49	55:12	Engine trouble										
		Joe Melzer.......	14:11	13:52	13:46	13:23											
43	**Marion**..	M. Basle........	15:53	31:28	60:51	Carbureter											
		Herbert Bailey..	15:53	15:35	29:23												
48	**Corbin**...	A. Maisonville...	12:04	Engine Trouble													
		A. C. Basdedissor	12:04														
47	**Mercer**...	W. H. Fry......	12:49	Hit Telegraph Pole on Second Lap													
		C. M. Kitrell.....	12:49														
44	**Correja**..	W. H. Roberts...	Disqualified by Technical Committee														
		H. Brasher......															

officially left in the contest. No change in leading positions.

Lap 8—The first of the Marquette-Buicks went out in the eighth circuit when car No. 3, driven by Arthur Chevrolet, experienced trouble with its transmission and retired. Marquette-Buick 29 averaged nearly 74 miles an hour up to this point and was almost 7 minutes ahead of the Alco.

Lap 9—The heart-breaking speed at which the pacemaker had been driven from the start began to tell upon the car in this round, and at the tape it was found that it had not only lost the lead, but had fallen back to seventh place. The Alco showed prominently in the contest for the first time, finishing the round in third place, being led by Marquette-Buick 27 and Marmon 25.

Lap 10—One round proved enough for Marquette-Buick 27, which went out with radiator troubles. The Corbin contestant also dropped out with similar troubles, thus leaving 23 cars in the race. Marmon 25 assumed the lead by a wide margin, having over 4 minutes the advantage of National 31, which had been pushed forward rapidly by Disbrow. Marquette-Buick 29 was driven hard to make up lost distance and was in third place, less than 1-2 a minute behind the National. Lozier was fourth and Alco fifth, all within striking distance.

Lap 11—The Marmon increased its lead slightly in this round, gaining 35 seconds on the National and 15 seconds on the Marquette-Buick.

Lap 12—The leader made slow time in this circuit on account of tire changes, but at the tape the Marmon 25 still led by 48 seconds over the Marquette-Buick 29, which was bowling along desperately to get to the front. National 31 avoided the spurting and fell back into third place.

Lap 13—This proved to be one of the speediest of the whole race. National No. 10 made a wonderful rush, breaking all records for the course in 9:31. The Alco's driver took no chances, however, and made the round in 11:27.

Lap 14—The pace of the last lap proved to be the last straw for several of the competing cars, and at the conclusion of this round the steadily moving Alco had moved up to third position, behind National 31. Marquette-Buick 29 made slow time and was apparently out of it. In its fourteenth circuit Marmon 21 broke a shaft and went out.

Lap 15—National 31 fell back several pegs with a round in 15:47 and the Alco moved up to second place, 2:24 behind the Marmon. National 10 slipped into third position, about 3 minutes back of the final winner. The Simplex pair, who had been maintaining a steady, fast pace from the start, were closing in with Pope-Hartford 17 a few seconds back.

Lap 16—The Marquette-Buick found its finish in this lap through an accident on the back stretch, in which the car was practically demolished. National 10 narrowed the lead of its rivals a small shade in this round, but the relative positions were unchanged.

Lap 17—The Marmon, tin-canning along in front, apparently established a winning lead at the end of this round, gaining 1:36 on the Alco and 12 seconds on the National 10, which was close on the latter's heels.

Lap 18—The Marmon lost the cup and prize in this round through hitting a spectator and losing about 8 minutes in the circuit. When the contenders had slipped over the tape, the Alco was in front with a margin of 3:24 ahead of National 10, which was 33 seconds before the former leader.

Lap 19—Out in front for the first time, Grant took hold of his car and made the next lap in 12:54, allowing both the placed cars to crawl up close.

Lap 20—The Alco was driven fast in this lap to maintain its narrowing lead, but the little Marmon was shooting at the big black car and cut off 7 seconds of the margin that separated them. National 10 fell back into third place in this drive. The Marmon was only 2:13 behind at the tape and was going fast.

Lap 21—A tire change for the Alco practically wiped out its lead in the next to the last round, and the Marmon, running nearly as fast as it did in its best lap. cut another minute and 30 seconds from the lead.

Lap 22—Into the stretch 18 great road locomotives plunged for the final trial of speed in competition for the cup. In front was the black car that had made such a gallant fight. Its 6-cylindered engine was working like a watch; its pilot, whose great headwork had proved a big factor in the race, was as steady as his car. Next behind was the Marmon, and next came a National, then another National, a Lozier—all stock cars, the special racing machines having been eliminated for one cause or another, and they were hopelessly beaten at this stage.

National 10 was the first to appear at the head of the stretch, and Aitken shot over the line in 257:29. He had done the last lap in 11:26, and barring disaster to the leaders, this was not fast enough to win. Then came a pause of a few seconds and the Alco plunged over in 255:58, making the last lap in 11:22. If the Marmon could make the final round in 10:40, it would win. The seconds ticked off slowly in the Alco camp, but before the yellow jacket showed at the head of the stretch somebody threw his cap in the air and yelled triumphantly. Then the staunch Marmon appeared and flashed past, but it was almost 25 seconds too late to gain first honors.

"Among Those Present"

W. C. Durant, of the General Motors Company, proved a life saver to some members of the press. Mr. Durant furnished them with a Welch-Detroit which was used in preliminary work.

The Pope-Hartford contingent was down from Hartford en masse. Among others there were Colonel George Pope, C. H. Gillett and Harold Pope.

J. D. Fulton, of the *Record-Herald,* and Joseph E. G. Ryan, of the *Inter Ocean,* were among the Chicago delegation.

James Evans, advertising manager of the Brush Runabout Company, came in from Detroit on Friday.

F. E. Dayton and H. V. Nuckols headed the Columbiaites.

Harry Field, of the Hartford Rubber Works, was among the interested spectators.

Mr. Brand, of the Parish Steel Company, of Reading, Pa., was present.

Orlando Weber, of the Chicago Palmer & Singer branch, with Mr. Singer, was on the track from an early hour.

C. G. Bleasdall, manager of the Maxwell-Briscoe-Cleveland Company, was a guest of Messrs. Briscoe and Maxwell.

Frank Briscoe, of the Brush Runabout Company and the Briscoe Manufacturing Company, with his family and some friends also occupied a box.

Howard Marmon was in charge of the Marmon pit. Howard prefers to be in the midst of the battle.

Harry Strong, president of the Rochester Automobile Club, who has lately gone into the automobile industry, drove down.

Charles L. Stevens, formerly with the Los Angeles Motordrome, was quartered at the Garden City Hotel.

William J. Lasher, well known in New York trade circles, announced prior to the race that he had assumed charge of the Hartford branch of Carl H. Page & Company.

William J. Coghlan, manager of the Chadwick Engineering Works, Philadelphia Branch, was one of the interested visitors.

John N. Willys, president of the Willys-Overland Company, was a keenly interested spectator.

H. A. Wilcox, manager of the Kelly Motor Truck Comapny, of Sprngfield, O., saw the race.

Inadvertently Let Cat Out of the Bag

Les vaincus, ce ne sont pas ceux qui ont couru, mais ceux qui se sont abstenus.—*La Vie Automobile*, Sept. 24, on results of "La Coupe des Voiturettes."

(Translation):

The conquered are not those who raced but those who held aloof.

This is one of the points that was plainly brought out in the Vanderbilt race—foreign automobiles were few and far between.

Short News From Everywhere

ITEMS CULLED HERE AND THERE FOR QUICK READING—TRADE AND GENERAL INFORMATION

—W. A. Logan has recently been added to the sales force of the Cleveland Rauch & Lang Co.

—George L. Schofield has been made general manager of the Elkhart Motor Car Company, succeeding John T. Knott.

—E. Winkes, formerly with the Cleveland Rambler branch, has accepted a position with the firm selling Maxwell and Columbia cars.

—The Halladay line, consisting of sixteen models, will be handled on the Pacific Coast by the Halladay Motor Car Company at Los Angeles.

—Hughson & Merton, Pacific Coast representatives of Ajax tires, have moved into a new store in Seattle, Wash., corner Pike street and 10th avenue.

—The Cleveland Electrical Repairing Company has opened a storeroom at 2025 East 22d street. Manager F. H. Clark was manager at the Peerless factory for six years.

—The Maxwell entry was awarded the reliability cup in the second annual contest of the Louisville Automobile Club. A Cole "30" proved winner in the economy division.

—Announcement has been made by S. F. Edge, Ltd., of London, that the company's exhibit of two Napier six-cylinder cars had been awarded the Grand Prix at the Brussels Exhibition.

—The Vail Motor Car Company, agent for the Empire and Clark lines, has purchased the Raymond garage on Carnegie avenue, where it will continue the garage and add a large repair and machine shop.

—S. A. Zapp has purchased the Lawrence Garage at 124 E. Fourth street, Fremont, Neb. The Overland agency will be continued and another line added. Supplies and accessories and a well equipped repair shop will be maintained.

—F. E. McClure, manager of the branch house that will be opened by the Brush factory this week, will also handle the Alden-Sampson truck. McClure has already began to make arrangements for salesrooms and northern Ohio agencies.

—At a meeting of the Board of Governors of the Columbus (Ohio) Automobile Club Dr. Walter E. Ranchous was elected secretary to fill the vacancy caused by the resignation of Arthur M. Crumrine and Frank McMakin was elected assistant secretary.

—J. B. Sperry, well known in Cleveland automobile circles, agent for the Henry car, has been appointed manager of the Warren Auto Sales Company, the Cleveland branch house for Warren-Detroit cars. Three hundred cars have been allotted Cleveland and northern Ohio.

—Dr. A. T. Lawless, of Syracuse, won the Syracuse *Herald's* second annual sociability run to Renwick Falls and return last week with a Maxwell car. Three other prizes were awarded for finishing the course close to the secret time. This is the second time Dr. Lawless has won the cup.

—The Cartercar Company has completed arrangements for opening a branch in Chicago. A lease has been closed for a handsome showroom at 324 Michigan avenue. Charles E. Hammerly, who has had the agency for the Cartercar for many years in Chicago, and owns a garage at Harrison and Oakley boulevards, has been named as branch manager.

—The Columbus Buggy Company of Columbus, Ohio, is sending out catalogs showing the various models made by the company for 1911. Photographs of the 10 models of gasoline cars are shown and the distinguishing features are explained in full.

—On the point of going to press it is reported by wire from Detroit, Mich., that the E-M-F Co. has dropped the prices of its 30-horsepower E-M-F from $1,250 to $1,000 and the 20-horsepower Flanders from $750 to $700. The reasons attributed for these reductions are improved facilities of manufacture and reduced cost of materials owing to the purchase thereof of large quantities.

—President Walker, of the Lorraine Motor Company, has closed a contract with the Philadelphia Housewrecking Company for the clearing of a large plot at Thirty-seventh and Ludlow streets, upon which a model garage will immediately be erected. All the appurtenances of a first-class club will be included in the equipment of the second floor, which will include apartments fitted up for ladies on one side of the new building, a suite of rooms for men on the opposite side, and a reception room leading to the main floor. Eighty cars will be stored in the building. A large machine shop equipped for heavy automobile work will be one of the features of the plant. In this field the Pierce-Racine and the Allen-Kingston are the cars which the Lorraine Motor Company will handle. The officers of the company are: W. L. Walker, president; Joseph Booth, vice-president; E. More, treasurer; J. L. Larsen, Dr. Ruel Stewart, Joseph Booth, George T. Cutler and W. L. Walker, directors.

Great Western Has New Home in Boston

The illustrations here given are of the new garage which was just completed by the Castle Square Garage Co., Boston, Mass. It is an L-shaped building fronting upon Ferdinand street, running through to Edgeley street. The group of illustrations show the front and rear façades and two interior views. As will be observed the building is of concrete construction faced with brick, and besides affording a large floor space entirely devoid of obstructions the building is light and is fitted out with every convenience, including three turntables, wash racks with hot and cold water, and a place for everything. The Great Western "40" is all that will be handled at this establishment and the sales rooms are so arranged that the cars may be examined closely by the clientèle of the company.

New Castle Square Garage, Boston, Mass. The home of the Great Western "40"—It is a fire-proof building with every convenience and has well-appointed salesrooms

Prominent Automobile Accessories

ACETYLENE STORAGE AND TRANSPORT

Among high powerful illuminants that are easy to handle and relatively cheap and portable acetylene gas certainly holds its own. Generators for direct gas production on the car or boat are extremely useful, but have their drawbacks owing to the necessity of recharging frequently unless they are bulky and cumbersome. There is also to be taken into consideration the storage of loose carbide and the chance of clogging and stopping of the water flow.

In order to obviate these small inconveniences much attention has been paid to dissolved acetylene put up in cylinders that are easy to handle besides being clean. The difficulties attending the compression of the gas into containers, due to the peculiar chemical character of acetylene, at the outset caused several failures. When certain temperatures and pressure limits are exceeded spontaneous decomposition takes place.

It is necessary to dissolve the gas in suitable organic solvents of the highest purity held in containers packed with porous material in such a way that no pockets can form inside.

A convenient and safe method of carrying acetylene gas has been placed on the market by the Searchlight Gas Co., of Pittsburg, Pa., and Warren, Ohio. The cylinders used are stamped from high-grade steel and measure 22 inches long and 6 inches in diameter, when finished. Protection from blows is well guarded against by placing the gauge, valve, safety plug and safety diaphragm entirely within the recess shown in Fig. 4, which also shows the compactness of the whole apparatus. The head is fitted after the porous filling has been inserted and carefully brazed, insuring the absence of all leaks. The strength of the cylinder is several times the pressure at which it is fully charged.

Fig. 1—New tire pressure gauge

Fig. 2—New tool for valve-grinding

In Fig. 3 a fusing plug is fitted "E" which melts at a very low temperature, allowing a gradual release of pressure in case the tank comes in contact with great heat. In case of accident the safety diaphragm D releases at 400 pounds pressure.

HANDY TIRE PRESSURE GAUGE

Sufficient stress cannot be laid upon the necessity of owners to see that the correct pressure is maintained in the tires and to do this it is essential to have a gauge that correctly registers this pressure. In the Brown Tire Pressure Tester, made by the Brown Co., Syracuse, N. Y., it is possible to ascertain the amount of pressure the tire contains by removing the valve dust cap and firmly pressing the tester on the nipple. Two hands are fitted, one to register all pressures and this carries with it another hand to register the maximum amount in the tire; this latter hand is red and remains at the maximum point of pressure, enabling the reading to be taken after gauge has been removed from the tire.

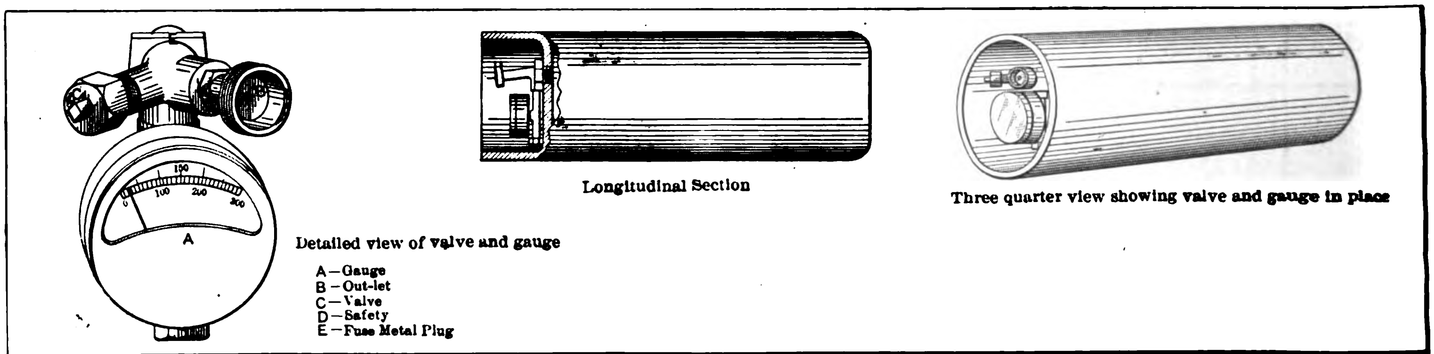
VALVE GRINDING TOOL

Motorists can save themselves money in the long run if they provide their men with a few extra tools to render certain operations on the car easier. One duty that the man often shirks is the regular grinding of valves. A device that permits the merest tyro to effect the operation as well as the experienced mechanic will be found in the valve-grinding tool here shown. It is made by the Brown Company, of Syracuse, N. Y.

NON-CORROSIVE BURNER SUBSTANCE

Next to a good automobile comes the question of lighting, for then the car is capable of affording a double time of service, since it will be available for use in the night time as well as during broad daylight. Autoists of experience have struggled with the problems of illumination, and acetylene has proven to be of great efficacy, despite the little drawbacks that attend its use. One of the real advances in the direction of the perfection of acetylene lighting comes in the form of Nuremberg Steatite, which is the material used in Alco Burners, one of which is here illustrated. It is of course true that the scientific shape of the burner has much to do with the excellent service it renders, but it is a property of this steatite to serve for a long time without choking up, and it is claimed that the real secret attending this latter consideration lies in the non-corrosive qualities of the steatite. These burners are made in many varieties to suit the several conditions, but the particular one here illustrated is known as the "Hilo-de-luxe," the price of which is 40 cents per burner. This burner is made by the American Lava Co., of Chattanooga, Tenn.

Fig. 3—The Alco Acetylene burner, "Hilo-de-luxe"



Detailed view of valve and gauge

A—Gauge
B—Out-let
C—Valve
D—Safety
E—Fuse Metal Plug

Longitudinal Section

Three quarter view showing valve and gauge in place

Fig. 4—Three views of the Searchlight Gas Co.'s new acetylene gas cylinder and control

Overland

"The truth, the whole truth and nothing but the truth" —— J.N. Willys

PRODUCTION must be gauged as to its value, depending upon the methods employed. In experimental plants, for illustration, the output is limited to a single model; it is whittled out by a slow and laborious process; it represents, when completed, a more or less imperfect crystallization of the half-baked ideas of the inventor, who hopes by thus proceeding to make one more progressive step in the direction of perfection, realizing all the while that his own ideas are incoherent and his plans incomplete, and the workmen who undertake the task under such conditions, having no facilities but their bare hands and the class of machine tools that are used in general machining work, will be quite content if the automobile will run at all.

* * *

AFTER the completion of the first model of a car, despite the fact that the soul of the inventor is spread thinly over its working parts, it takes but a few moments for the man who pays the bill to arrive at the sane conclusion that he has put up a lot of money and received in return an ill-contrived mess that is rendered the more conspicuous by the noise it makes when it does run—granting that it will run at all. There are too many automobilists who are able to testify, as a matter of personal knowledge, to the facts as herein set forth. They are able to say that when the man who pays the bill finds himself the possessor of an aggregation of noise and confusion, he promptly transfers the obligation to one of P. T. Barnum's old and respected friends—Barnum having proved that "there is a sucker born every minute."

* * *

FIRST models, under the circumstances, must not be regarded as efficacious for exacting work. The next step in the evolution of an automobile comes as a revision of the first model; were it listed as an eatable it would be called "hash." Those who have patiently supported the automobile industry from the start, and who purchased their experience with real money, will appreciate just what this means, and they will understand that safety lies in the selection of perfected automobiles.

AFTER progressing thus far, the builder of cars on this plan is confronted by the unpleasant knowledge that he cannot build anything unless he first provides the requisite facilities. The chances are that his lack of experience will not permit him to intelligently select the facilities, and his first attempt in this direction will parallel his first effort as represented in the building of the model car.

* * *

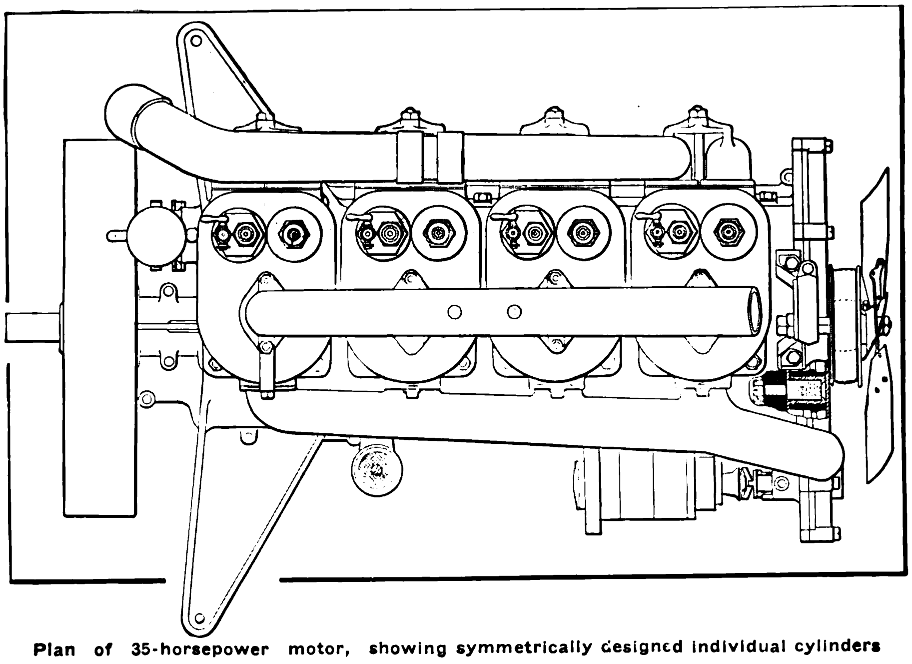
PERHAPS the unfortunate would-be builder of automobiles, when he reaches this point, strikes a balance and locates a shortage that makes heavy inroads into a half-million dollars. In recounting his experiences, as he mourns his loss, he is not likely to forget that his customers are sharing his misfortunes; he loses real money, and they acquire junk at a cost.

* * *

THERE is nothing to suggest real production in the plan as above outlined. No part of such an effort is likely to lead to the goal of standardization, and, unfortunately, the builder suffers quite as severely as the purchaser of the ill-contrived product; they are both the victims of ignorance goaded on by enthusiasm, with no limit from the maker's point of view until he reaches the end of his credit; and as for the purchaser, he buys experience.

* * *

SUCCESSFUL manufacturers are those who have passed beyond this experimental stage—those who have dealt honestly



Plan of 35-horsepower motor, showing symmetrically designed individual cylinders

W. H. Cameron,
Chief Engineer

H. G. Fitch,
Asst. Gen. Mgr.

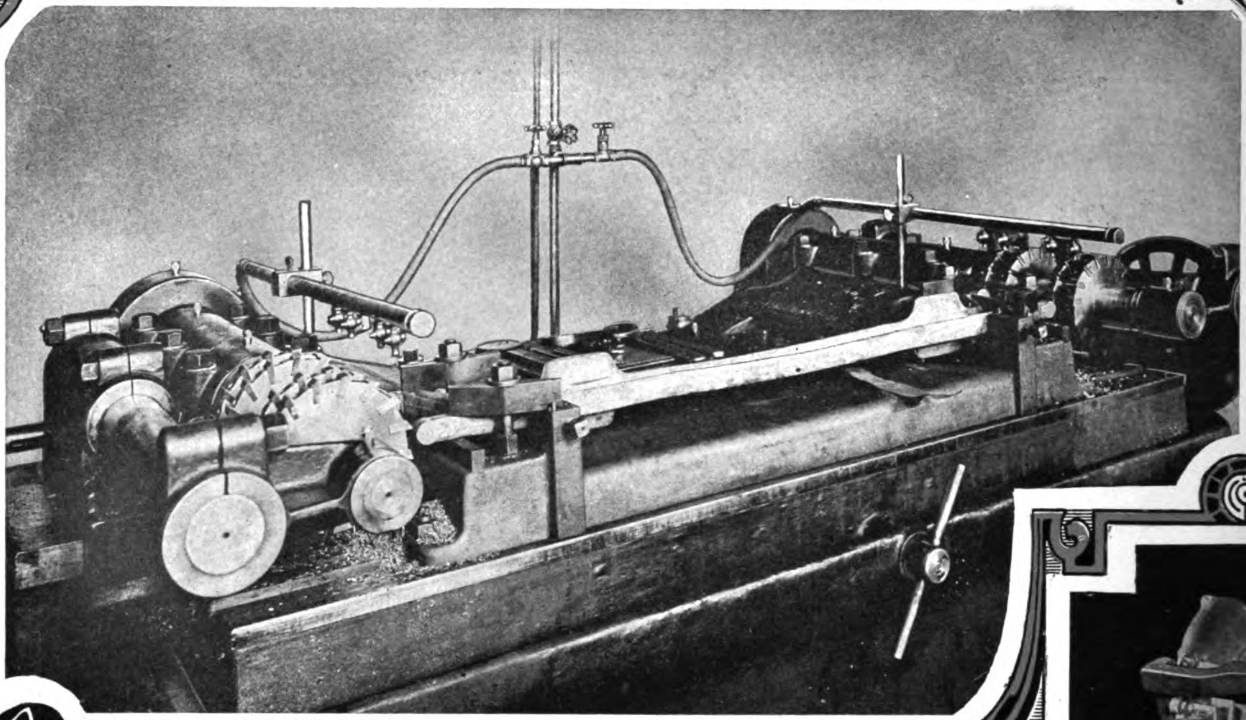
Will H. Brown,
Vice-President

Walter Stewart,
Treasurer

Geo. W. Bennett,
Sales Manager

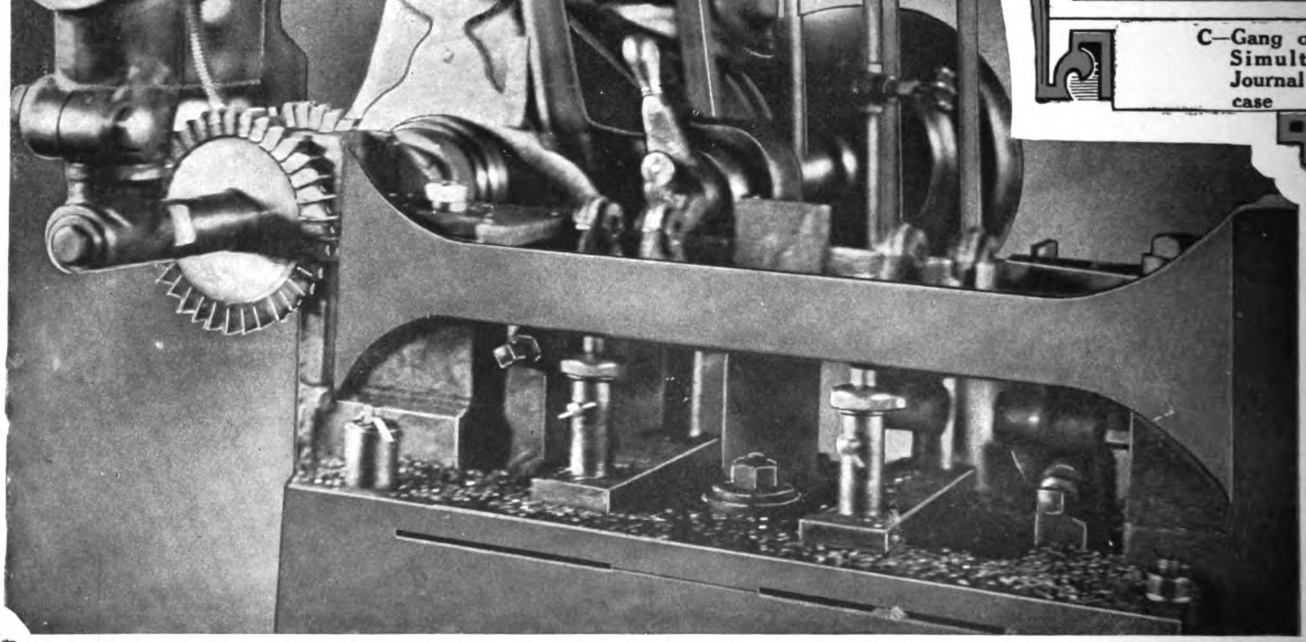
Burton Parker,
Adv'g Manager

Plate I—Gang Milling Processes Utilizing Inserted Tooth Cutters



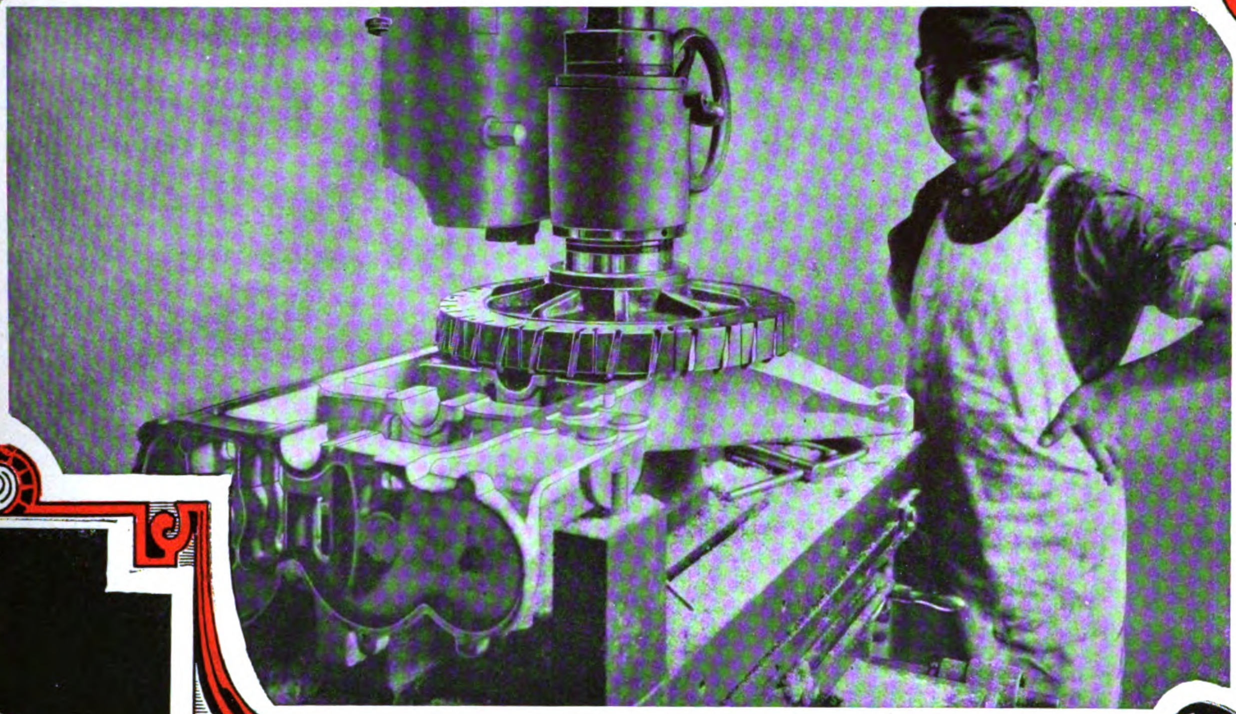
A—Special Steel I-section Front Axle Clamped to the Platen of a Double-Headed Multiple Cutter Milling Machine Milling all Faces at one Setting

C—Gang of Inserted
Simultaneously
Journal Boxes in a
case

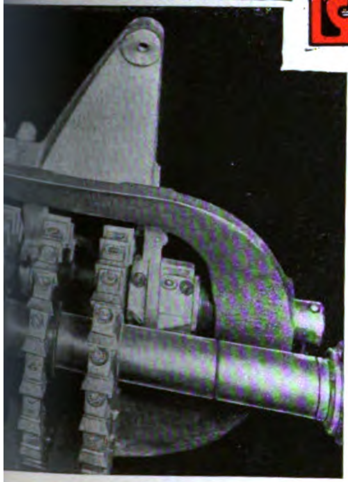


B—Example of a Milling Machine Equipped with Straddle Mills Facing the Compound Cross Member in one Operation, Feeding the Work Vertically Against the Cutters

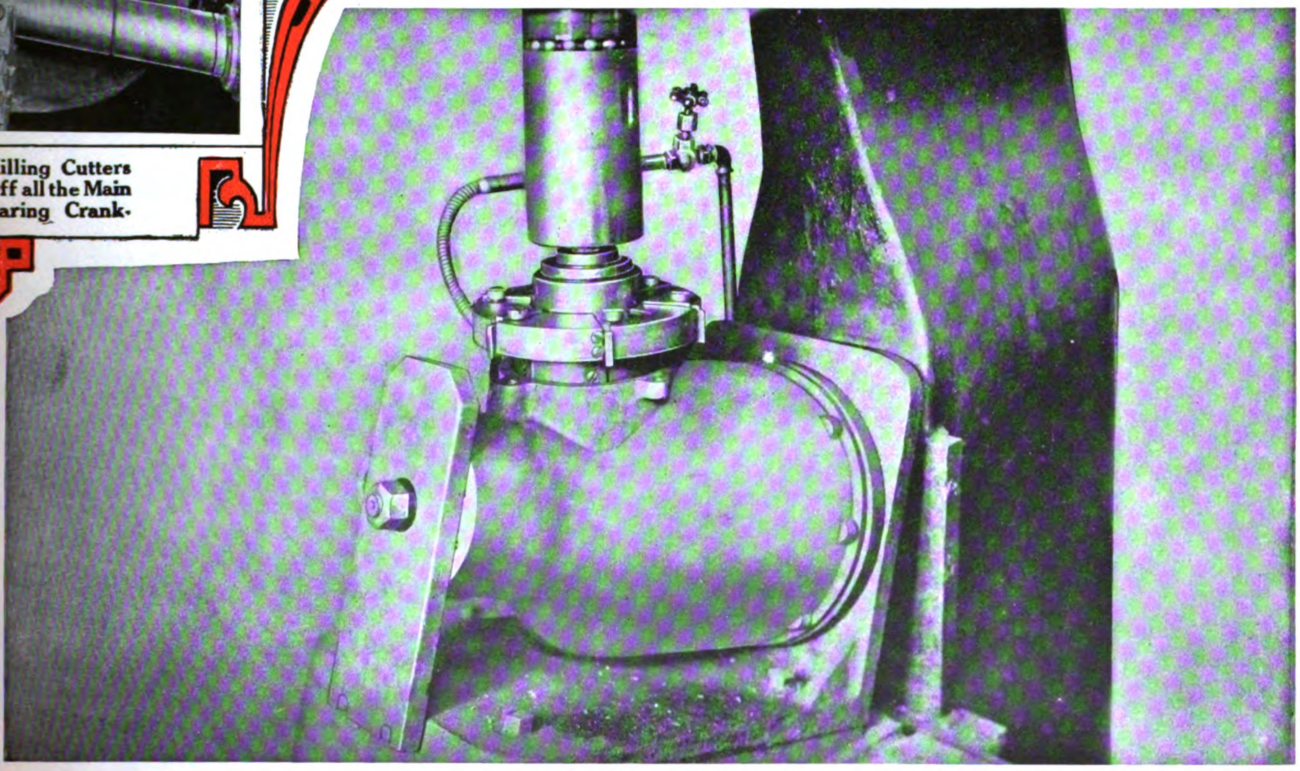
Under Conditions of Terrific Speed and Great Accuracy



D Ponderous Inserted Tooth Cat-head in a Vertical Mill Facing off the Aluminum Crankcase at High Speed Down to Scraping Size in a Single Operation



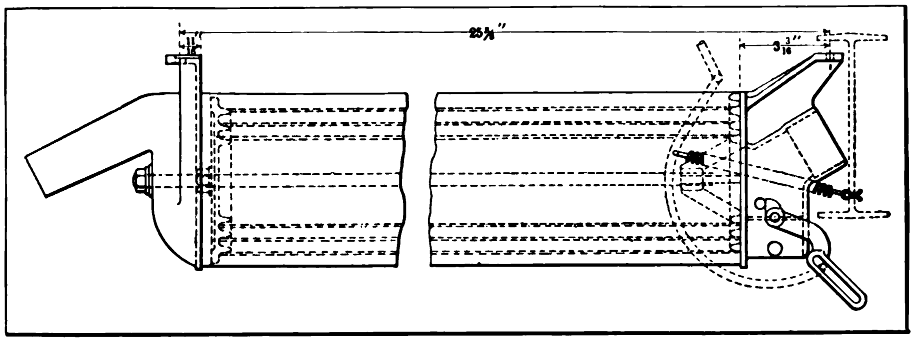
Tooth Milling Cutters Facing Off all the Main Five Bearing Crank-



E—Example of Milling Work Using an Angle Plate Fixture and an Inserted Tooth Compound Milling Cutter Boring and Facing the Hand-hole in a Planetary Gear Housing in One Operation with themselves, hence honestly with their customers, and have made the fight along constructive lines, finally arriving at the only conclusion that can be reached in the long run, i.e., good automobiles emanate from the laboratory as a basis for action, and are definitely designed under the direction of a chief engineer aided by an efficient corps of assistants.

* * *

BUT engineers do not build automobiles; they merely design them. When it comes to the production in fact, there are special tools and facilities, as plans, patterns, templets, gauges, and instruments of precision, with buildings in which to place them, and an organization that is capable of directing their use, all to be provided and at a cost that would stagger the purchaser were the output limited to a single car. Even an output of 1,000 cars per annum offers but slight encouragement.



Section of the silent muffler showing symmetrical design and method of fastening same to the chassis frame

JUST to show that absolutely first-class automobiles cannot be designed and constructed excepting in large quantities, the following approximation of some of the items of fixed cost is offered·

Cost of drawings for a single model	$6,000
Cost of patterns for a single model	24,000
Cost of jigs and fixtures for a single model	50,000
Cost of special machine tools for the work	50,000
Laboratory expenses incurred in investigating	8,000
Miscellaneous expenses, as fitting out in the foundry, dies for drop-forging work, and the hundred and one other small items that must be included	20,000
Total	$158,000

These are good average results that cannot be bettered in a plant that is noted for absolutely interchangeable work.

WHAT do these figures portray? Remember, there is no automobile represented in $158,000 worth of cost; there are no buildings in which to house the machinery; there are no officers and men to direct the work; there is nothing, in fact, but the list of special things that must be had before the most skilled men in the world will be able to build a car that will come up to standard.

* * *

DOES it not mean that the fixed charges which must be added to the cost of every car made will be on a basis as follows:

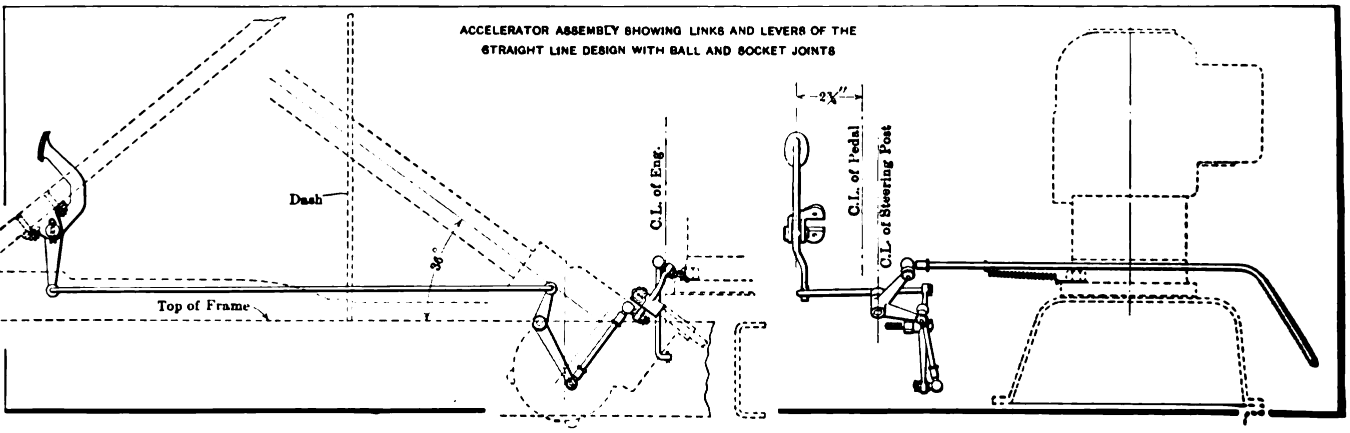
For an output of 1 automobile	$158,000.00
For an output of 100 automobiles	1,580.00
For an output of 1,000 automobiles	158.00
For an output of 10,000 automobiles	15.80

* * *

IS it not plain, with no chance of mistake from any quarter whatsoever, that the enormous cost for special tools and facilities will be just as high if one car is built as it will be if 10,000 automobiles are made? Is there any way by which a $50,000-a-year advertising man, with his splendid array of glittering generalities, can get away from the fact that the fixed charges for each automobile made can only be reduced if the total number of cars is increased?

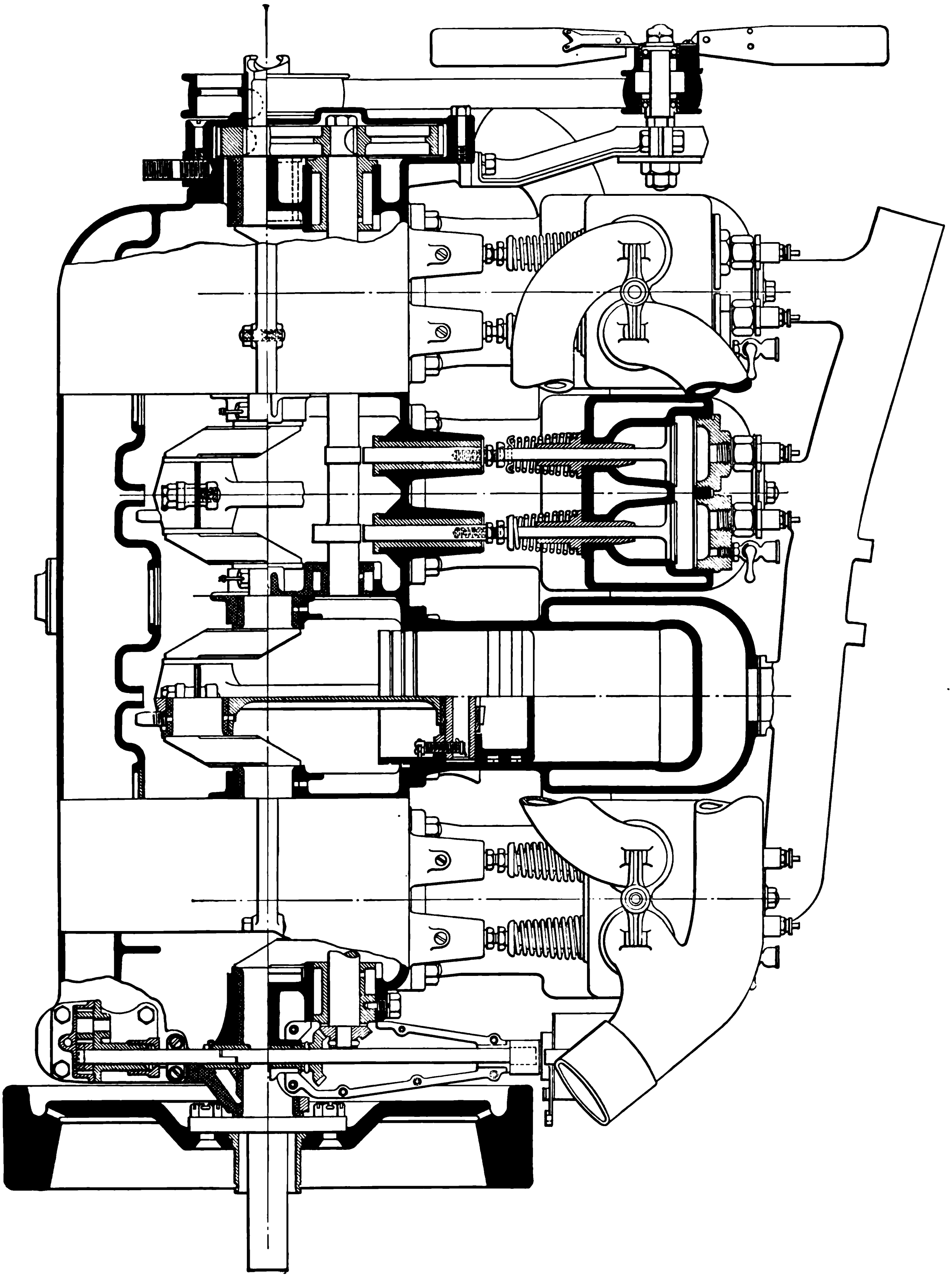
* * *

IS there any sense in listening to the explanations of the builder who says he can do accurate and interchangeable work without these costly facilities? Is



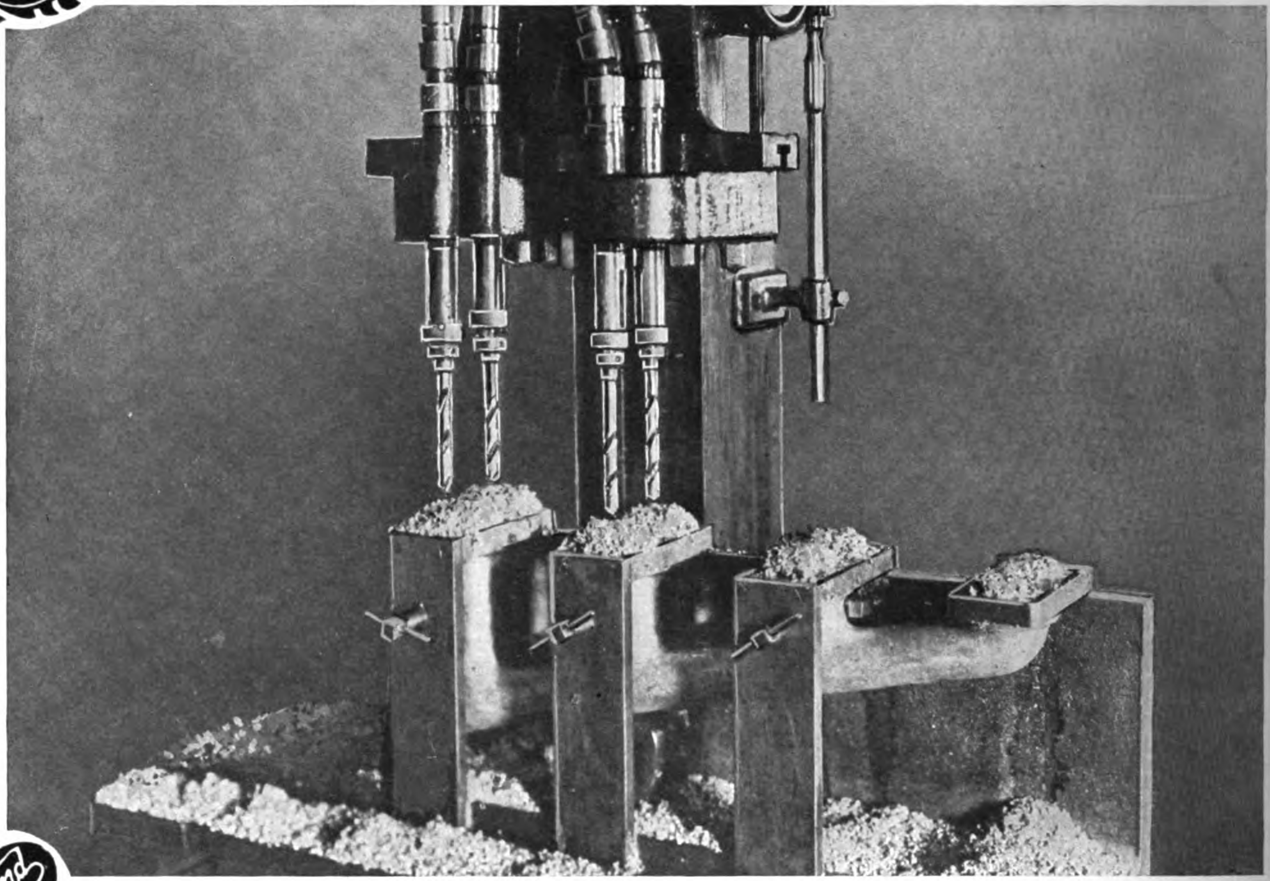
Lay-out of the links and levers for the accelerator, showing ball and socket joints and straight line movements

Overland

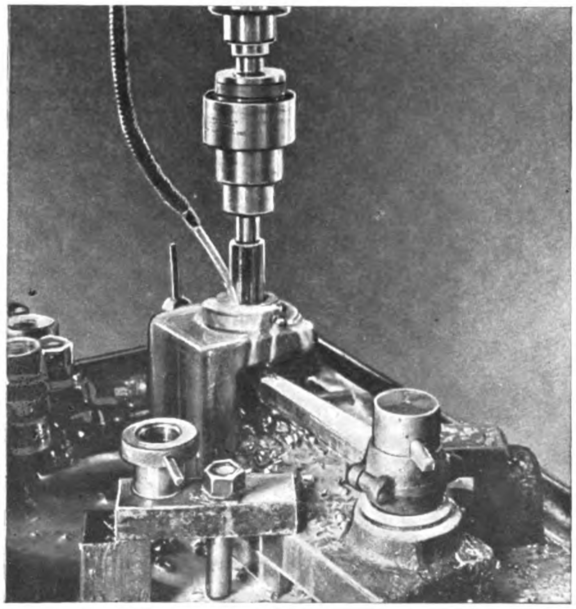


ELEVATION IN PART SECTION OF 35-HORSEPOWER MOTOR, SHOWING PERFECTED OILING SYSTEM AND MANY REFINEMENTS

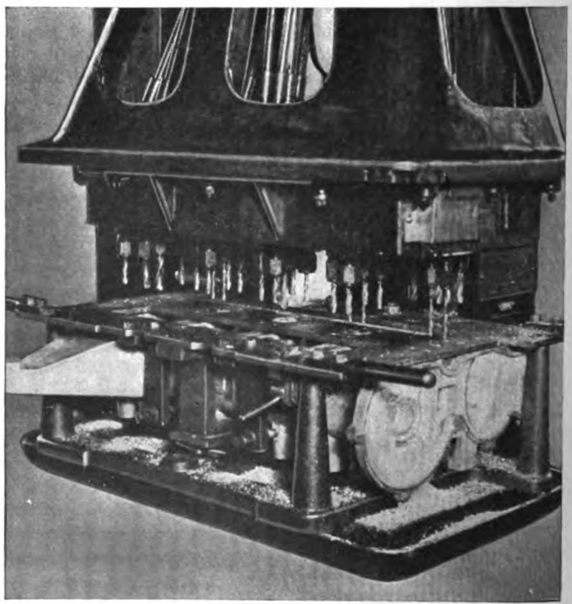
Plate II—Examples of Multiple Spindle Drill Work



A—Water Manifold Set Up in Angle Plate Fixture Equipped With Jig Plates so That all the Flange Holes are Drilled to Accuracy by a Multiple Spindle Drill

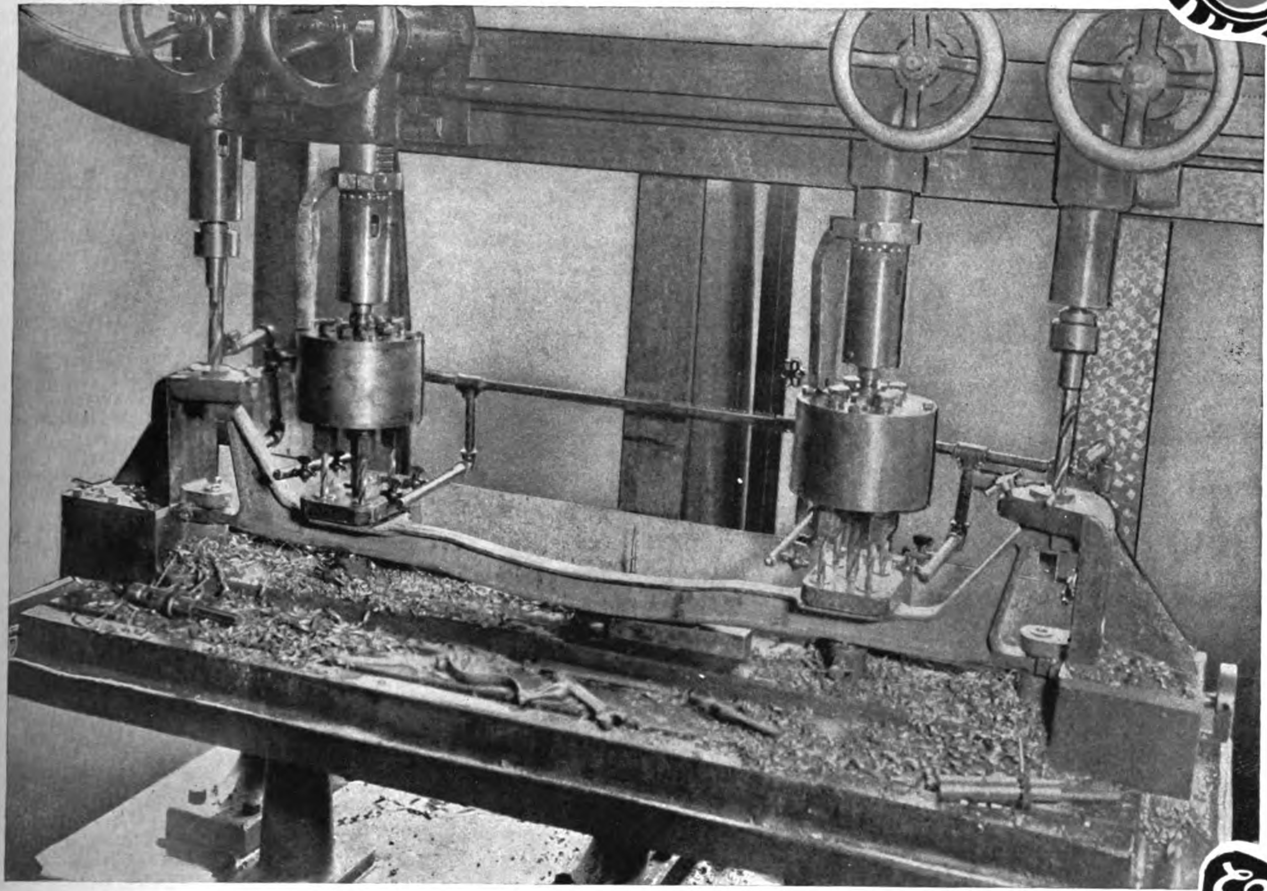


B—Connecting Rod Mounted in a Fixture on the Platen of a Power Reamer Having the Piston Pin End Reamed to Exact Diameter.

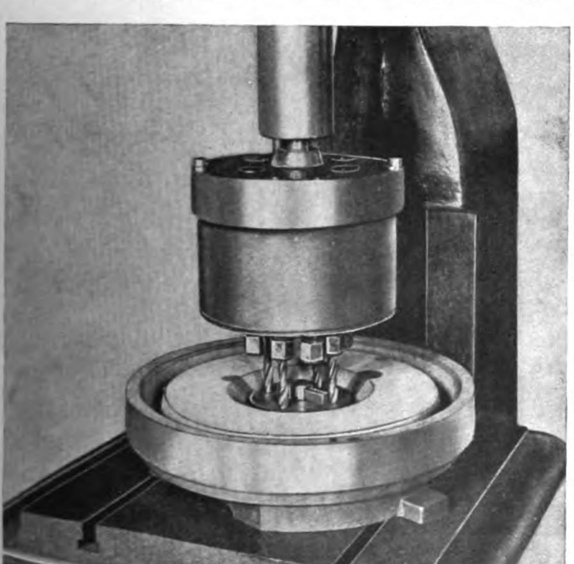


C—Crank Case on the Platen of a Thirty-two Spindle Drill Using a Jigging Fixture Having All the Holes Drilled at One Time.

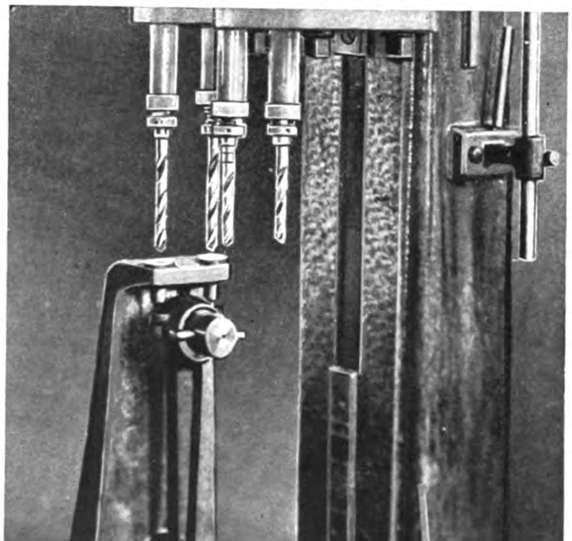
Used in Conjunction with Special Jigging Facilities



D—Special Steel I-section Front Axle Held in a Fixture on the Platen of a Multiple Spindle Drill Combining Cluster Boxes on Two of the Spindles Drilling all the Holes in the Axle at One Time



E—Convincing Example of the Cluster Box Idea in Which the six Flange Bolt Holes of the Flywheel are Drilled Simultaneously, Using a Single Spindle Drill Press for the Purpose



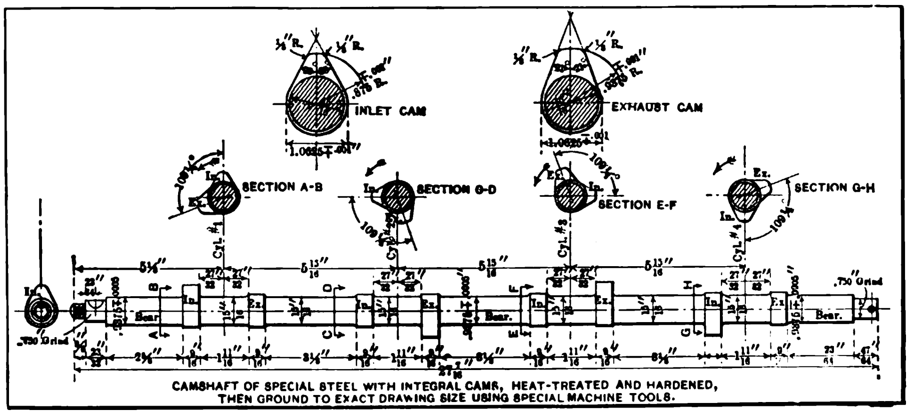
F—Depicting a Connecting Rod in a Fixture Having the Holes for the Holding Bolts Drilled, Using a Multiple Spindle Drill

Overland

he not trying to substitute cheap cleverness for necessary cost? Is it not true that it is cheaper for him to pay $50,000 a year for a man to write his advertising copy than it is to pay $158,000 for special tools, by means of which he could build a car so good that he would not be afraid to make a show-down?

* * *

WOULD a business man be able to keep outside of a lunatic asylum were he to expend $158,000 for special tools for which he would have no use? Would his confreres in business permit him to make this enormous expenditure were they not convinced of the necessity for so doing? Could the entire engineering world be wrong about this matter? Don't forget that they all, without exception, advocate the necessary first cost to bring about standardization, the duplication of parts, and the suppression of the personal equation in the shop.



Plan of camshaft with integral cams, well-proportioned contours, and exactness of finish

NATURE breeds variety. No two blades of grass are alike; no two men were ever known to be exact duplicates of each other. Criminals are identified with absolute certainty by the Bertillon system; this is but another way of saying that the imprints made by the cuticle at the tips of the fingers of no two individuals are identical. And when the gamut is run the conclusion must be reached that standardization of product in a shop is utterly impossible unless the personal equation is done away with, and the men who perform the operations are so guided by jigs and fixtures that they cannot introduce their own ideas, even should they be inclined to do so.

* * *

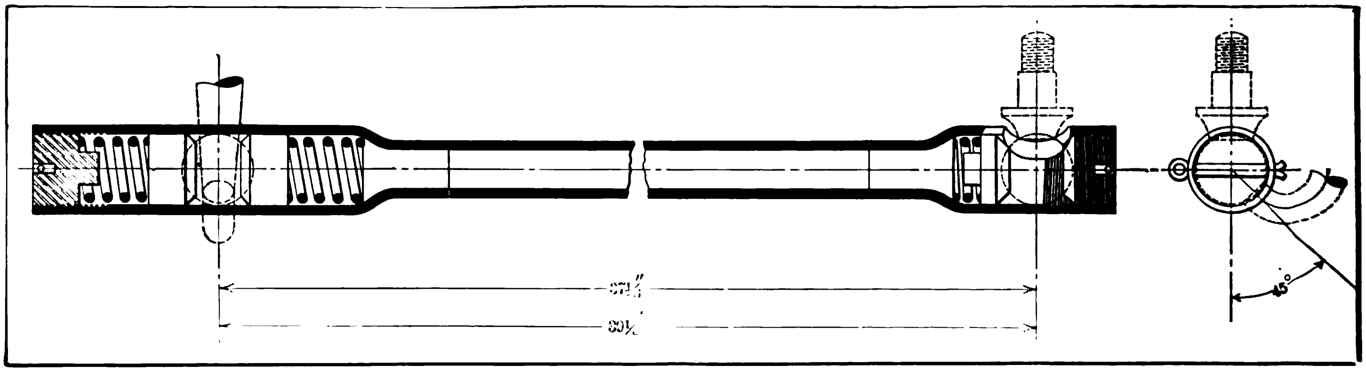
IN a word, it costs $158,000 per model to guide the workmen in the path of standardization—that is to say, to prevent them from introducing the variations that would surely come were they permitted to exercise their own judgment. In the earlier efforts along automobile lines, every maker was compelled to rely upon the skill of his men. There were no machine tools available such as would satisfy a more exacting situation; it was impossible to find a market for all the automobiles that would have to be made in order to limit the fixed charges to a reasonable sum, doing the work with jigs and fixtures as guides, thus excluding the vagaries of the workman.

* * *

REMEMBERING that the recommendations of the great engineering societies of the world are absolutely in favor of standardization at whatever cost, not forgetting that all the good automobiles that can now be had from any source whatever are built in shops that are fitted out with this costly equipment, what faith can be put in the statements of the assemblers of aggregations of materials that go into cars, when they say that there is no occasion for incurring so large a cost and going to so much trouble?

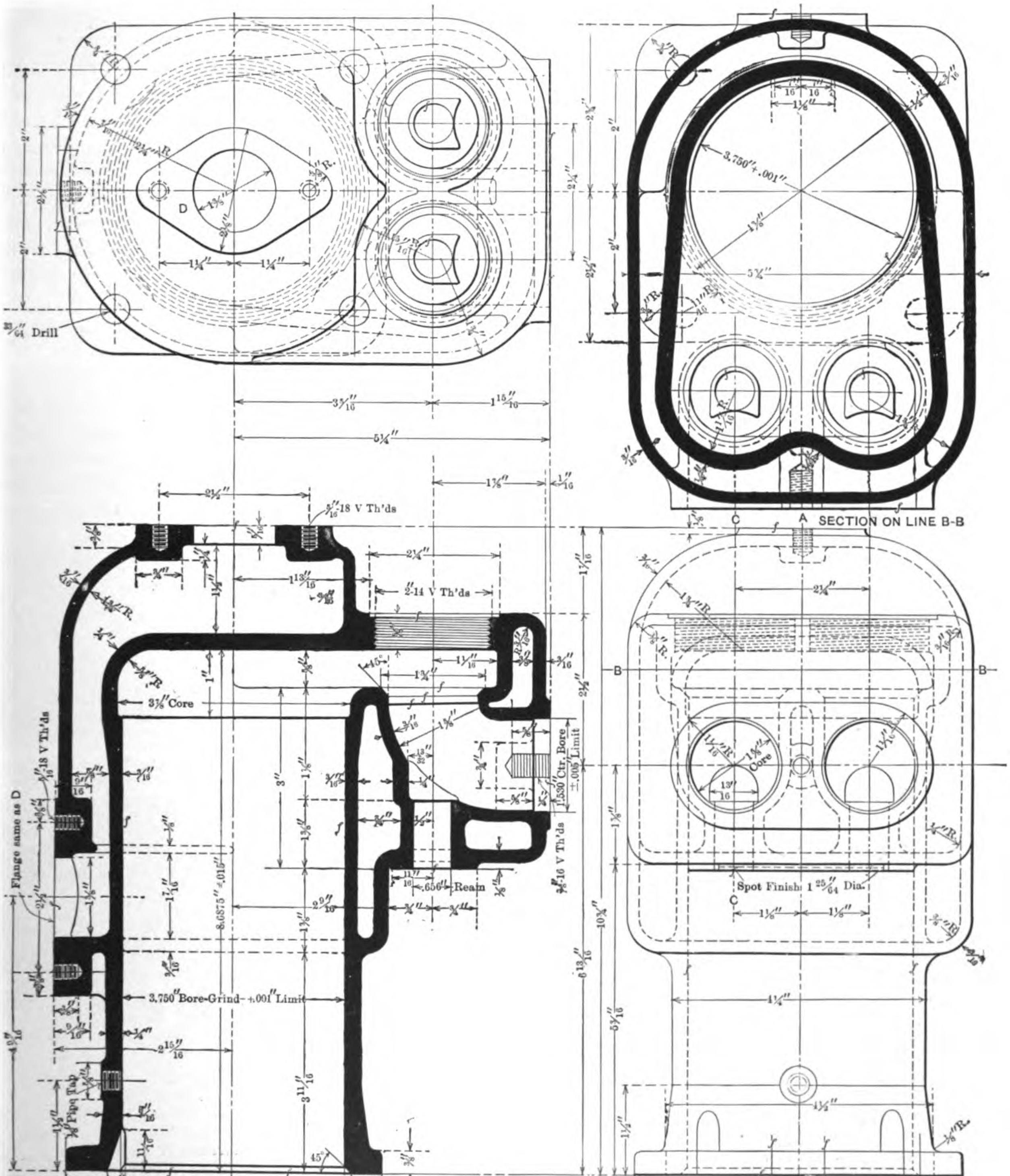
* * *

PERHAPS these assemblers have more faith in their ability to advertise money out of a purchaser's pocket than they have money with which to buy the necessary facilities to build a good au-



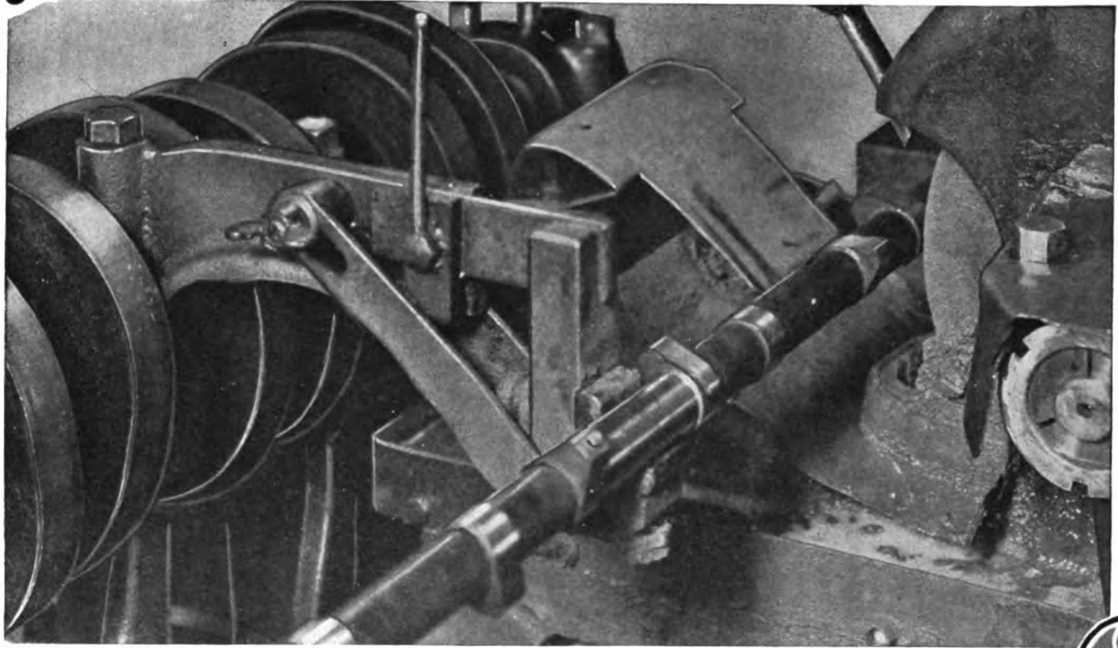
Section of the drag-rod showing how the same is built up without braced joints using large size spherical movements.

Overland

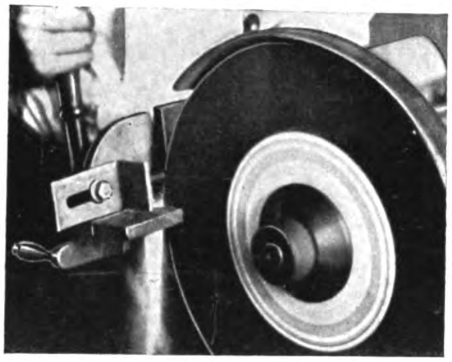


PLAN OF INDIVIDUAL CYLINDER FOR THE 35-HORSEPOWER MOTOR WITH A CROSS-SECTION SHOWING UNIFORMITY OF WALLS AND ALL DIMENSIONS, INCLUDING CLOSE LIMITS OF TOLERANCE

Plate III—Grinding Methods Obtain at Every Point That

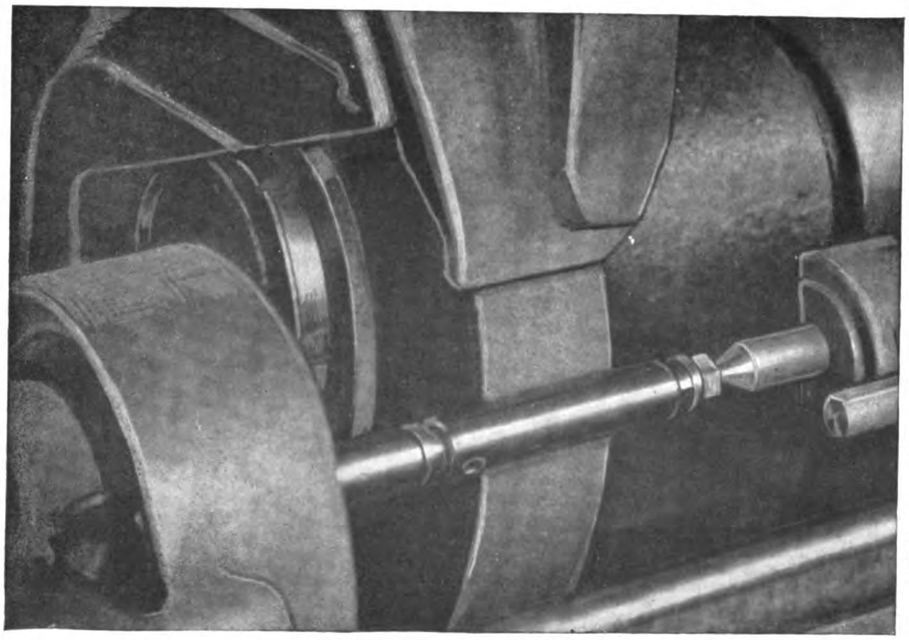


A—Special Type of Grinder Designed in the Overland Plant Shown in the Act of Grinding a Cam on an Integral Type of Camshaft, Reducing the Hardened Cam Faces to the Exact Design Contour Expeditiously



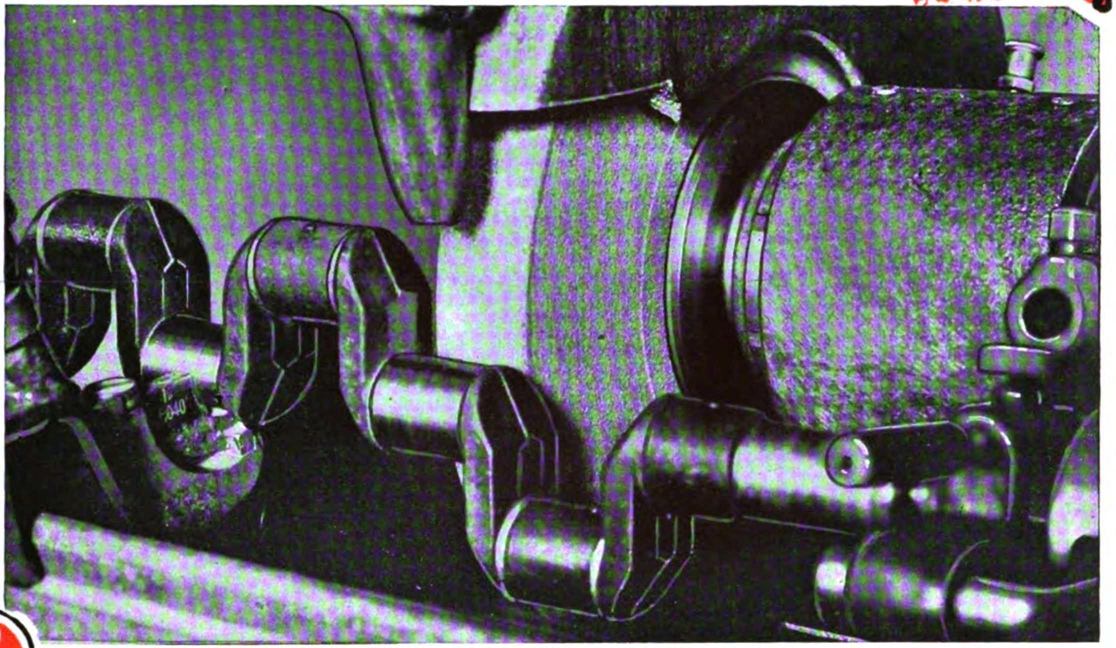
B—Special Form of Cutting-Off Tool Utilizing a Flexible Emery Wheel Cutting-Off Tool Steel Key Stock, the Latter Being So Hard That It Cannot Be Cut Off in Any Other Way—This Stock Is Used in Overland Cars for Keys Instead of Ordinary Cold Rolled Key Stock

D—Heald Special Grindar, Designed for Internal Grinding, of Alloy Steel with Internal Bores to Be Reduced to a

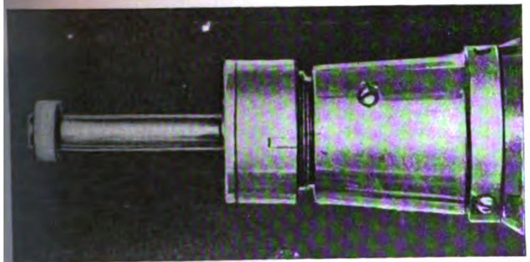


C—Large Wet Grinder on Hardened Piston Pins Working to a Limit of Tolerance of 0.0005

Demands Use of Hardened Materials and Accuracy of Finish

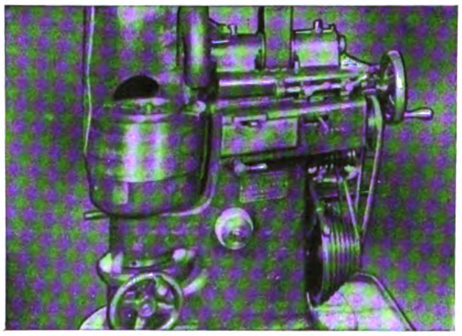


E—Norton Grinder Grinding the Main Bearing of a Crankshaft Working to a Limit of 0.0005 of an Inch as the Limit of Tolerance



Utilized for Ball-Bearing Cones and Other Parts Definite Size with a Limit of Tolerance of 0.0002

F—Magnetic Chuck Grinder Used for Finishing Piston Rings to Limits of Tolerance of 0.0002, Making Them Interchangeable and Free-Fitting But Gas-Tight



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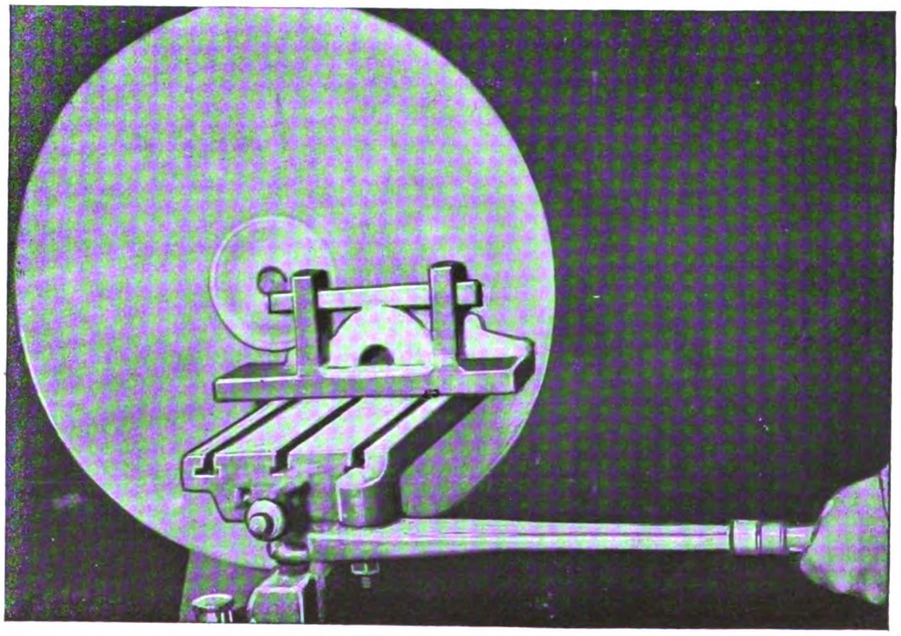

G—Example of the Utility of Large Diameter Disc Grinders Which Are Used for Facing Off Manifolds and Like Parts, Presenting Here the Work of Grinding Front Bearing Caps

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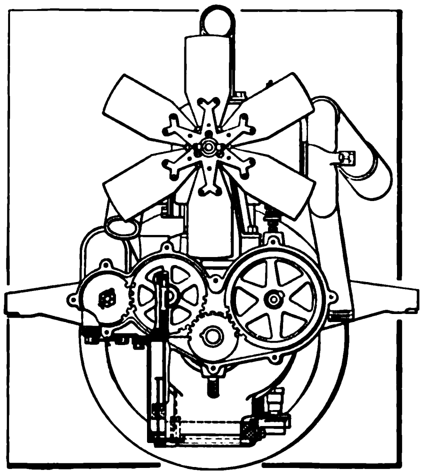
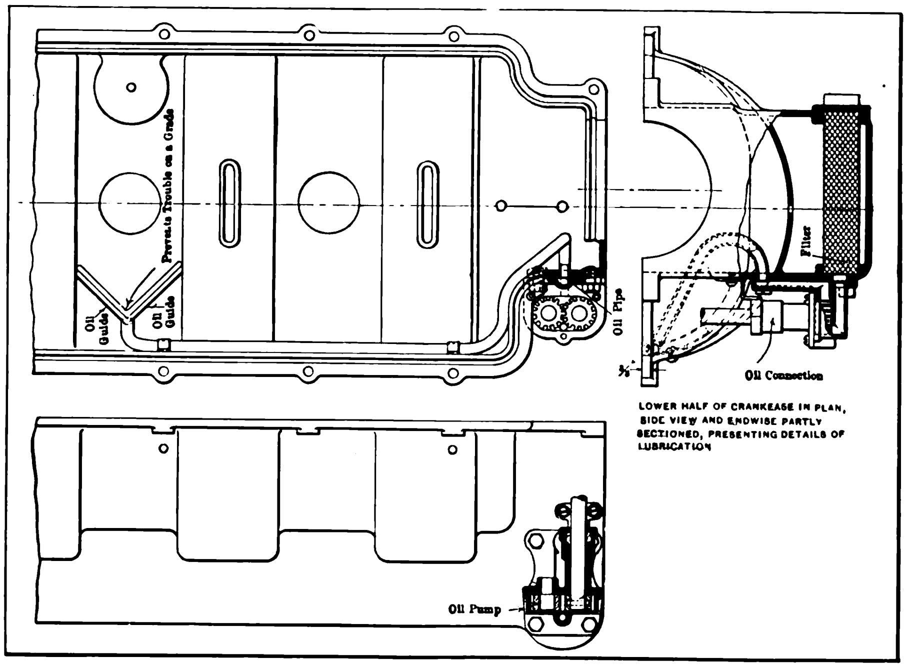
tomobile. On second thought this must be true, because with proper facilities it is possible to determine with great accuracy the cost of building automobiles so that the investment becomes scientific in its certainty of an honest return, and there is no gainsaying the fact that these assemblers of aggregations of picked-up material have the good taste and the sense of proportion that would compel them to prefer a certainty rather than to indulge in a speculation. What they need is the ability and the funds.


Front end view of the 35-horsepower motor with the cover for the halftime gear-box off, presenting evidences of substantial methods of construction



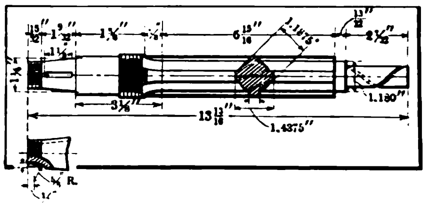
LOWER HALF OF CRANKCASE IN PLAN, SIDE VIEW AND ENDWISE PARTLY SECTIONED, PRESENTING DETAILS OF LUBRICATION

Looking into the lower half of the crankcase of the 35-horsepower motor showing the oil container in the bottom and oil-ways cast integral

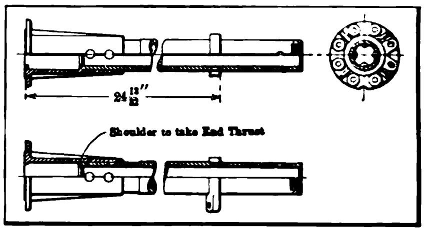
If good automobiles can be built without first acquiring a sufficient measure of the facilities used under first-class conditions, why is it that some racing cars as they are used for advertising purposes, are so designed and constructed that they differ from the stock car specifications, and have to be entered in free-for-all events on that account? Why should the builders of this character of automobiles spend thousands of dollars in racing, and thousands more in making special cars for racing, if it be true that they can build good automobiles under bad conditions?

* * *

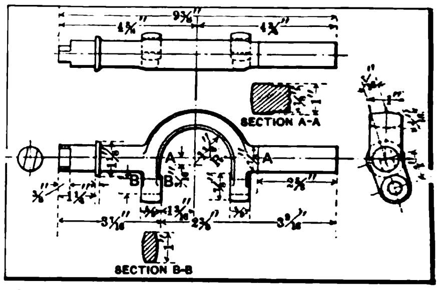
Is it not a reasonable assumption that the amount of money expended in thus hoodwinking the public, is far less than the $158,000 per model, for every model turned out, that would have to be paid for the special tools alone in order to manufacture a standardized automobile? Is there any chance of being mistaken when it is said that the public is hoodwinked every time a specially built racing car is scheduled in an event, if in the advertising of the result it is alleged that it is a stock car proposition? Is there any reason for concealing the fact that the A. A. A. rules are sufficiently liberal to permit of making alterations to cars if they are entered?



Presenting sliding gear spindle



Section of propeller shaft tube



Clutch actuating yoke of drop-forged steel

* * *

There is ofttimes expressed the belief that good automobiles will ultimately be sold at a very low price. A few years ago, when the hand-whittled products of Europe were cast adrift on the shores of America, and men of means with sporting proclivities purchased them at prices that ranged all the way from ten thousand to twenty thousand dollars apiece, they were looked upon as the toys of the rich, but American engineers and toolmakers recognized the weakness of the foreign situation.

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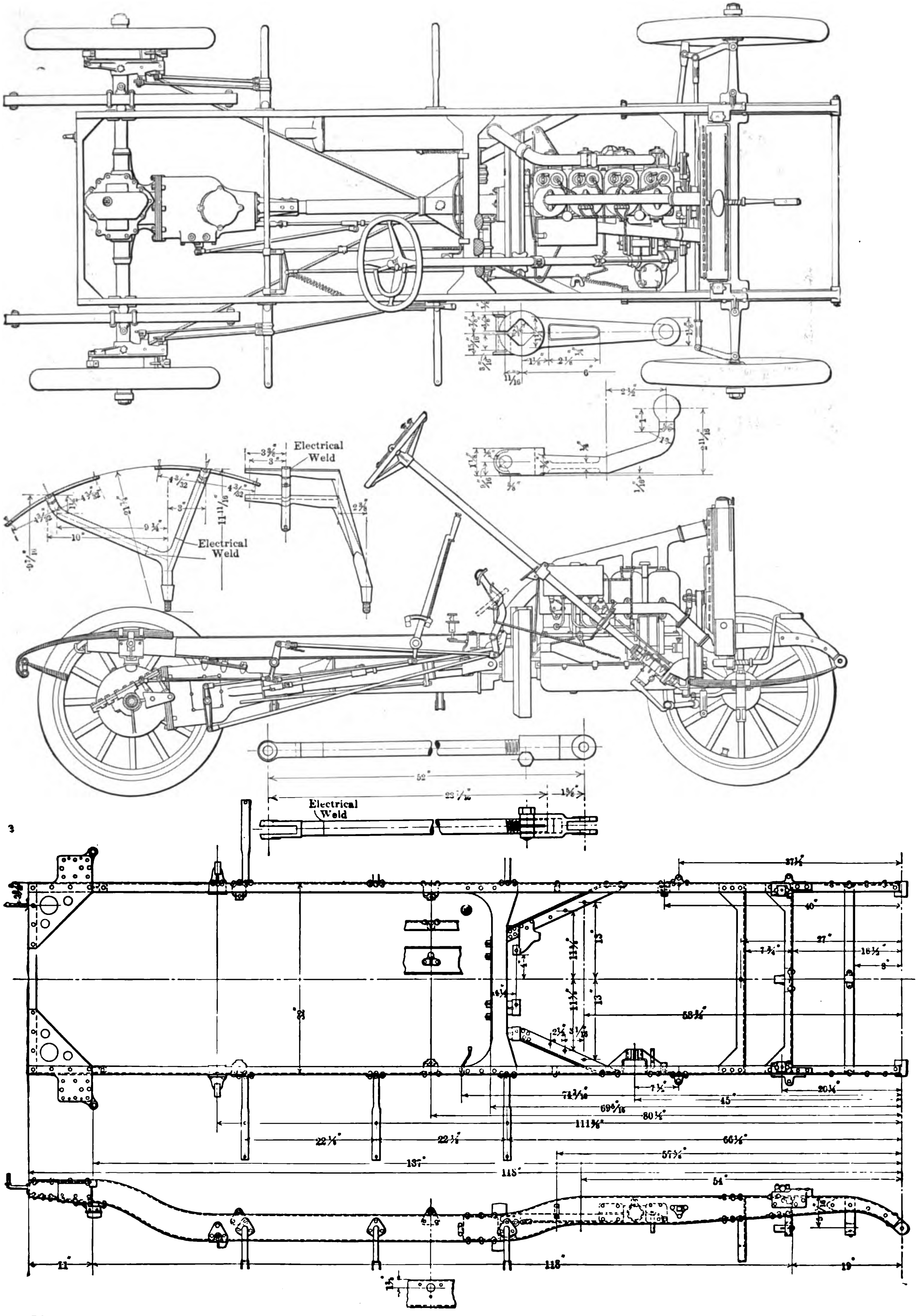
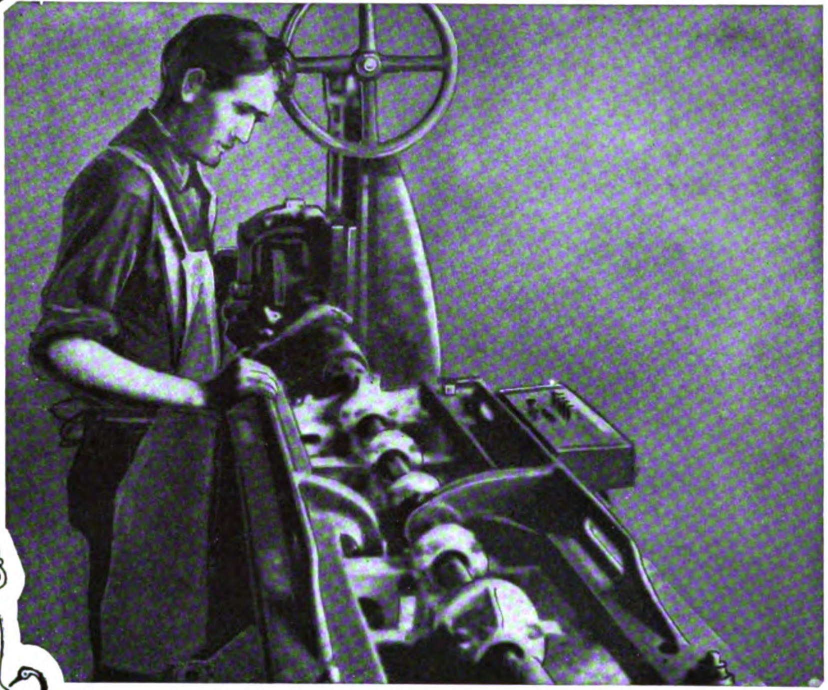
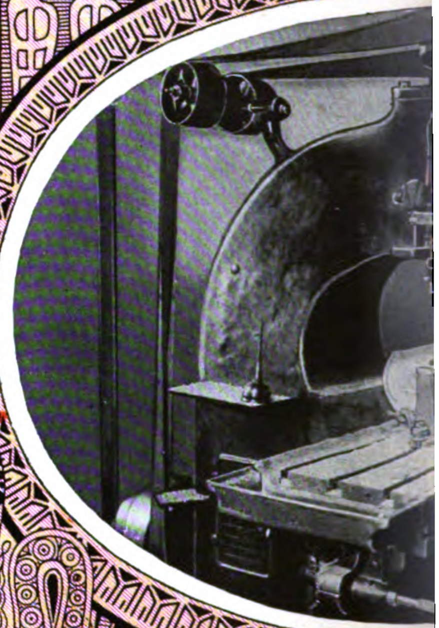


PLAN AND ELEVATION OF CHASSIS, ALSO PLAN AND ELEVATION OF DOUBLE-DROP CHASSIS FRAME

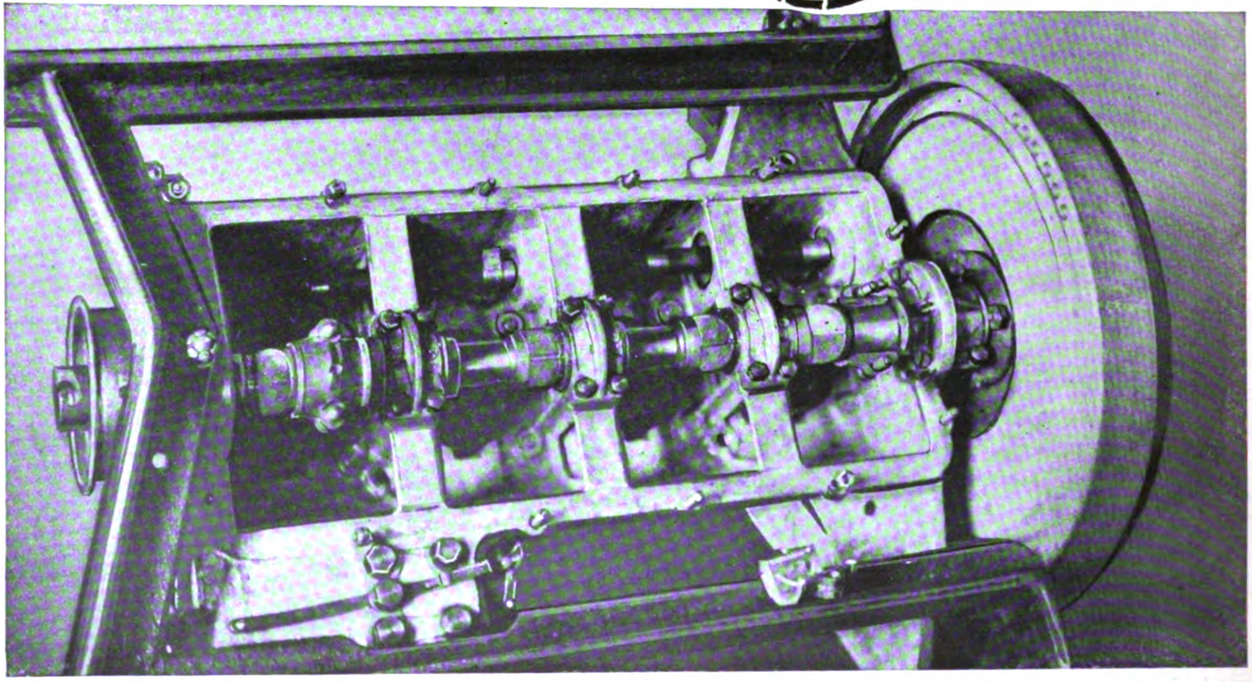
Plate IV—Sweet-Running Qualities Are Present in Proportion



A—Specially Contrived Form of Horizontal Boring Mill Arranged to Bore for the Crankshaft and Camshaft Bearings Simultaneously and Reducing the Time of Setting Up, as Well as Inducing Great Accuracy



C—Substantial Form of Vertical Mill Fitted Facing off a Crankcase which is Strapped Revolving Cutter.



B—Motor with the Lower Half Removed Bolted to a Tilting Assembling Stand which is so Arranged that Motor May be Revolved, Placing it in the Several Advantageous Positions to Enable Workmen to do Quick, Accurate Assembling

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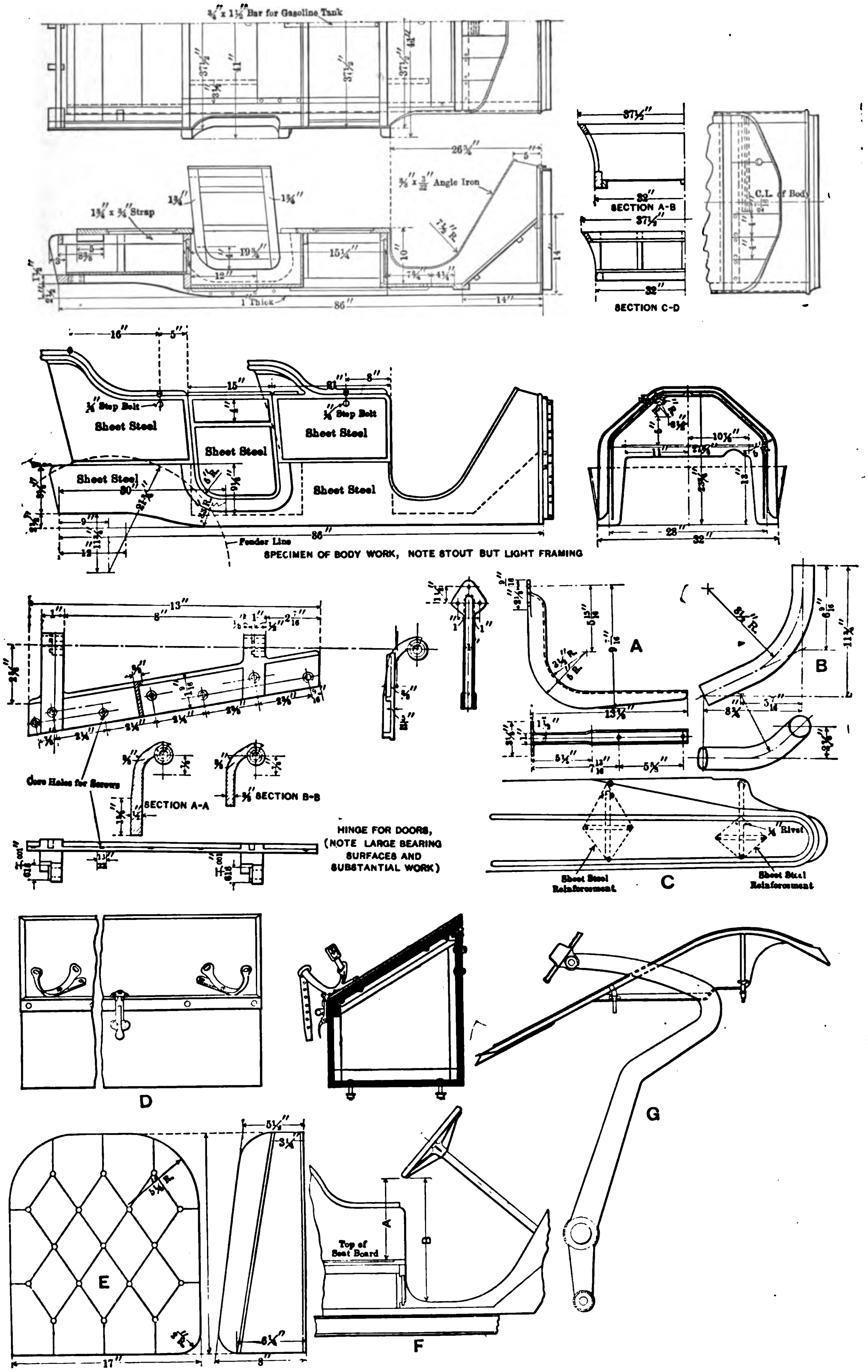
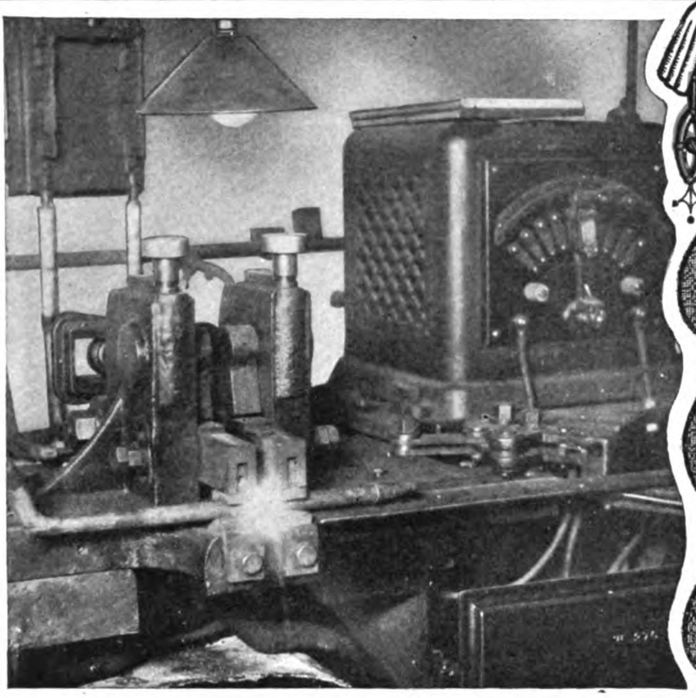


SPECIMEN OF BODY WORK, NOTE STOUT BUT LIGHT FRAMING

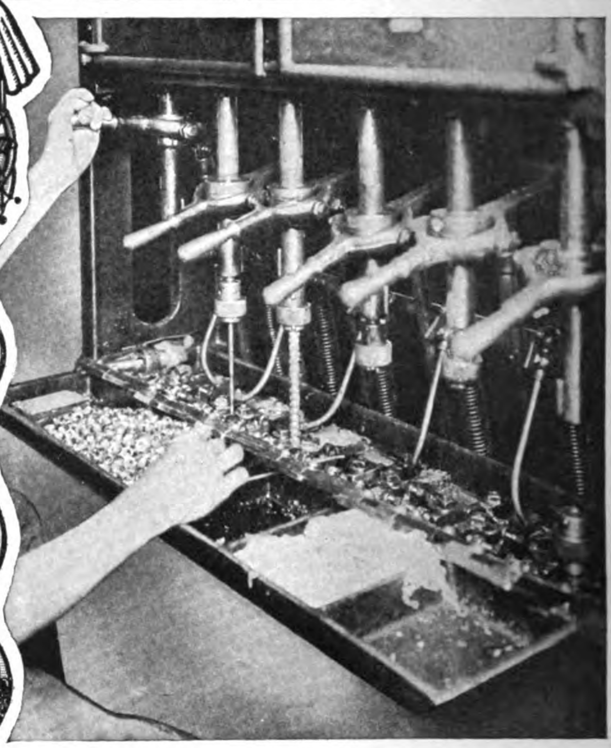
HINGE FOR DOORS, (NOTE LARGE BEARING SURFACES AND SUBSTANTIAL WORK)

EXAMPLE OF OVERLAND BODIES AND OTHER DETAILS WORKED DOWN TO A NICETY

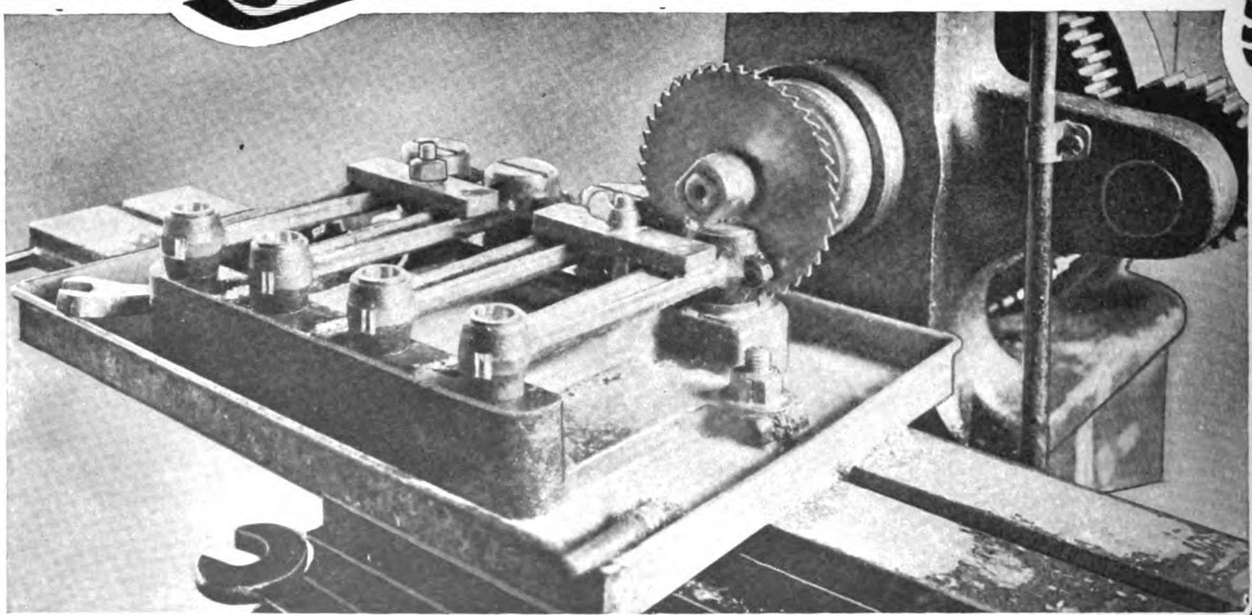
Plate V—Increasing Accuracy and Decreasing Cost are Brought



A—One Unit in a Well-Equipped Electric-Welding Department Welding Mudguard Irons by which Process the Mudguards are Interchangeably Placed on Every Automobile Made and the Relating Parts are Brought to Machining Accuracy

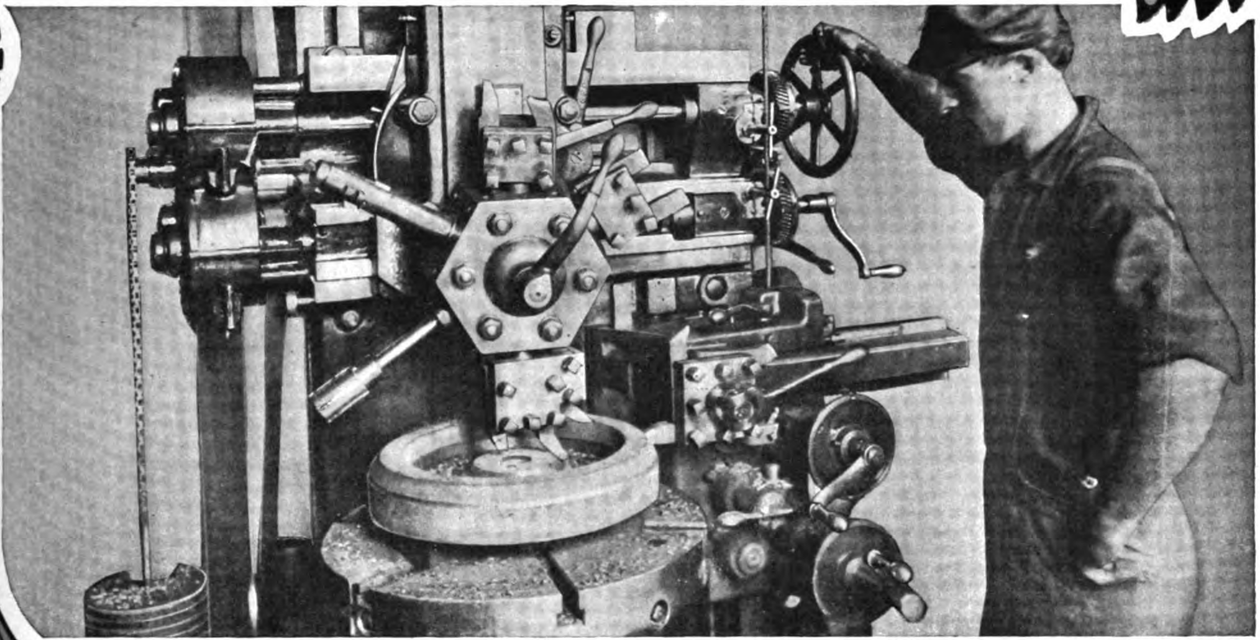


B—A Six-Spindle Nut Tapping Machine Semi-automatic in Character Used for Accurately Tapping Nuts, with which One Boy Performs as Much Work as was Formerly Done by Six Men



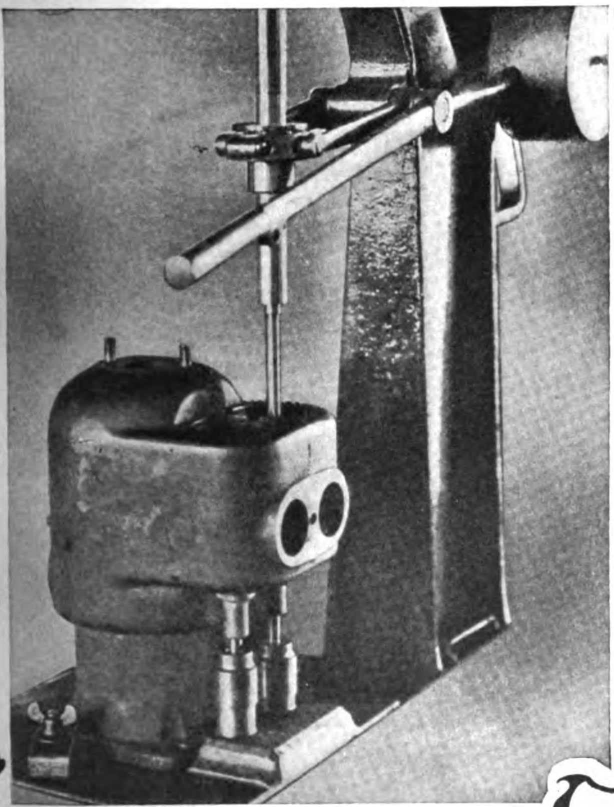
C—Slitting Connecting Rods in Gangs, Employing a Special Form of Fixture Bolted to the Platen of a Milling Machine Using a Saw in the Process

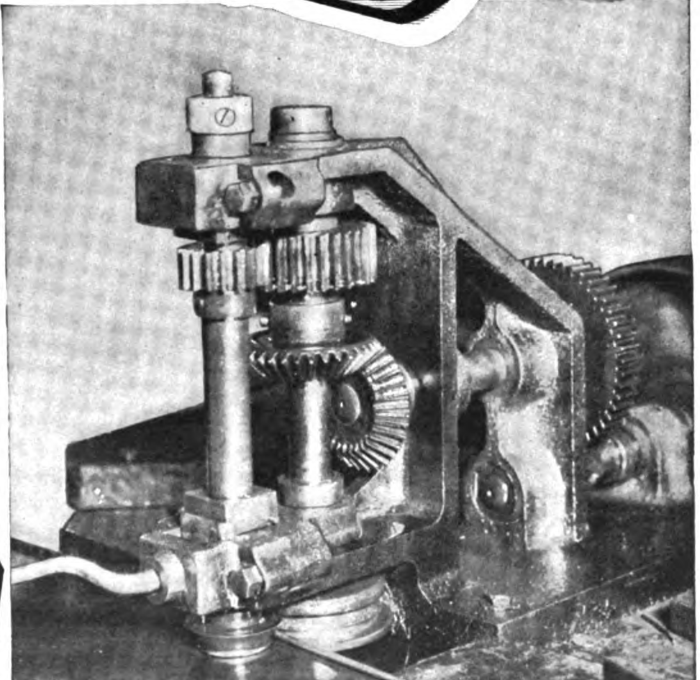
About by Reducing the Number of Setting Up Operations



D—Bullard Vertical Mill Fitted with a Turret Employing Multiple Cutters Doing all the Operations on a Flywheel Simultaneously; Utilizing Special Means of Accurately Centering the Work

Overland





E—Valve-Grinding Machine which is Designed to Produce Reciprocating Motion, Lift, and Other Movements Made by an Expert Grinder, with the Result that Work is Done Many Times Faster and with Far Greater Uniformity Because the Machine Does not Get Tired or Careless

F—Fender Wiring Machine in Action, Showing How the Wire Binder is Turned Under Around the Edges of the Fenders, the Work Being Done Just as Expeditiously at Points of Curvature as Along Straight Lines, Resulting in Uniformity and Presenting Earmarks of Highest Type of Workmanship

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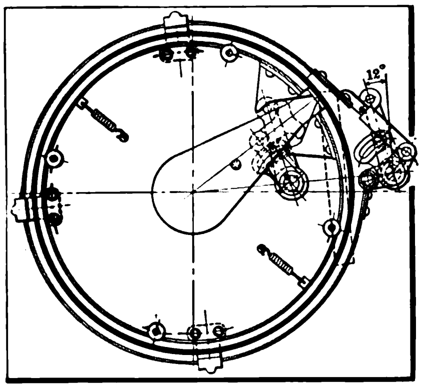
any substance to speak of behind the reckless claims that are made in advertising generally? Would the men who pay for space in which to make their unsubstantiated claims pursue such a course if the purchaser were to write the word "Contract" across the top of the page and ask the maker to put his signature at the bottom of it?

* * *

WHEN a man goes out to buy an automobile and he notices all the claims that are being made for this or that make of car in the advertising thereof, why is it that he permits a salesman to slur over the definite claims therein made and substitute a lot of colloquial piffle that releases the maker from further responsibility and puts the burden of proof up to the purchaser?

* * *

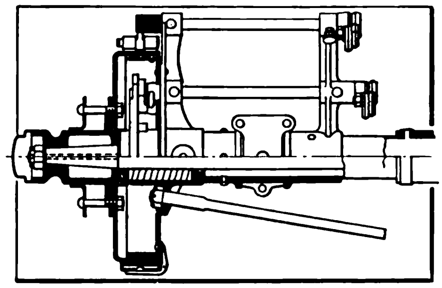
IS it not strange that even good business men forget, as the saying goes, "Ignorance of the law excuses no man?" In business law *caveat emptor* represents a principle that is as fixed as the rock of Gibraltar. It is another way of saying: "Let the purchaser beware." There is no chance of the buyer of an automobile getting the little end of the horn if he will sally forth with a string tied to one of the fingers of his right hand to remind him of *caveat emptor*, and another string tied around a finger of his left hand to remind him of his status as a buyer, i.e., "Ignorance of the law excuses no man."



Section through brakedrum showing method of adjusting take-up

* * *

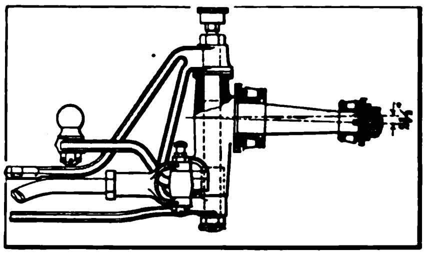
THERE still remains a considerable problem to be solved by the man who prefers to receive a dollar's worth of automobile for each dollar that he expends. This problem is shared by the maker who elects to deliver a dollar's worth of automobile for each dollar received. It is self-evident that an automobile that will deliver perfect satisfaction to one man may be entirely unsatisfactory to another—both cars may be thoroughly good in every way for the work for which they are intended.



Section of live rear axle showing hub pressed on taper end

THE wise purchaser first examines himself with a view to determining his needs; he then proceeds to examine the automobiles of the makes that promise most. It is a matching process, just as a sample of cloth is used and matched up if more cloth of the same kind is wanted. When the purchaser finds the automobile that matches with his needs, he may then proceed to buy it. He will be wise, if, after having made up his mind, he keeps it made up. Substitutions "a la drugstore" are distinctly bad.

FROM the maker's point of view, since there is a diversity of purchasers to satisfy, he is compelled to invest in a promising variety of models in order that he can honestly entertain the various types of intending purchasers. Experience teaches that purchasers may be divided into from ten to fifteen distinct classes, each of which requires models of cars that are sufficiently at variance with each other to demand that they be given separate consideration; and if one model of car requires the expenditure of $158,000 for special tools in the building of it, even though this figure is not multiplied by the number of models turned out, does it not indicate that the maker who is lacking in means finds himself incapable of manufacturing a sufficient number of models to satisfy the existing demand?



Part section of front knuckle and shank of I-section front axle

* * *

WHAT is the alternative? Obviously, the maker with limited facilities must either cater to a restricted clientele or fudge up the required number of models, doing the best he can with his restricted facilities. Will this effort on his part, however ambitious, be up to the standard set by engineers as necessary to the well-being of the automobile business? How can it be? No other established business, ever succeeded in spreading out thin and at the same time maintained a reputation for that peculiar quality which brings a glow of satisfaction to the cheek of the fastidious.

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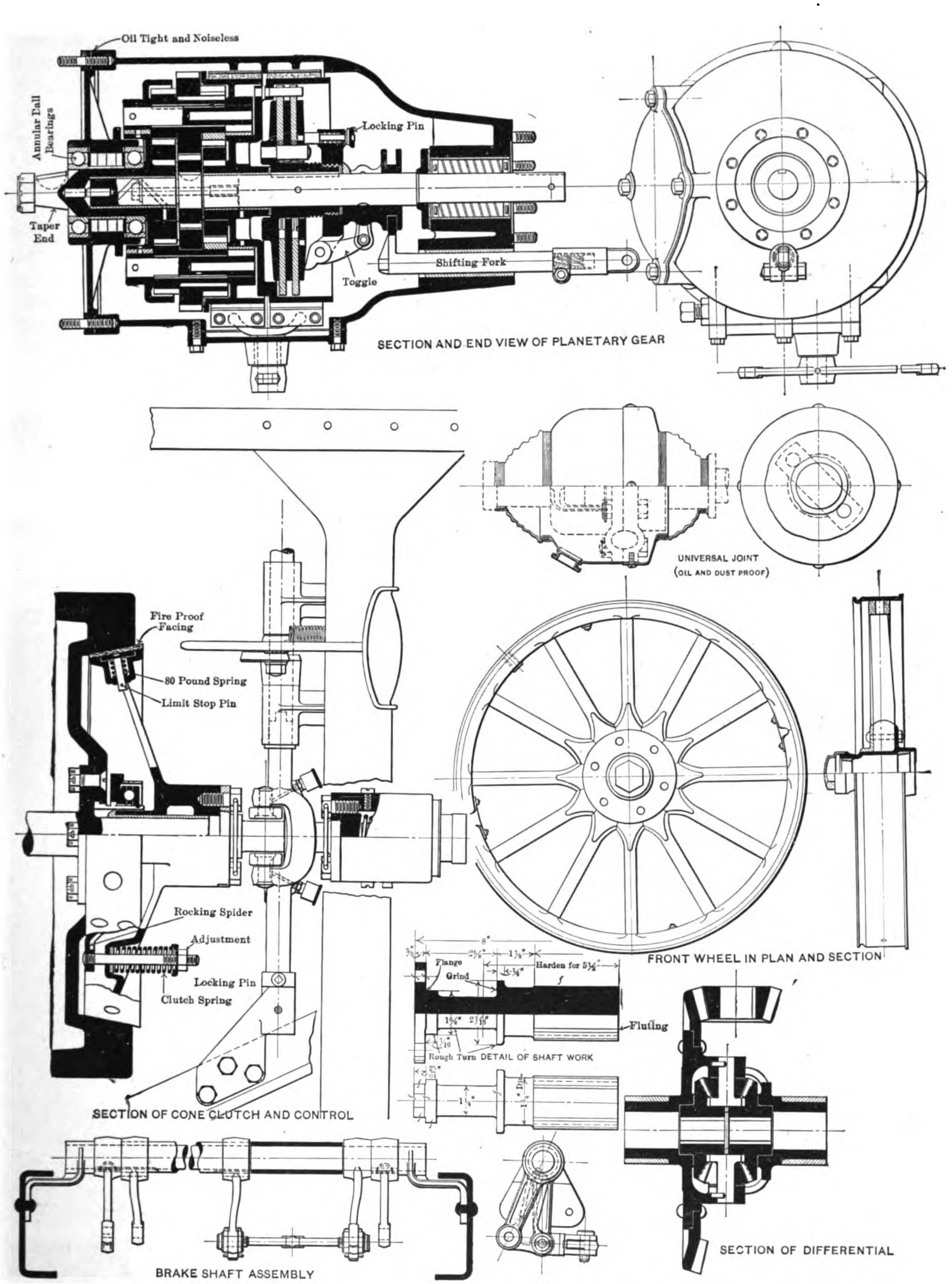
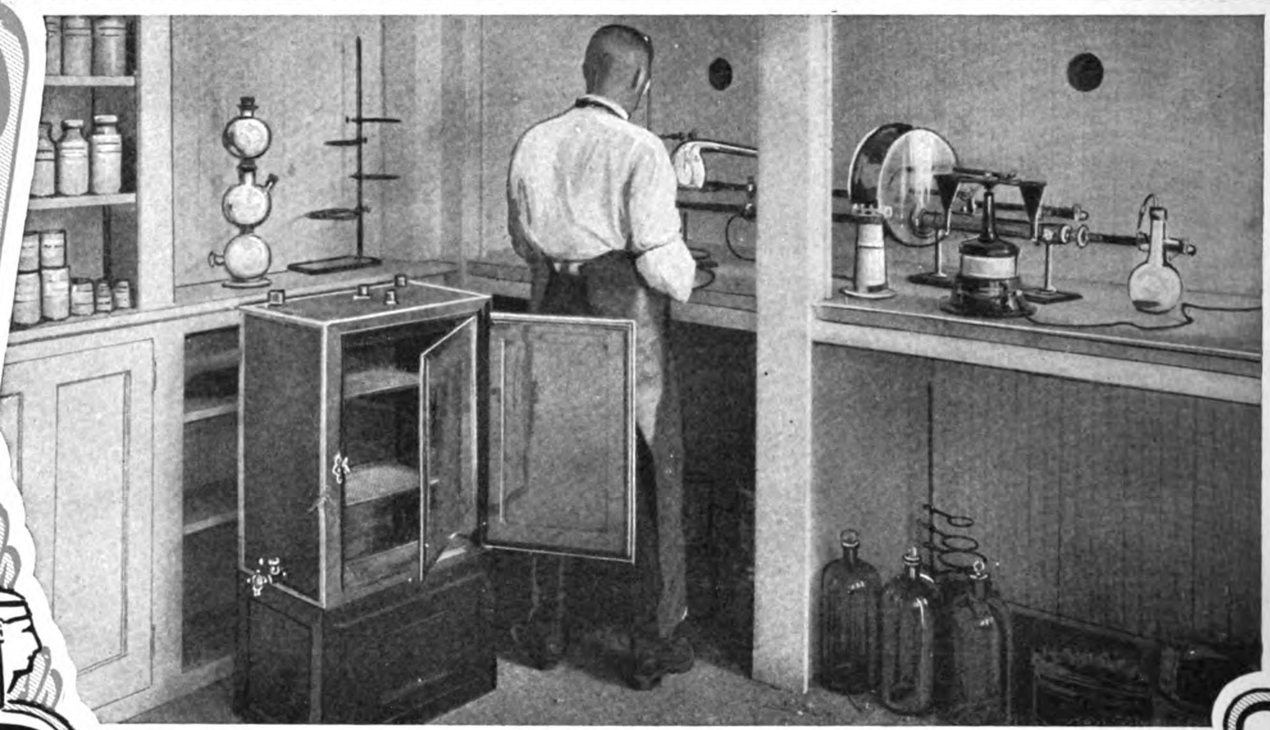
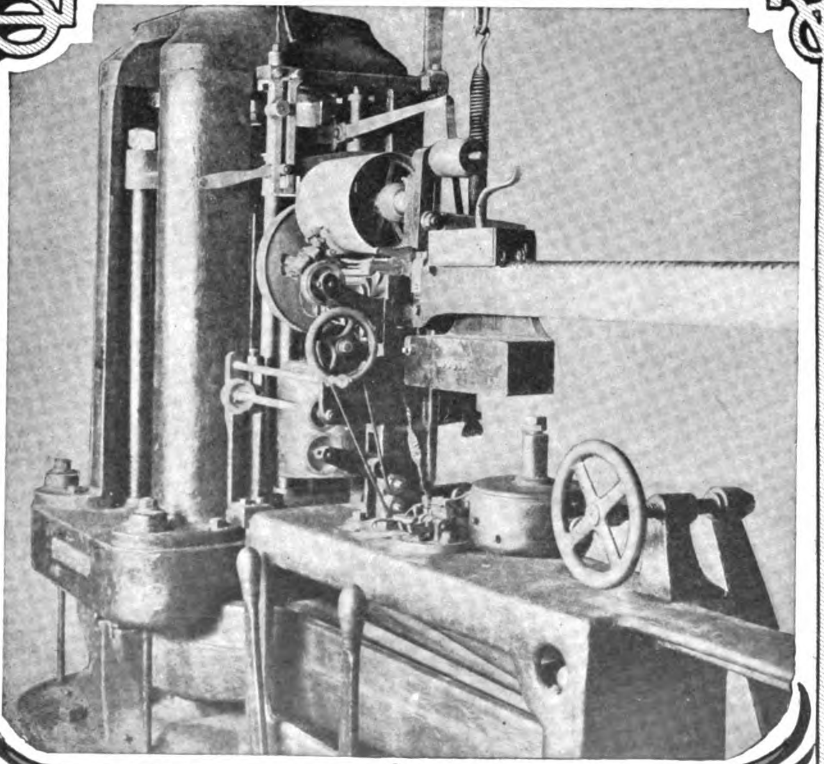


SECTIONS OF PLANETARY GEAR, CONE CLUTCHING MECHANISM, FRONT WHEEL, DIFFERENTIAL AND OTHER PARTS INDICATING EXACTNESS IN THE DESIGNING PROCESS

Plate VI—Basis of All Engineering Effort is the Laboratory,



A—Chemical Laboratory Fitted Out with the Latest and Most Approved Equipment and Methods for Determining the Chemical Composition of every Character of Material Employed in Overland Automobiles

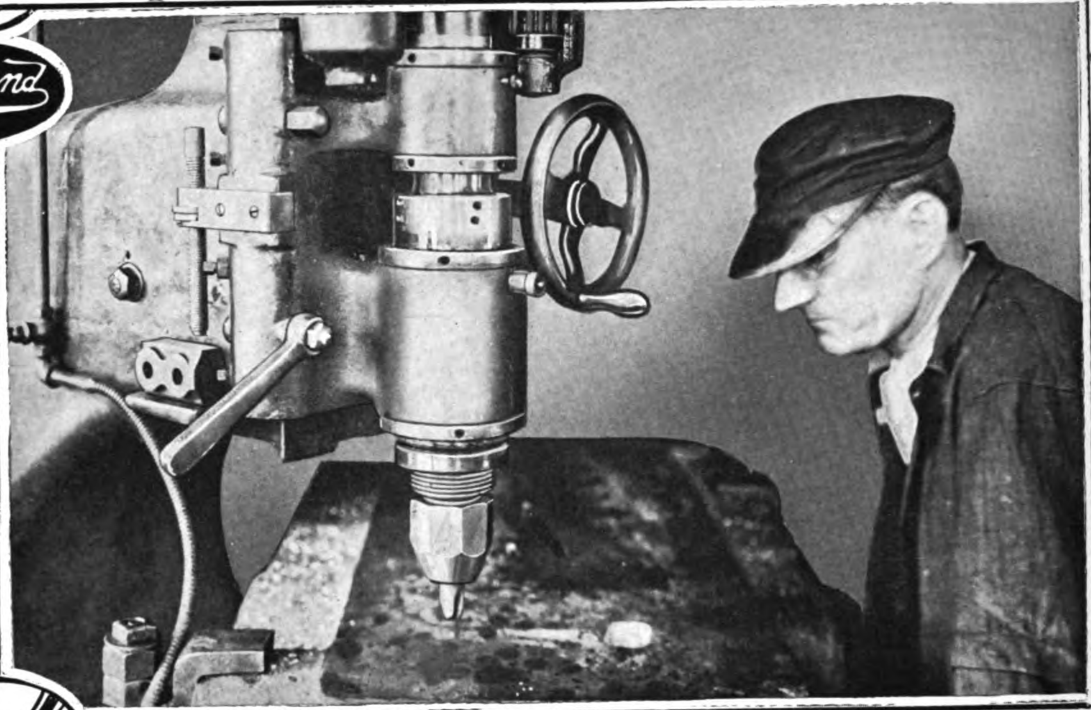


B—Olsen Testing Machine of One Hundred Thousand Pounds Capacity for Use in Determining the Physical Properties of Steel and Other Materials

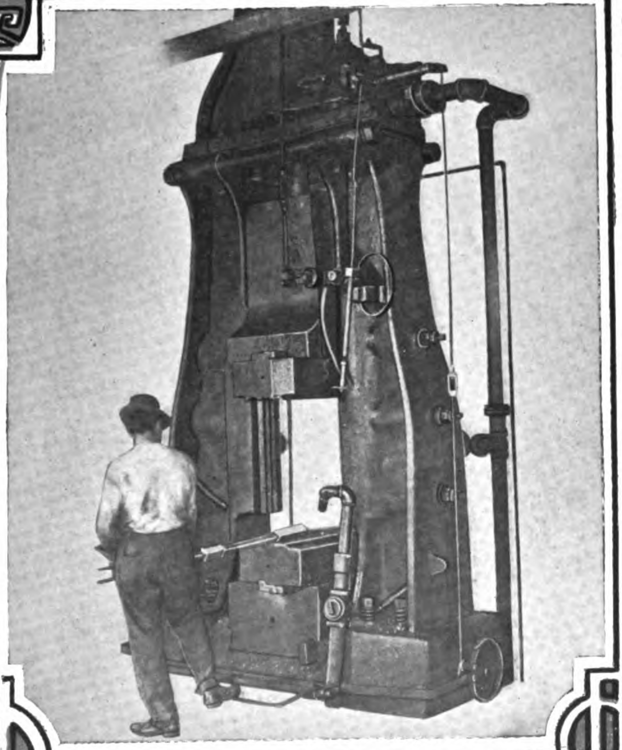
C—Special Form of Equipment Designed to Test Gears for Centers, Bores, and Critical Dimensions

Plate VII—To Produce Quality Cars in Quantity, Drop-forging

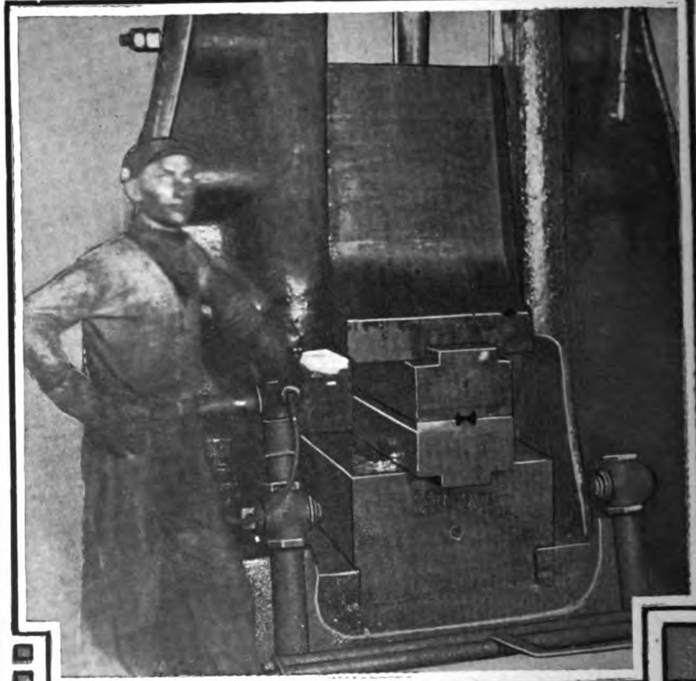
Overland



A—Depicting a Vertical Routing Machine Routing Out for a Breaking-down Die to Be Used in Drop-forging, Special Steel I-Section Front Axles

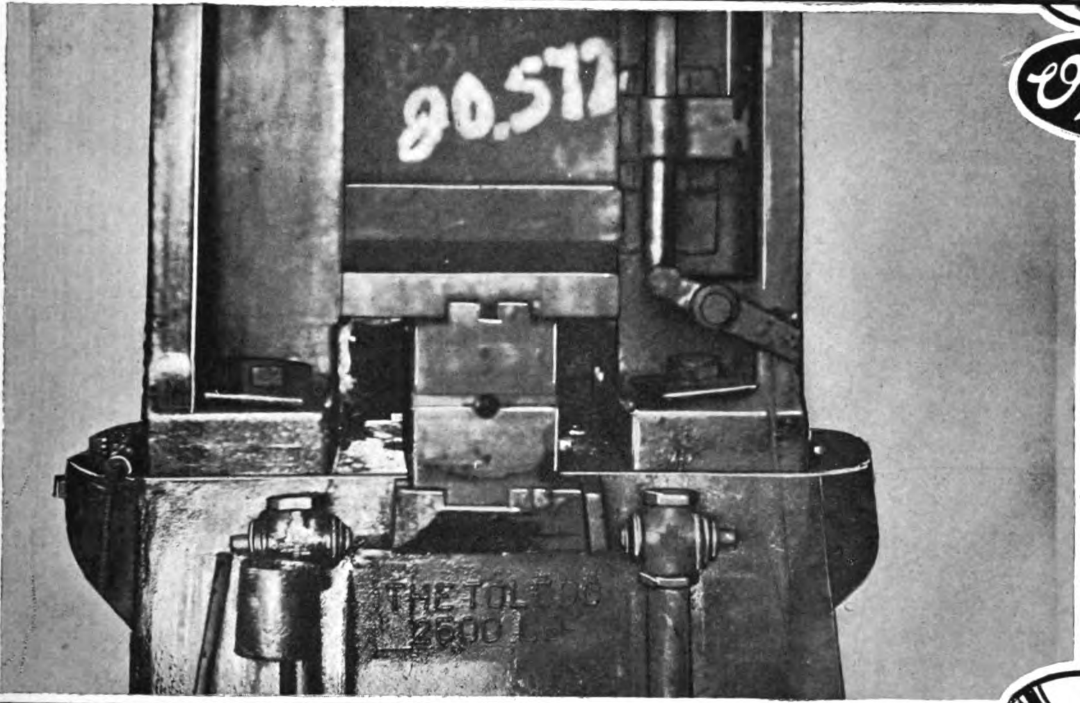


B—Heavy Press in the Act of Drop-forging a Special Steel I-Section Front Axle, Showing How the Bar of Steel Is Placed on the Breaking-down Die and Given Its Preliminary Shape

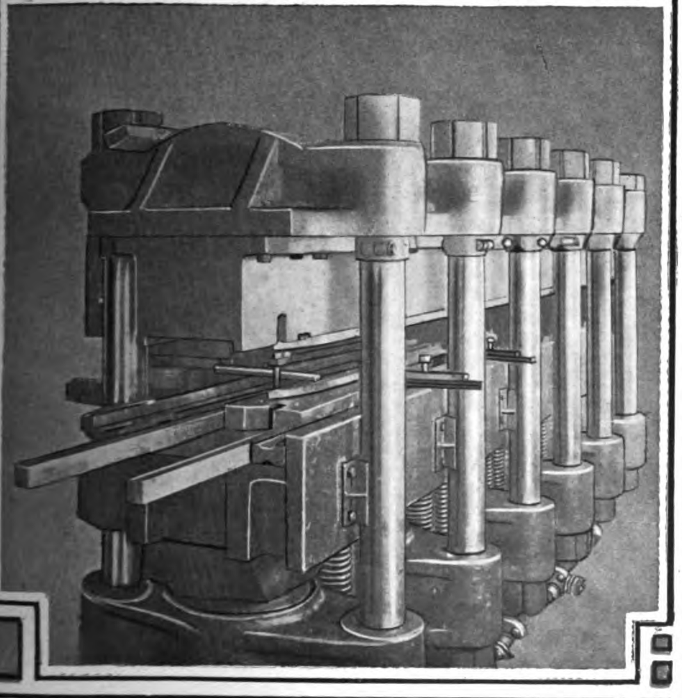


C—Shows the Large Drop-forging Press as Utilized in Front Axle Work, with the Tup Down, Giving an Idea of the Enormous Hammer Blows Required in This Character of Work

Machinery is Necessary to Guard Against a Famine of Parts



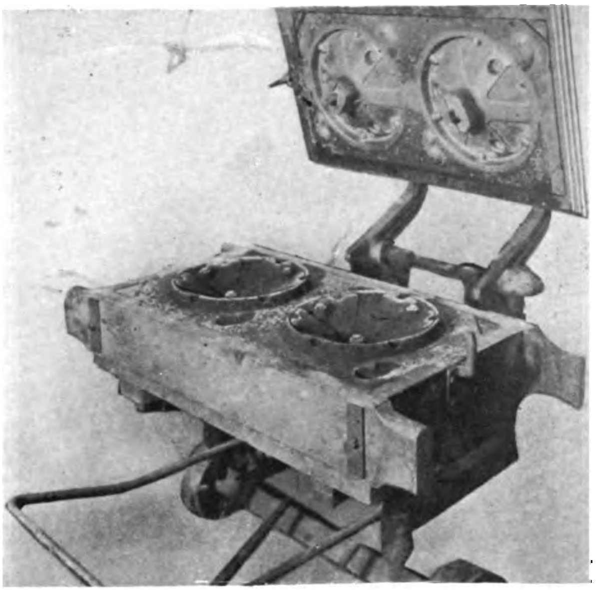
D—A 2,500-Pound Toledo Hammer Working on Drop-forged Crankshafts of 40 Carbon Steel, This Being One of a Considerable Battery of Hammers in the New Overland Drop-forge Plant



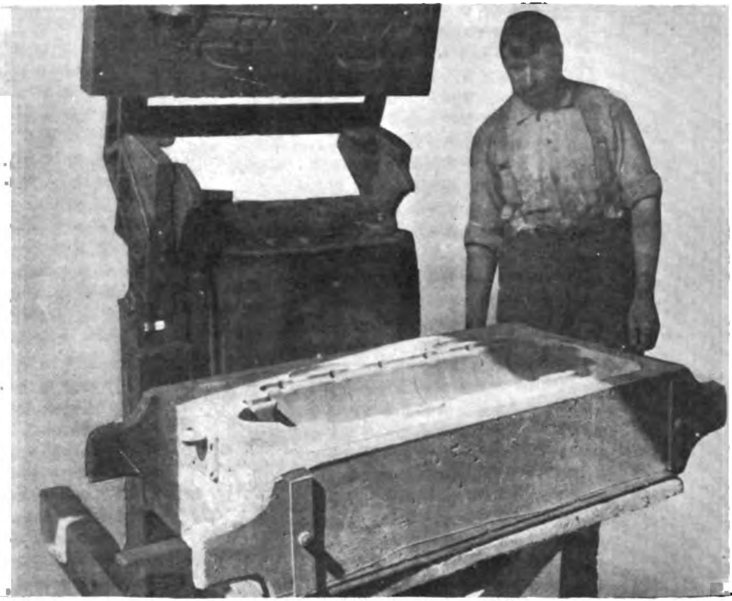
E—Hydraulic Press Rated at 175 Tons, Designed fo Use in the Overland Plant, Making Double Drop I-Section Sidebars, Fitted Out to do a Variety of Chassis Frame Work, This Being One of a Battery of Presses

F—Special Jigging Fixture Designed for Use in Assembling Chassis Frames, so Contrived That All the Holes Are Drilled Interchangeably and the Work Is Held Securely in Position During the Process of Riveting

Plate VIII—Extensive Use of Aluminum Castings and Necessity

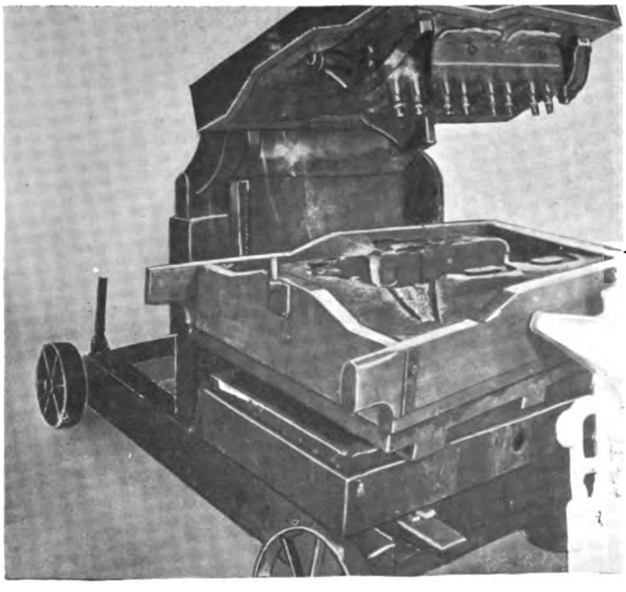


A—Moulding the Aluminum Clutch, Showing the Cope and Drag, the Latter Being Raised Up, Affording an Opportunity to Observe as to the Care with which this Work Must be Done



B—In the Process of Moulding Crankcases, Presenting the Mould After the Pattern is Removed, Leaving the Sand in Replica Thereof

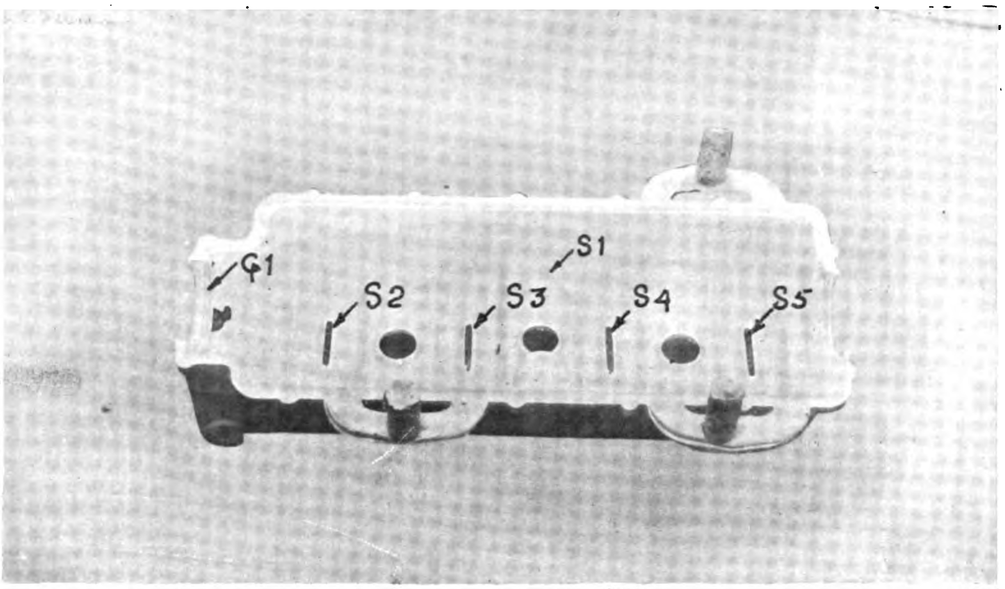
Overland

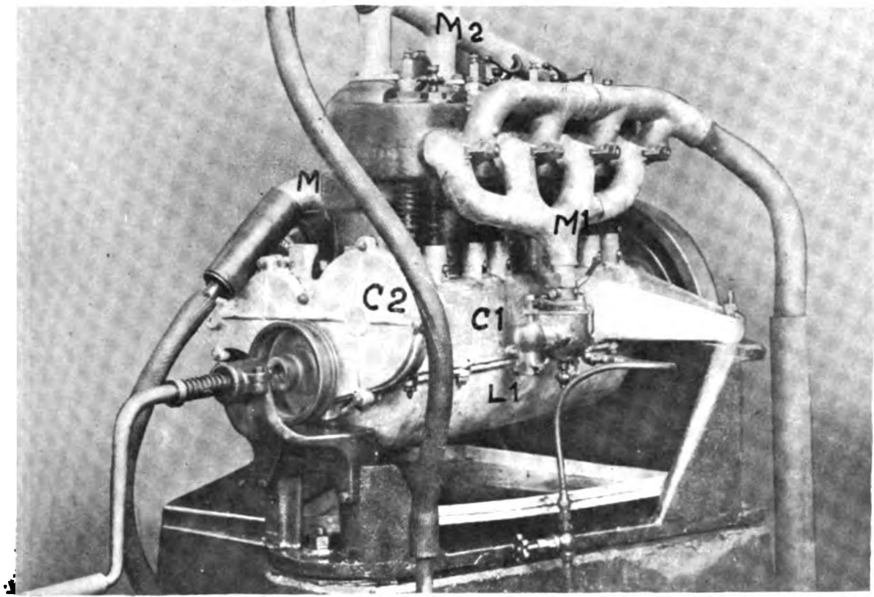


C—Moulding the Aluminum Crankcase, Showing the Casting Standing Up Against the Drag of the Mould, the Cope Having Been Removed, Presenting a Fine Character of Work

# of Fine Cylinder Castings Require Modern Foundry Equipment

D—Lower Half of a Crankcase as it is **Broken** Out of the Sand, **Indicating** the Oil-Spreader **S1, which** is Cast Integral, **Calling** Attention to the **Groove** G1 which Passes all **Around** the Flange to Make **the Case** Oil Tight, and the **Spillways** S2, S3, S4 and S5, **Through** which the Oil Flows, **Maintaining** a Constant Level —**Attention** is Called to the **Function** of the Oil-Spreader **S1 which** Prevents the Oil **from Piling** Up when the Car **is Travelling** Up or Down a **Steep Hill.** The Lower Half **is Resting** on New Pig—No **Scrap is** Used in Overland **Aluminum** Castings



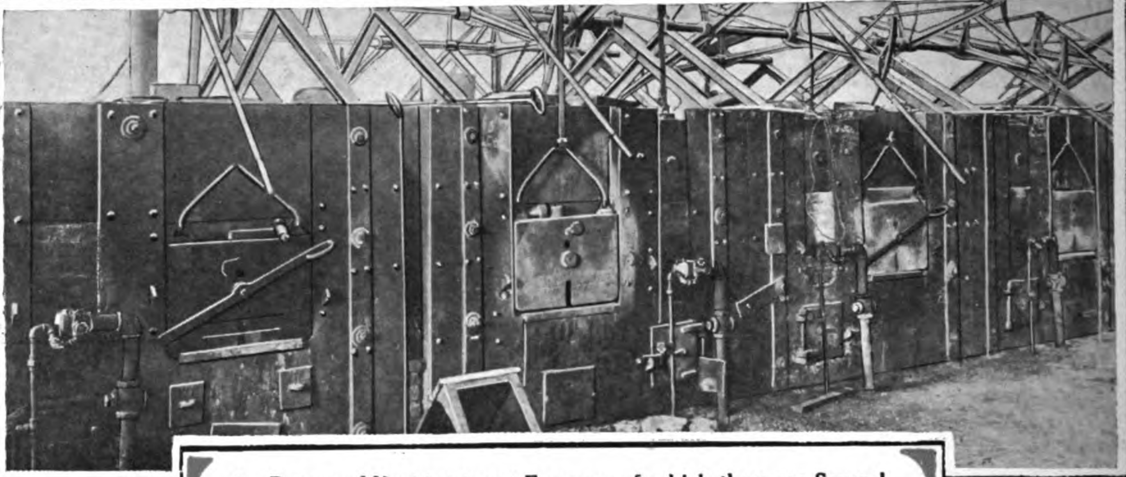


E—Motor on Test Block in Position to be Investigated for Perfection of Assembling, Smooth Running Qualities, and Noiseless Performance—Attention is Called to the Considerable Use of Aluminum in this Work. The Castings L1, C1, M1, M2, C2, and M. being of this Metal

Overland

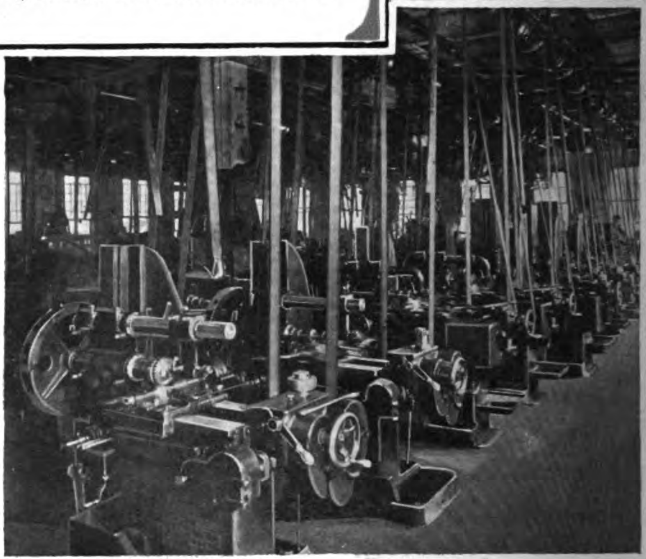
F—View of the Well Equipped **Laboratory**, the Function of **which is** to Establish the **Chemical** Composition of **Materials** to be Used in Castings **as** Made in the Foundry, **and** to analyze the Castings **when they are Made in Order** to Determine the **Uniformity** of Charging—**Steel and** Other Materials **are also** Checked for Chemical **Composition** in the Same **Laboratory.**

Plate IX—Random Shots Taken with a Camera, Indicating in

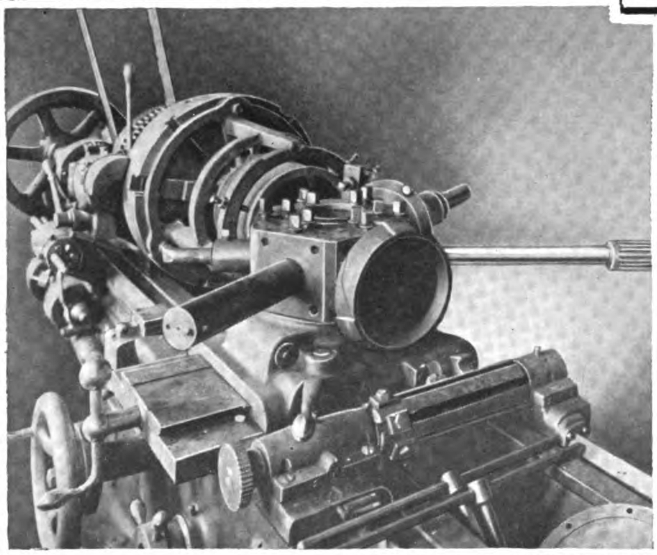


A—Battery of Heat-treatment Furnaces, of which there are Several, this Particular One Being Devoted to the Heat-treatment of Crankshafts and like Parts.

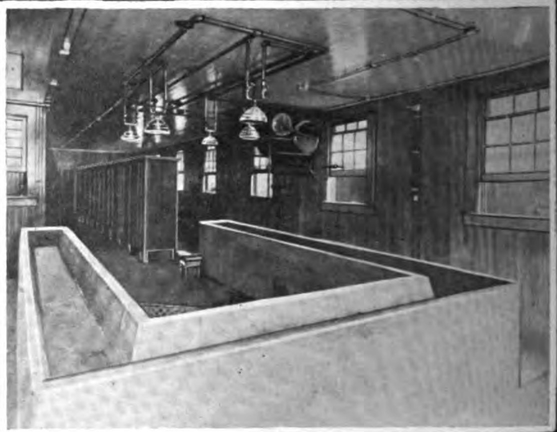
B—The Entire Plant is Operated by Electric Motors This is a View of the Main Switchboard and the Battery of Transformers from which the Electric Current is Taken



C—Battery of Brown & Sharpe Gear-cutting Machines Indicating Something of the Requirements from the Point of View of Quality and Quantity of the Gears Turned Out



D—Heavy Turret Lathe with a Fixture Bolted to the Face Plate to Carry the Shell of the Planetary Gear and a Sufficient Variety of Tools Mounted to Perform the Successive Operations Expeditiously

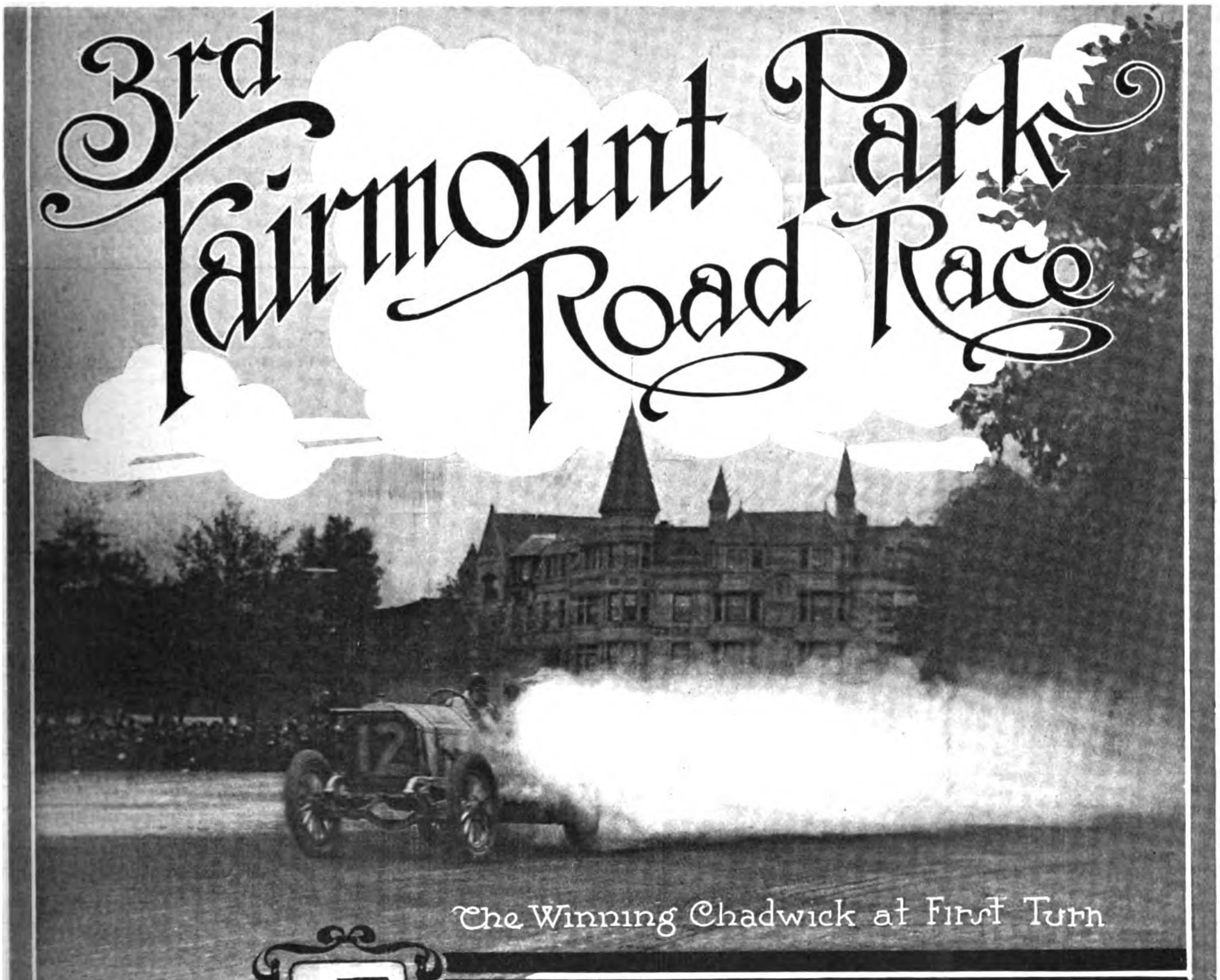


E—Shower-bath and Washstands Adjacent to the Forge Placed at the Disposal of the Employees

VOL. XXIII NEW YORK—THURSDAY, OCTOBER 13, 1910—CHICAGO No. 15

THE AUTOMOBILE

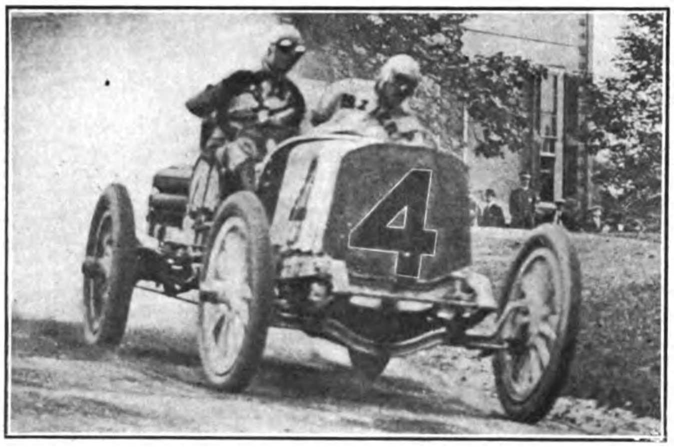
3rd Fairmount Park Road Race



The Winning Chadwick at First Turn

FINISHING in a neck-and-neck drive, the intensity of which has seldom been equaled in a sporting event of any kind, and never in an automobile road race, the Chadwick entry, No. 12, driven by Len Zengle, won the third renewal of the Fairmount Park Road Race at Philadelphia, Saturday, from the speedy and consistent Lozier, with Ralph Mulford at the wheel. For ten laps of the course, the winner lay close to the Lozier, sometimes one flashing by the grandstand in front and sometimes the other.

The finish was hair-raising. In the next to the last lap, the Lozier had established a lead of 9 seconds and shot past on the final round with the same steadiness that had characterized its running all through the race. There was a difference in the starting time of 80 seconds in favor of the Lozier and this, with the 9 seconds it led in actual time, put it 89 seconds ahead of the Chadwick at the start of the last lap. When the Chadwick came whistling down to the stand, the signal from the pits informed Zengle to "beat it" and the big car reared like a living thing as it set sail for the white flyer. Less than a minute after it had disappeared from view around the first turn a telephonic message conveyed the news that the Chadwick was suffering from tire trouble. It was learned that the car had thrown two shoes passing the turn. By a marvelously quick change the tires were replaced and the car was once more on its way.



Lozier, No. 4, rounding Sweet Briar Hill turn

It seemed ages before the white hood of the Lozier appeared at the head of the stretch, tire trouble having been experienced, but when it did it came with a rush that seemed able to carry it to victory. In fact, after the report of the tire trouble suffered by the rival car, the appearance of the Lozier, even after a slow round, 9:53:70, seemed to warrant its reception as the winner.

Soon into the straightaway swung the long red-hooded car. The pilot knew it was a matter of seconds and he drove as never before. So fast came the giant that the eager crowds drew away involuntarily as the car shot past. Only a few realized that there was a winning chance, but everybody understood that Zengle was making a most terrific and spectacular effort. The magpie banner waved as he sped on and the electric device showed that he had beaten the total elapsed time of the Lozier by about 6 seconds.

It was a Philadelphia victory gamely won, for the car is made not far from the Quaker city and the driver is a native son. The winner is entitled to every credit, but the showing of the Lozier was quite as good, when it is remembered that the winner had the advantage of 161 cubic inches piston displacement. Stoddard-Dayton, No. 29, driven by De Hymel was third, about 8 minutes later, and National, No. 3, Aitken, the same car that finished third in the Vanderbilt cup race, was fourth, five minutes behind the Stoddard. Five others finished the full course as follows: Mercedes, Jackson, Westcott, Pullman and Apperson.

Eight out of the nine cars that finished were stock models of American make, emphasizing the lesson taught in the running of the Vanderbilt Cup. The foreign racing machines experienced bad luck or something else, for they failed to stand up.

The race was a beautiful contest. It was managed and administered with skill and fairness. It was witnessed by fully half a million persons and not a single spectator was even frightened, so perfect were the policing arrangements. Neither were there any sanguinary accidents to the contestants, although several of the cars met with mishaps and two mechan-

OFFICIAL TABLE SHOWING THE STANDING OF EACH OF THE 32 CARS THAT STARTED IN THE THIRI

DIVISION 6C—FOR CARS WITH PISTON DISPLACEMENT RANGINC

No.	Car	Piston Displacement	Driver	1st Lap 8 Miles	2nd Lap 16 Miles	3rd Lap 24 Miles	4th Lap 32 Miles	5th Lap 40 Miles	6th Lap 48 Miles	7th Lap 56 Miles	8th Lap 64 Miles	9th Lap 72 Miles	10t
12	**Chadwick**	707	Len Zengle	8:43	17:07	25:45	34:07	42:20	50:46	58:59	67:15	77:	85:
5	**Benz**	731	E. R. Bergdoll	8:50	17:07	25:23	33:39	41:39	**49:41**	**57:48**	**66:03**	**74:12**	[illegible]
25	**Chadwick**	707	Al Mitchell	**8:10**	18:48	**25:07**	**33:18**	**41:30** Struck Bank					
13	**Simplex**	672	W. C. Mullen	9:49	19:26	28:11 Cylinder							
22	**Simplex**	672	R. E. Beardsley	8:45	17:33 Struck Wall								
19	**Simplex**	672	I. Fred Betz	Crank Shaft									

DIVISION 5C—FOR CARS WITH PISTON DISPLACEMENT RANGIN

4	**Lozier**	544	Ralph Mulford	8:32	**16:53**	25:17	33:40	41:58	50:22	58:39	66:54	75:07	83:
29	**Stoddard-Dayton**	487	De Hymel	8:25	17:07	25:32	34:17	44:39	51:14	59:36	68:04	76:26	84:
20	**Mercedes**	557	Jogersberger	8:54	17:58	26:43	35:35	44:25	53:36	62:22	71:09	79:50	88:
9	**Apperson**	597	Geo. E. Davis	9:44	19:14	28:31	37:54	47:11	56:30	65:39	74:07	84:05	94:
1	**Apperson**	597	H. Hanshue	9:31	18:47 Stripped Gear								
7	**Stoddard-Dayton**	487	Hugh Harding	8:47	23:47 Engine Trouble								

DIVISION 4C—FOR CARS WITH PISTON DISPLACEMENT RANGIN

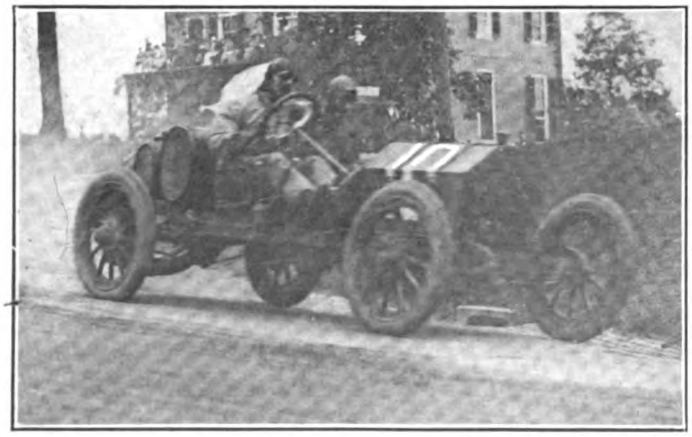
3	**National**	447	J. D. Aitken	9:01	17:46	26:26	35:07	43:54	52:47	61:33	70:16	**79:10**	88:
14	**Jackson**	354	Harry Cobe	9:06	17:58	26:58	36:22	45:31	55:04	64:10	73:30	**82:36**	91:
23	**Westcott**	354	H. C. Knight	9:11	18:37	27:27	36:50	46:01	55:07	64:09	73:12	**82:14**	91:
11	**Marmon**	318	Harroun	12:05	21:20	29:55	40:02	48:22	57:15	66:04	74:50	**83:32**	92:
17	**Benz**	444	Willie Hauut	20:02	28:25	37:22	46:	54:40	63:14	71:51	80:28	**89:12**	97:
16	**National**	449	H. S. Wilcox	8:54	17:49	26:42	37:49	47:08	60:51	72:19	81:01	**89:38**	98:
26	**Benz**	448	Ed. Hearne	8:58	33:53	43:36	53:03	64:34	75:58	85:38	95:23	**109:57**	Ignition
30	**Benz**	449	C. A. Bergdoll	Lost Gasoline Cap									

DIVISION 3C—FOR CARS WITH PISTON DISPLACEMENT RANGIN

10	**Pullman**	286	E. Gellard	9:43	19:12	28:38	37:59	47:19	56:47	66:	75:05	**84:03**	[illegible]
15	**Mercer**	300	H. P. Frey	10:12	20:57	30:39	41:24	51:30	61:34	71:41	81:41	**91:38**	[illegible]
32	**Otto**	253	Frank Yerger	12:57	23:05	33:08	43:05	53:	67:47	77:52	87:44	**97:41**	[illegible]
28	**Marmon**	299	Dawson	8:43	17:43	26:15	35:04	43:58	52:45	61:29	70:08	**78:46**	[illegible]
31	**Corbin**	270	Matson	9:25	19:17	30:27	Magneto						
8	**Pullman**	286	H. Hardesty	11:49	Twisted Pump Shaft								

DIVISION 2C—FOR CARS WITH PISTON DISPLACEMENT RANGII

21	**Abbott-Detroit**	213	V. P. Padula	11:28	22:23	33:10	44:	54:43	65:25	76:07	86:41	97:18	10
2	**Abbott-Detroit**	213	Mort Roberts	10:43	19:53	29:46	39:39	49:33	59:32	69:29	79:30	89:24	99
24	**Ford**	201	Frank Kulick	9:47	19:54	29:06	39:14	55:21	64:46	74:16	83:41	115:22	12
18	**Cole**	201	H. Endicott	9:52	20:07	29:24	40:01	50:03	60:02	70:05	80:03	89:52	9
27	**Cole**	201	Bill Endicott	10:27	20:54 Broke Pinion in Steering Gear								
6	**Abbott-Detroit**	213	Mort Roberts	11:42	30:20 Ignition								



Pullman, No. 10, at Sweet Briar Mansion

icians suffered broken arms. The course is comparatively slow on account of the numerous hazards along the winding eight-mile route.

Besides winning the grand prize of $2,500, the Chadwick also wins its class prize in Division 6C, amounting to $1,000 and a silver trophy presented by the city of Philadelphia. In addition there were the usual number of accessory prizes.

The race was really five races in one for there was a cash prize hung up for each division under Class C from 2C to 6C. The prizes were $1,000 each and a silver trophy given by the city.

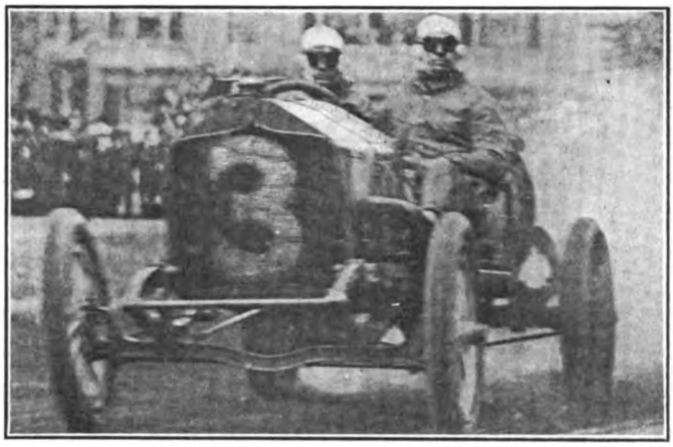
The Chadwick was the only contestant in its class to finish the course, all the others meeting mishaps.

The Lozier won in its class, Division 5C, but three others finished in that division.

National, No. 3, Aitken, won the division 4C honors, but two others completed the full route.

Pullman, No. 10, driven by Gellard was first in Division 3C.

The Abbott-Detroit, No. 21, driven by Padula was the winner in Division 2C, but did not have to make the full distance as the car was the only one running in that division when the race was declared finished.



National. No. 3, passes the Smith Memorial

NNUAL 200-MILE FAIRMOUNT PARK RACE, WITH THE WINNERS IN EACH OF THE FIVE CLASSES.

ROM 601 TO 750 CUBIC INCHES—WON BY THE CHADWICK, NO. 12

h Lap	12th Lap	13th Lap	14th Lap	15th Lap	16th Lap	17th Lap	18th Lap	19th Lap	20th Lap	21st Lap	22nd Lap	23rd Lap	24th Lap	25th Lap
Miles	96 Miles	104 Miles	112 Miles	120 Miles	128 Miles	136 Miles	144 Miles	152 Miles	160 Miles	168 Miles	176 Miles	184 Miles	192 Miles	200 Miles
3:29	101:42	109:55	118:10	126:18	134:26	142:23	150:37	158:46	**166:50**	**174:57**	183:09	**191:22**	199:31	**203:07.88**
0:35	98:40	107:01	115:17	123:32 Broke Oil Feed										

ROM 451 TO 600 CUBIC INCHES—WON BY THE LOZIER, NO. 4

1:33	99:45	107:57	116:09	124:24	**132:39**	**140:51**	**149:08**	**157:26**	166:53	175:08	**183:06**	191:23	**199:22**	209:13.30
3:10	106:42	114:47	126:09	134:51	143:07	151:53	160:09	168:25	176:41	184:53	193:02	201:12	209:24	217:42.95
7:37	108:22	116:58	125:38	134:17	142:53	151:23	159:51	168:44	180:08	188:55	197:30	206:05	214:41	223:18.74
3:50	112:58	122:08	131:20	140:36	150:03	161:50	171:10	188:15	197:25	206:39	216:01	225:19	234:29	243:42.05

ROM 301 TO 450 CUBIC INCHES—WON BY THE NATIONAL, NO. 3

7:19	106:13	115:02	123:57	132:57	141:47	150:36	159:27	168:22	177:13	186:11	195:16	204:13	213:18	222:20.75
0:58	110:01	119:15	128:12	137:07	146:04	155:04	163:59	172:59	181:56	190:50	199:42	208:37	217:28	226:13.16
0:57	109:09.	118:06	127:05	136:01	144:55	155:38	164:36	175:14	184:18	193:15	202:14	211:09	220:08	232:44.87
1:53	109:31	118:29	150:50	160:30	170:08	179:38	191:15	201:04	210:39	220:25	229:55	239:28 Running		
6:23	115:06	123:51	132:33	141:20	150:23	159:02	167:38	176:09 Stone in Shifting Quadrant						
7:01	115:43	126:31	135:06	143:35	152:05	160:44	170:39 Radiator							

ROM 231 TO 300 CUBIC INCHES—WON BY THE PULLMAN, NO. 10

2:	110:53	119:49	129:54	139:06	148:22	157:49	167:27	177:05	186:32	196:10	205:46	216:40	226:59	237:04
1:	120:34	130:07	139:39	149:08	161:43	171:18	180:51	190:20	199:56	209:36	219:11	228:49	238:22 Running	
1:06	131:08	141:10	151:13	163:26	173:41	183:47	193:52	205:09	215:10	225:09	235:18 Running			
6.15	104:59 Broke End of Housing Rear Axle													

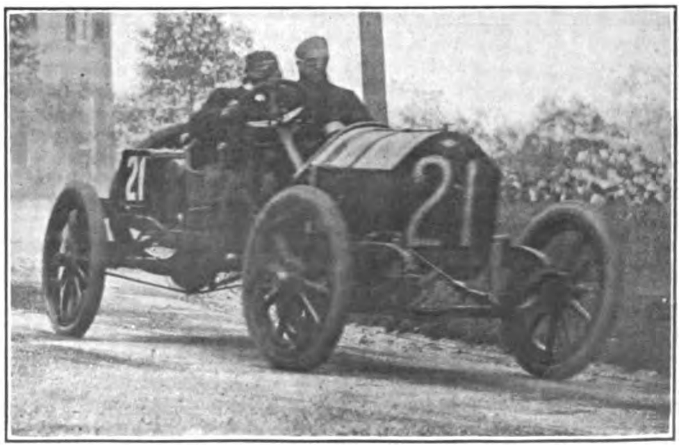
IOM 161 TO 230 CUBIC INCHES—WON BY THE ABBOTT-DETROIT, NO. 21

6:18	128:49	139:17	149:53	160:25	172:31	183:05	193:25	204:03	214:27	224:50	235:27 Won Its Class Running at Finish			
7:22	119:19	129:13	139:13	149:08	159:10	169:04	179:06	189:06	199:05 Threw Wheel					
1:27	143:57	153:24	162:55	172:51	184:22	197:05	206:40	216:06	225:46 Disqualified, 4 Men Changing Wheel					
1:43	119:52	130:57	143:19	151:43	162:07	172:58	193:25 Broke Spring Leaf							

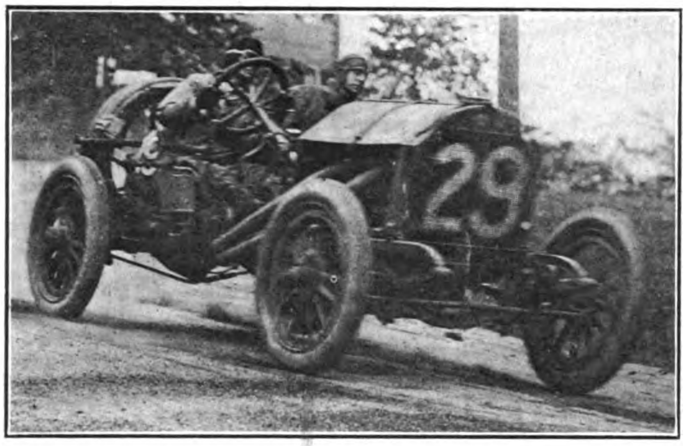
The story of the race by laps is rather complicated because of the fact that there were so many factors to be considered.

Starter Gantert made as perfect a job of getting the thirty-two cars away from the starting line as has ever been seen on a race course. The Apperson, No. 1, was first away and the Otto last, 5:10 after Hanshue's mount. Each car was given ten seconds headway. The fairness, exactness and perfection of the start was generally commented upon. Chadwick 25, led in elapsed time at the end of the round, in the fast time of 8:10. The Lozier was first to make the trip, leading past the stand, but its time was 8:32. Chadwick, 12, was third, a shade faster than the Marmon, 28, but both were credited with 8:43. National, 16, led in its class and Ford, 24, showed the way for the small cars.

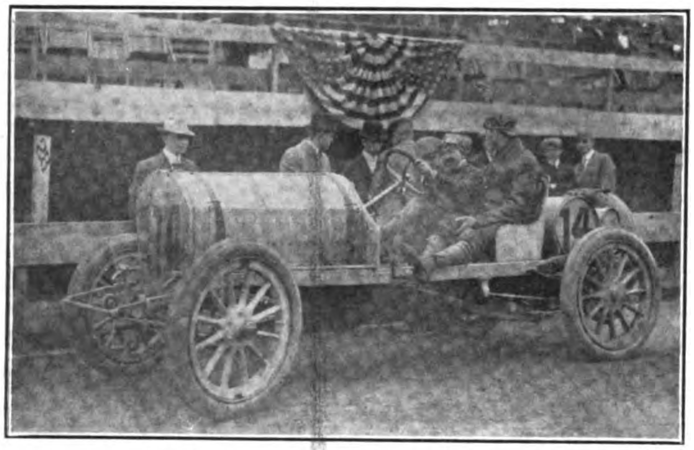
The Lozier assumed the lead in the second round with Stod-



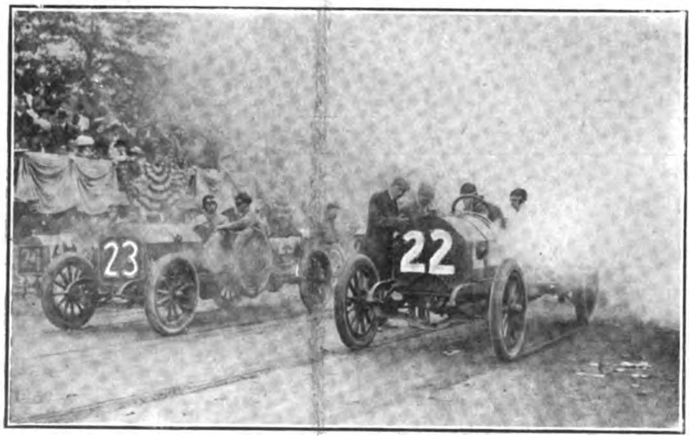
Abbott-Detroit car, No. 21, on Sweet Briar Hill



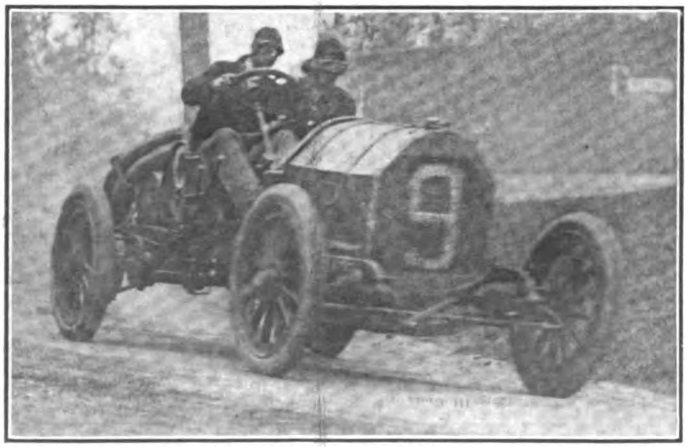
Stoddard-Dayton, No. 29, at Sweet Briar



Jackson car, with Cobe at the wheel



Simplex, 22—Beardsley; Westcott, 23—Knight



Apperson, No. 9, rounding into the Concourse

dard-Dayton, 29, Benz, 5, and Chadwick, 12, tied for the place positions.

In the third round, Chadwick, 25, regained the lead and held it for three laps, closely pressed by the Benz, 5, and the Lozier. In the sixth round Chadwick, 25, driven by Mitchell, was eliminated by plunging off the course and striking an embankment.

Benz, 5, driven by E. R. Bergdoll, went to the front in the sixth round and from there to the end of the fifteenth lap it set a fast pace, running about a mile a minute. At the end of that round it was leading the Lozier by 52 seconds; with the Chadwick, 12, in third place. National, 3, was fourth in point of speed and led its class by a wide margin. The Marmon that had run second in the Vanderbilt Cup had met with a mishap in the thirteenth round and the Pullman 10, had established a winning lead in Division 3C. Abbott-Detroit, 2, led Cole, 18, in their class. Marmon, 11, broke the lap record in the twelfth round with 7:38.

In the next round, the Benz broke an oil feed and was withdrawn, leaving the Lozier out in front with a comfortable lead over the Chadwick, 12. From this point to the finish it was a duel between these two such as has been rarely witnessed. For four laps the Chadwick gradually reduced the margin of about two minutes, and in the twentieth round it finished with an advantage of three seconds. It stayed in front through the next lap, but in the following round the Lozier got into the van once more, with three seconds to spare. The Chadwick seemed to have something in reserve, for whenever it reached the lead, the driver was signaled to take it easy. Nevertheless he was forced to make some exceedingly fast rounds at this stage through the beautiful steady speed of the Lozier. Lap 22 found the Lozier in front, but in the next round the Chadwick was ahead by one second. Lozier made the twenty-fourth lap in less than eight minutes and led its rival by nine seconds at the tape.

At the beginning of the last lap there were still thirteen cars left in the race, and word was given that enough cars would be given a free course to finish as would be necessary to decide upon a winner in each class. As has been said, the Chadwick won the grand prize and its class in record-breaking time, but the race was not called off until Abbott-Detroit, 21, had finished 22 laps and was running perfectly, without any opposition.

The National, winner in Division 4C, ran steadily and well throughout. The Westcott, 23, completed the full course in this division as did also the Jackson, 14.

Pullman, 10, was the only car to finish in Division 3C, but Mercer, 15, and Otto, 32, were both running perfectly at the end.

The Abbott-Detroit, winner of the 2C prize and trophy, had a stormy passage. Both Cole entries succumbed to mechanical troubles before the end and the Ford was disqualified for using four men to replace a wheel in lap 20. Abbott-Detroit, 6, had dropped out early with ignition troubles and Abbott-Detroit, 2, had shed a wheel while far in the lead in lap 20. This left Abbott-Detroit, 21, a certain winner, and when the victors in the larger class had been determined, Padula was given the checkered flag while still three laps from home.

The race was conducted as usual by the Quaker City Motor Club. Harry C. Harbach, secretary, was responsible for the preliminary arrangements, all of which worked out to a mathematical nicety. The timing, scoring, starting, judging and everything connected with the race was well done in an orderly manner. The police arrangements would command admiration anywhere. The technical committee, under the supervision of A. L. McMurtry, was quick and decisive in its actions. In order to show how carefully the committee did its work, it may be cited that the winning Pullman car was given the white flag in one of the later rounds by Mr. McMurtry, when it was noted that a tire carrier was dragging from the rear springs. At the time the car was struggling for the lead in its class and this peremptory action might have caused it to lose. But the committee figured that it is better to be safe than sorry, and the Pullman had to stop and adjust the dislodged part and won anyway. R. E. Ross was referee. Something like $11,000 was realized for charity by the sale of grandstand seats and concessions.

1910 Edison Storage Battery

FIRST INSTALLMENT—WALTER E. HOLLAND DELIVERED A PAPER BEFORE THE TWENTY-SIXTH ANNUAL MEETING OF THE ASSOCIATION OF EDISON ILLUMINATING COMPANIES HELD AT FRONTENAC, THOUSAND ISLANDS, N. Y., SEPTEMBER 6, 7 AND 8, 1910, OF WHICH THIS IS AN ABSTRACT

ANNUALLY the Association of Edison Illuminating Companies meet for the purpose of reviewing the past and outlining the future for the good of the service. Among the problems that have to be coped with is the "peak load" as it relates to the long hours during the day when the machinery that is necessary to cope with the "peak load" lies in idleness, or at least operating far below rated capacity. Any demand of sufficient moment to serve as a loading factor that can be so regulated that it will come during the long hours of the day, excepting at the time of peak loading, presents unusually attractive possibilities, and it is on this account that the central stations throughout the land look to the electric vehicle with a favorable eye.

In the presentation of this paper, Walter E. Holland, of the Edison Storage Battery Company, owing to his great familiarity with subjects akin to the central station problem, mindful of the possibilities of the new Edison storage battery, and appreciating the professional keenness of his audience, presented relating matter in concise and technical form, some of which will scarcely be of immediate interest to automobilists in general, but an attempt will be made here to differentiate sufficiently to permit readers of THE AUTOMOBILE to arrive at some of the reasons why the time taken to develop the Edison storage battery to its present state of perfection was not unduly long, especially if it will be remembered that M. Gaston Planté started out to commercialize lead-lead batteries in 1861, and a coterie of eminent physicists worked upon the problem from that day to this, notable among whom mention will be made of Emil Fure, who brought out his modification of the lead-lead battery in 1879, not forgetting that Brush patented the paste, paint, or cément idea in 1881; and it is this modification of the lead-lead battery that ultimately became prominent in electric vehicle work, it being the case that the original Planté type of battery would scarcely deliver more than three to four watts per pound, and it was a great stride in the direction of commercial acceptability when Charles F. Brush introduced modifications that made it possible to realize as much as eight watts per pound of elements on a sufficiently stable basis to render the electric vehicle a factor, despite the wonderful possibilities that reside in the internal combustion motor as it is at present used in gasoline automobile work.

Thomas A. Edison, with his customary penetration, tersely points out that the first thing to do in the final solution of the electric vehicle problem, assuming that the battery is available, is to establish a charging plug outside of the door, in an accessible position, of every electric central station in America. As Mr. Edison said, "The charging facilities must come first; the automobilist will decline to put his money into a vehicle that cannot be charged with certainty at a sufficiently large number of points along the road to serve his purpose." Mr. Edison also said: "Central station managers everywhere have the capacity for charging vehicle batteries as a by-product, and the cost to them of building a 'lean-to' to serve as a protecting shed for automobiles when they come to be charged, together with the cost of installing charging plugs, is so slight, and the advantage is so obviously great, that it is a mere matter of telling them about it to get them to fall into line."

One of the great advantages of annual meetings of the managers of central stations lies in the concerted action that can be taken when the propitious time arrives, and Mr. Edison made the point that it is now only a matter of a few brief months when charging facilities will be afforded by the small central stations in the little hamlets betwixt great centers, as well as at the larger stations that now cater to the automobilist and find him a profitable customer because he comes for his "charge" and takes away a by-product.

Among the many other interesting points that were brought out at a recent interview, the rather naive way that Mr. Edison took advantage of in offering a broad justification for the future of the electric vehicle may appeal to the automobilist, who, while perfectly satisfied with himself and the position he occupies, may not be averse to having his intellect tickled by the inference that there must be something in it since gasoline costs $32 per ton, and steaming coal, such as is used by central station companies, is at a premium price when the cost is one-eighth of the price of gasoline.

The central station man has in his possession two fundamental reasons why he can afford to make concessions to the automobilist who wants a charge for his battery. The first reason is that he has his machinery lying in idleness (90 per cent. of it) 22 hours out of every 24. The second ground for his interest presents itself when the fact is taken into account that what the central station man really sells is the energy that he abstracts from coal, putting it in the form of electricity, the cost of which to him is represented by the cost of the coal per ton, plus the money he puts into it in making the conversion from the energy as it resides in coal to the electric energy that he pours into the battery when the automobilist comes for his charge. It would be a far stretch of the imagination were the incidental costs which must be added to the initial cost of the coal to expand sufficiently to make heavy inroads into the ton price of gasoline. The margin is insurmountably wide and the central station man

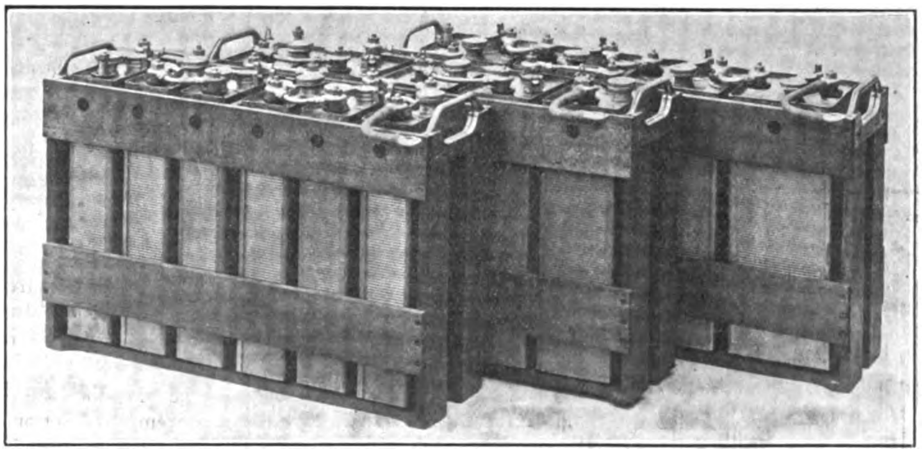


Fig. 1—The Edison vehicle battery, showing how six cells of battery are joined and assembled in crates

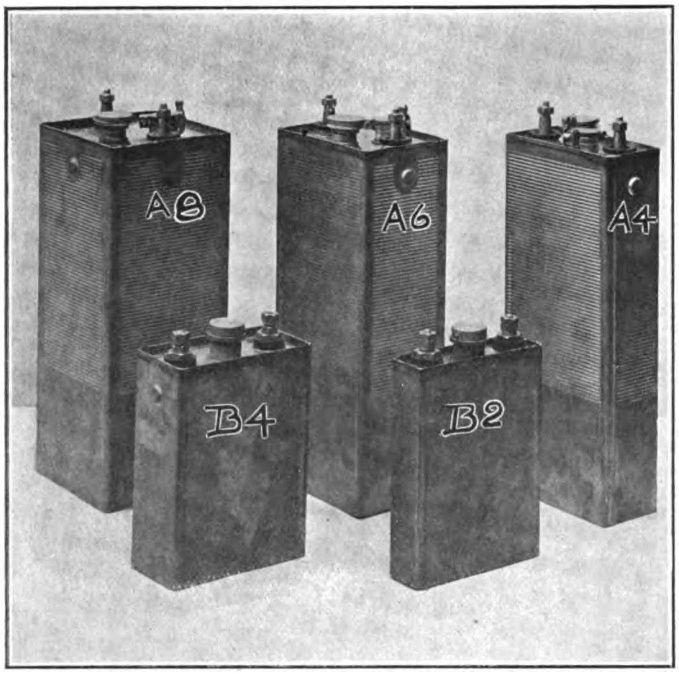


Fig 2—Showing the five sizes of cells, as used in general service, transportation, lighting and ignition work

is in a position to compete with gasoline, and as Mr. Edison concluded, when he said, "it puts the whole burden on the battery—with a good battery that will not wear out, there is nothing left but to bask in the sunlight of prosperity."

Many Obstructions Put in the Way of the Battery

Keeping in mind the difference between batteries as used in central station work and the battery problem as it is slowly being worked out for transportation purposes, it is more to the point to clearly state the impeding influences and indicate how they are being coped with than it will be to simply assume that a battery with a satisfactory output per pound of material used will serve for vehicle purposes, disregarding the thousand and one other things that stand in the way of success. There is more significance to be attached to Mr. Edison's process of elimination than rightfully belongs to the fact that Mr. Edison as an inventor of repute has patented and is commercializing a type of storage battery.

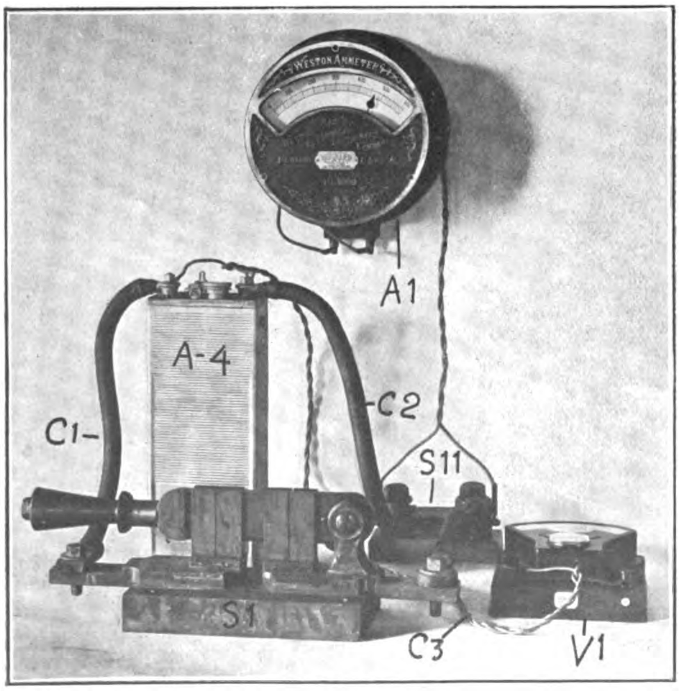


Fig. 4—Apparatus used in short-circuiting test

The history of the patent offices in the various civilized countries is largely composed of that character of historical material that clearly describes all the generic types and modifications of storage batteries that have failed to do satisfactory vehicle work. "The proof of the pudding lies in the eating of it." There are two parts of this pudding that would induce acute indigestion for the eater. The most conspicuous part of the moment is in the guise of the relatively large number of gasoline automobiles in proportion to the relatively small number of electric vehicles to be had. The second consideration takes into account the enormous amount of money that has been wasted in storage battery work and the relatively poor results obtained therefrom.

When Mr. Edison states that the future of the electric vehicle is clearly incumbent upon the battery he reiterates a situation that history proves, not forgetting, however, that there are so many good things to be said in favor of electric vehicles that despite storage battery imperfections they have survived and are looked upon by the average autoist as entirely satisfactory under certain conditions, approximately competitive under other conditions, leaving it for the storage battery in its final perfected form to extend their radius of travel and place at the disposal of those who desire to tour, using electric vehicles that will take them where they want to go, means of obtaining a charge at the end of each day's run wherever they happen to be.

A very significant statement made by Mr. Edison may be restated as follows: "When the storage battery reaches a state of perfection where it will furnish all the energy required to propel a car for a whole day there remains nothing to be desired." Obviously, a tourist who wants to keep on the go day and night will find a Pullman car much more to his liking. Moreover, there is no profit to be derived from the supplying of automobiles to men who want more than can be a reasonable expectation from even a railway locomotive. In railway work the locomotives are treated with precisely the same consideration as a horse—when they do their allotted work per day they are groomed, stalled and permitted to rest. Unless the men who use electric vehicles can be brought to understand the reasons why even locomotives are treated with the consideration that is accorded a horse, it is not profitable to do business with them.

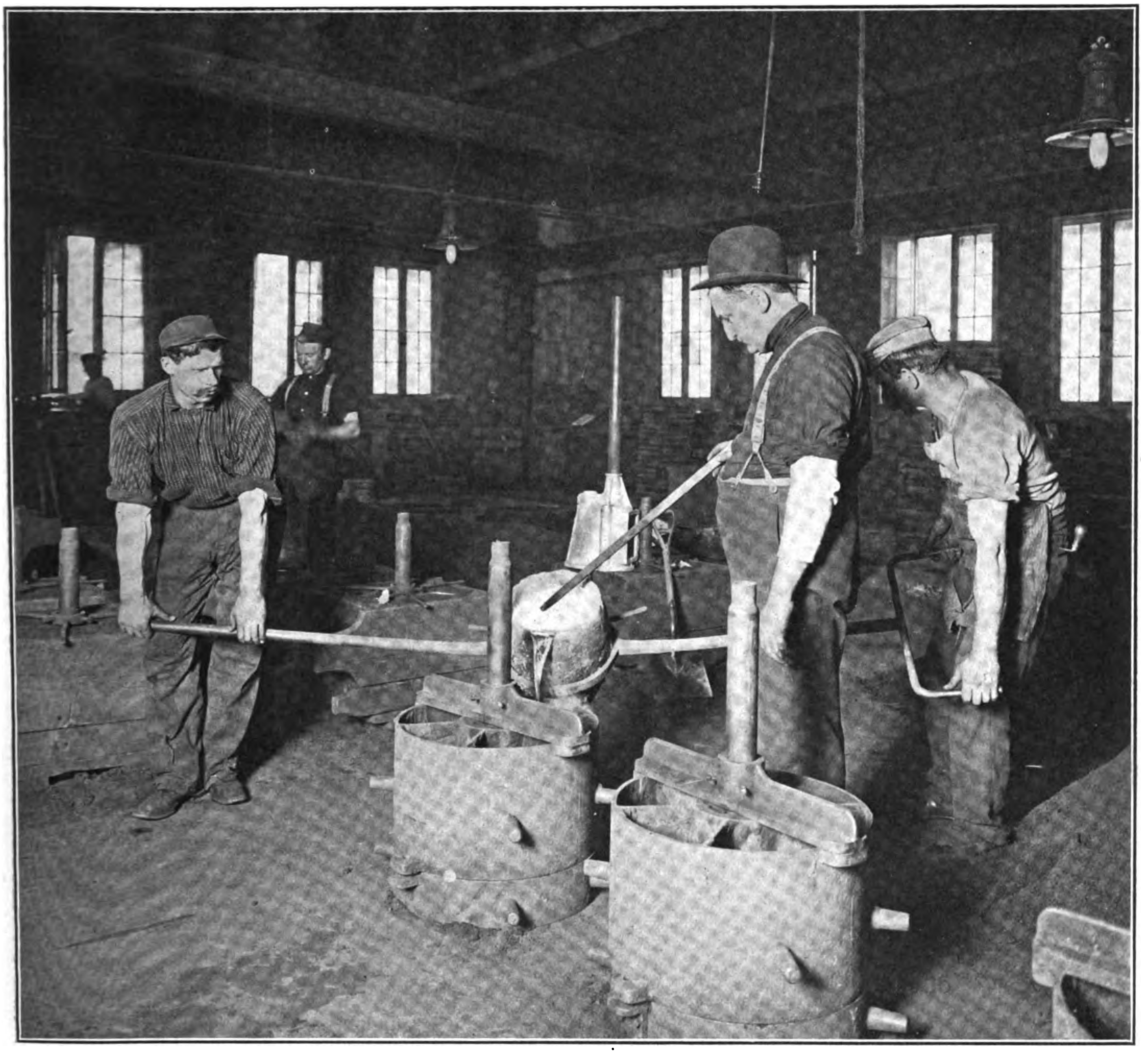
Narrowing the discussion down to the specific differences between the conditions of service that storage batteries render in central station work as compared with that of transportation, it must first be pointed out that in central-station battery service the batteries are installed under the most precise conditions in well-lighted and properly ventilated rooms, and experts attend them day and night, year in and year out, giving them a precise charge at the right moment, as indicated scientifically with instruments of precision designed for the purpose and performing all the other duties as based upon electrochemical considerations that experience has proven to be efficacious in the prolonging of life, limiting the delivery of current to that which is good for the battery from the life point of view, rather than to compel the battery to serve under severe conditions.

Turning the attention to transportation service for the moment, it is simple to point out that the installation is made in a vehicle that has to negotiate all sorts and conditions of roads under speed variations that are only under the control of men who entirely disregard everything but the point, *i.e.* they wish to go somewhere, or they are on their way back. The battery is subjected to vibration, shock and jar, and the expert who watches the central station battery hour after hour and utilizes instruments of precision for determining everything about it is far away. The great primal consideraton is entirely lost sight of; instead of the battery being limited in its output to that which is good for it from the life point of view, as in central station work, it is required to furnish all the current that is necessary under operative road conditions, entirely disregarding its rated capacity, or the state of its charge.

(*Continued on page 644*)

Among the Makers

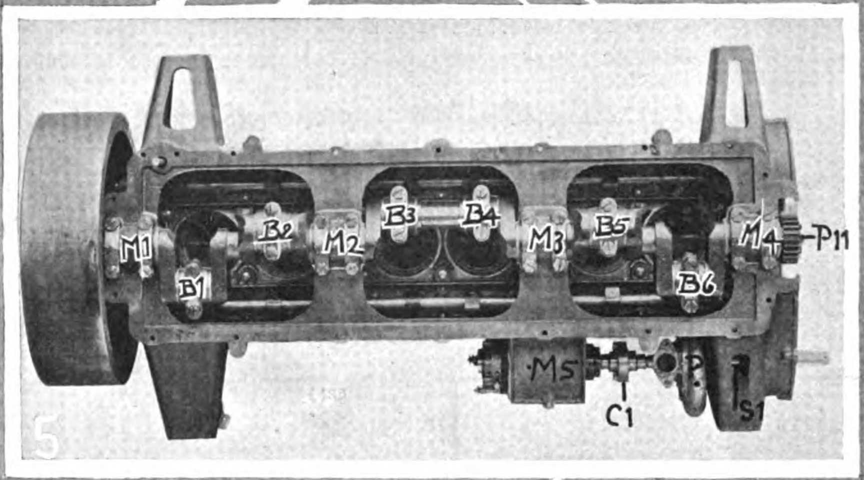
THE PREMIER LINE FOR 1911 BEARS EVIDENCE OF MANY REFINEMENTS—THE ACME S. G. V. FOR NEXT YEAR A DISTINCT INNOVATION—THE ROADER CAR A NEWCOMER



IN THE FOUNDRY DEPARTMENT OF THE RAMBLER SHOP AT KENOSHA, WIS.

MARKET conditions are now quite cleared up; the bankers who were so much concerned a few weeks ago are quite calm, and from what can be seen by those who make a practice of looking below the surface the automobile situation is on a firmer basis than ever. For the benefit of those who may not have followed the situation closely it may not be out of place to point out that the makers are preparing in a serious way for the struggle that competition is bringing, but it is fortunate for the purchasing public that quality, instead of suffering, is bound to be improved, the reason for this lying in the preparing for better work.

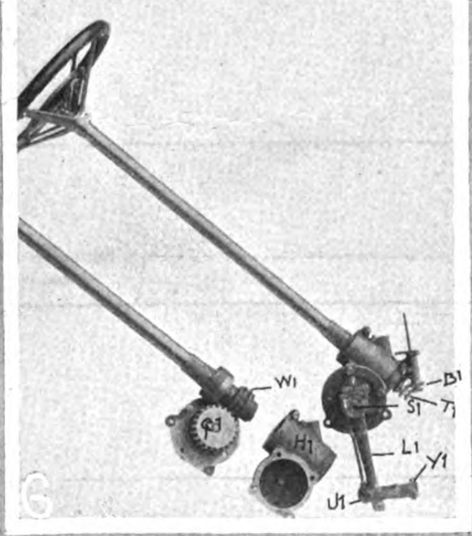
One of the most troublesome branches of the automobile business from the makers' point of view lies in the foundry problem. The procuring of good castings has caused many a maker to go abroad for them, and it has been found that the outside foundry is better able to cope with the "grate bar" problem than it is to turn out good cylinders. That which is true of cylinder castings is equally to be remembered when reference is had to aluminum castings, and the 1911 method of disposing of the troublesome feature attending is to own and operate a foundry in connection with the making of the automobiles.

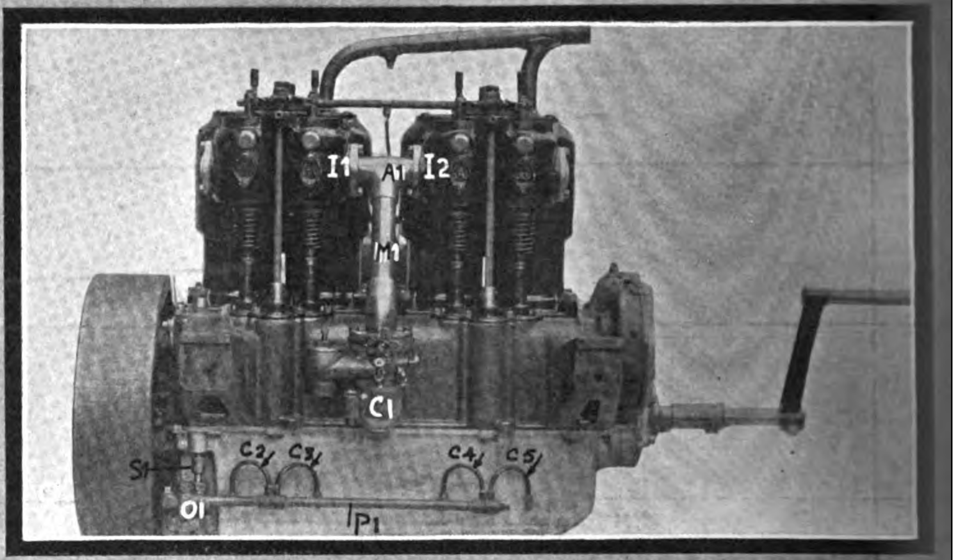


1911 Premiers

TAKING advantage of experience, utilizing the broad foundation which resulted in the Premier car as it is now generally understood, the 1911 models are offered by the Premier Motor Manufacturing Company, Indianapolis, Ind., subject to the refinements of a year, retaining the general plan, and the mechanisms that have proven to be the most substantial. As the table on another page shows, the 4-40 model affords five options, beginning with the "Touring Clubman," including the Limousine and Roadster, while the 6-60 model is in four options beginning with a "Clubman," including Roadster, Touring and Limousine models. The general appearance of the finished cars may be gleaned from a study of Fig. 1, which is a front view of the 6-60 Touring car; Fig. 2, which is the 4-40 Touring car, three-quarter view, and Fig. 3, which is a side view of the 6-60 Touring car, and it will be observed that all three models of this car are of the latest and most approved fore-door designs, with overhanging cowl and a dashing effect generally.

From a mechanical point of view, the several models have a certain similarity; it has been found that a principle that works well in one model is good for the





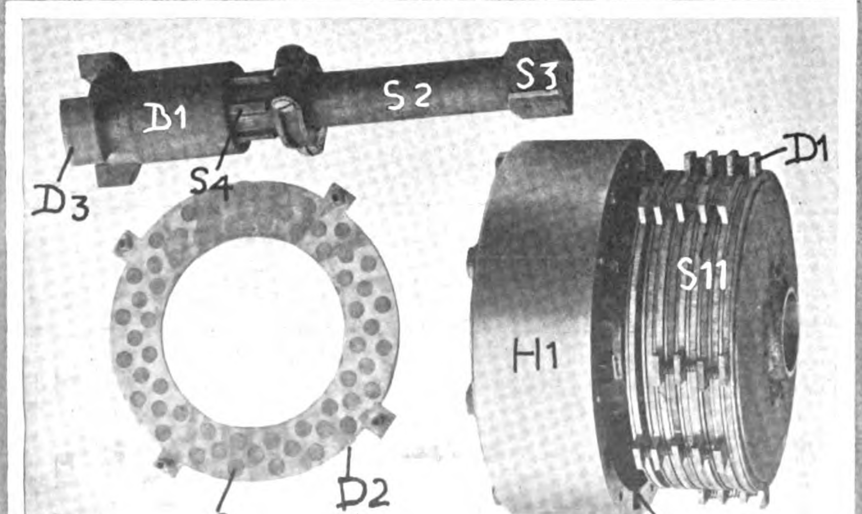


Fig. 5—Six-Sixty motor turned upside down, with lower half removed

Fig. 6—Worm-and-sector type of steering gear with the parts removed

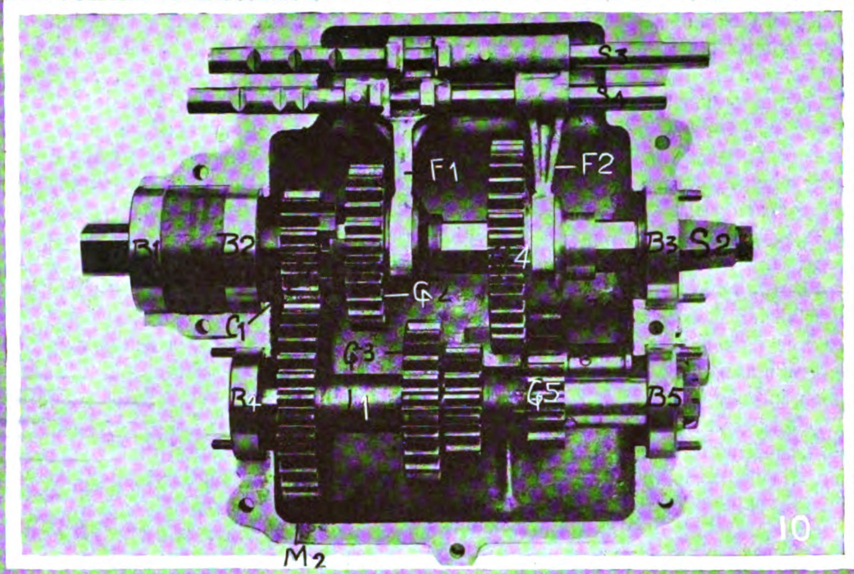
Fig. 7—Presenting the multiple-disc clutch, clutch shaft and housing

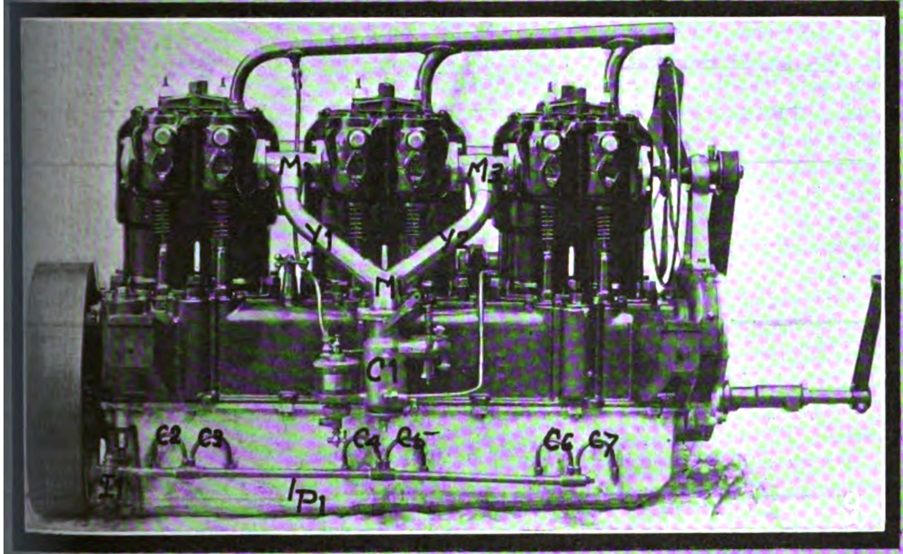
Fig. 8—Right side of Four-Forty motor

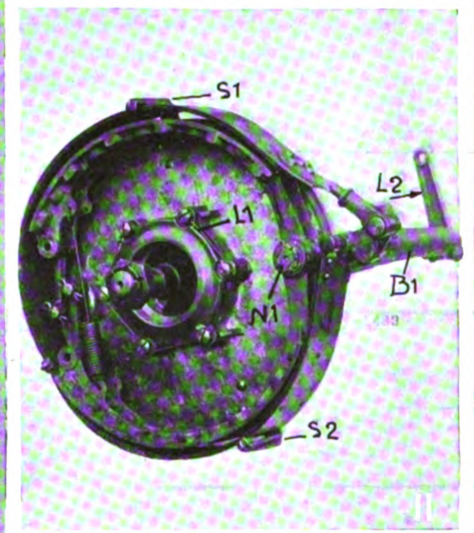
INCLUDING 4-40 FOUR-CYLINDER AND 6-60 SIX-CYLINDER MODELS

other, and Fig. 4 is offered as an illustration of the general plan mechanically, this being of the 4-40 model showing the motor M1, flywheel F1, multiple disc clutch C1, clutch control shaft S1, clutch pedal P1, service brake pedal P2, transmission gear G1, control shaft S2, steering gear G2, transmission side lever L1, and an emergency brake lever L2. Attention is called to the width of flanging F2 of the chassis frame, at the point of narrowing, also to the depth of the frame and the use of pressed steel footboard irons I1. It will be to the point to observe how the lateral L3 is fastened to the side member at the point L4, utilizing a secondary stiffener from the lateral L3 forward to afford a substantial platform for the machinery equipment.

With the general arrangement and scheme of design fixed in the mind's eye, it will be in order to take up with the mechanical detail in which the 4-40 has two pairs of cylinders with a bore of 4 1-2 inches and a stroke of 5 1-4 inches. The 6-60 is provided with three pairs of these cylinders. The only difference then between the 4-40 and the 6-60, from the cylinder point of view, lies in the use of six cylinders instead







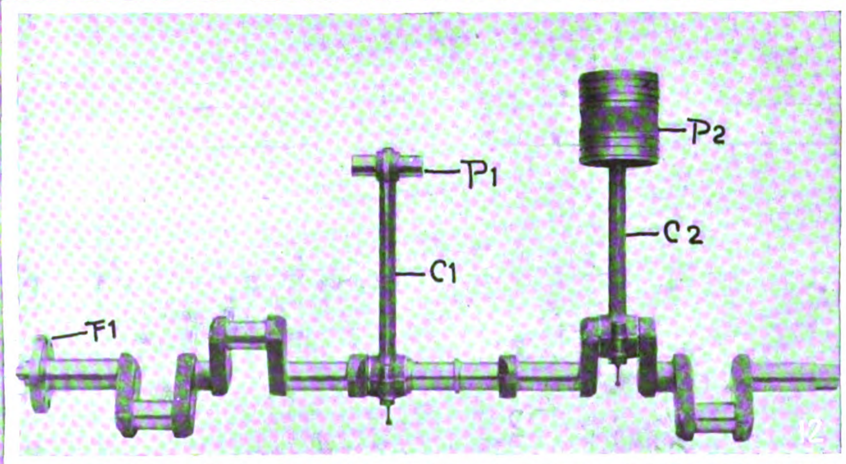


Fig. 9—Looking at the right-hand side of the Six-Sixty motor

Fig. 10—Looking into the three-speed and reverse selective transmission gear

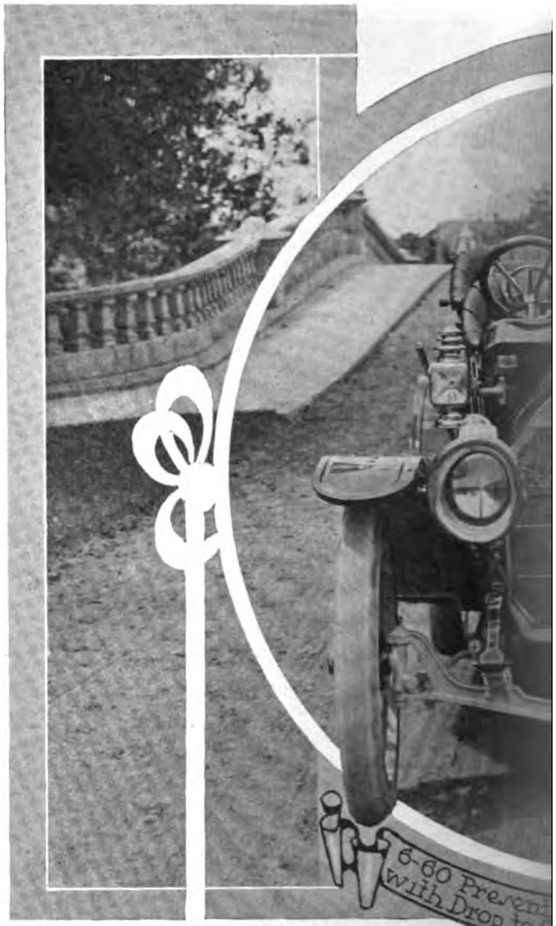
Fig. 11—Details of the brakedrum and brakeshoes on live rear axle

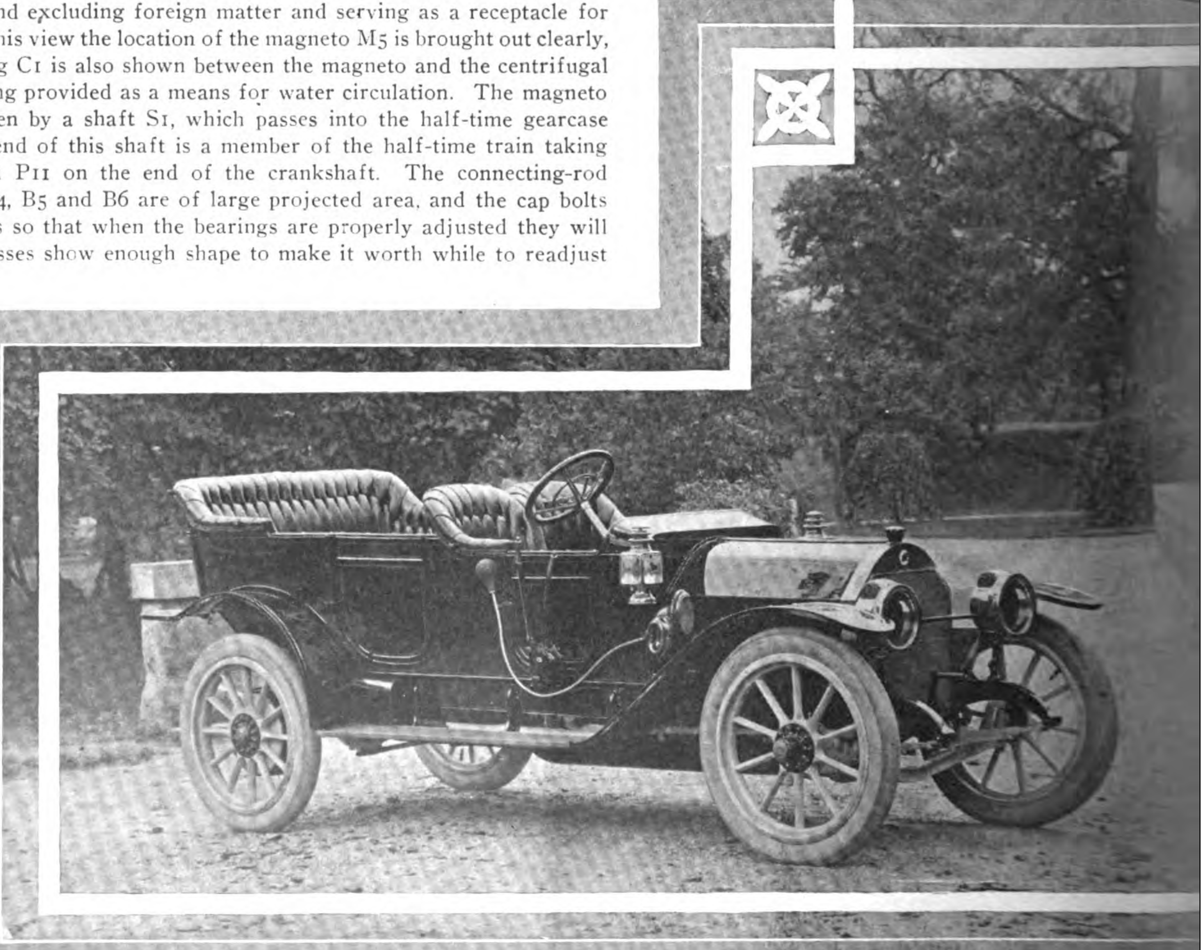
Fig. 12—Crankshaft of the Six-Sixty motor

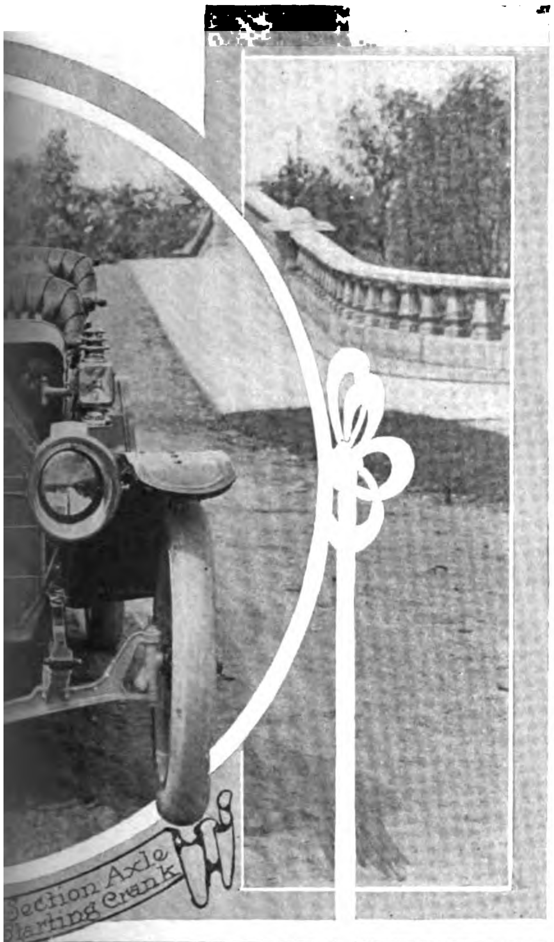
of four. The general appearance of the 4-40 motor is shown in Fig. 8, looking at it from the right-hand side, with a Wheeler & Schebler carbureter C1 located in the mid position, and the manifold M1 leading straight up to an accommodation piece A1, placed between the two pairs of cylinders, flanging to the sides of the intakes I1 and I2, thus making the intake non-tortuous, and particularly adapted for the good work expected of it. The oil pump O1 also shows on this side of the motor with the surplus of oil carried in the lower half of the crankcase, below the level of the pipe P1, and the connections C2, C3, C4 and C5 transfer the oil from the pipe P1 to the respective oilways within, whence the oil is distributed to all the bearing surfaces. This system of lubrication is known as "the return circulating system," and the pump O1, which is driven by means of a gear on the camshaft, with a vertical shaft and a sleeve connection at S1, is of the centrifugal type, while the oil supply in the lower half of the crankcase is equal to about three gallons, and it has been found in practice that the miles per filling of the lubricant is between 500 and 750. There is a sight-feed glass on the dash, which serves as a tell-tale, and the lubricating oil is poured into the lower half of the crankcase through a large opening in one of the crankcase arms.

Referring now to the 6-60 motor as shown in Fig. 9, the similarity of general design will be rendered at once apparent. The carbureter C1 is located in the mid position and the manifold M1 has a branch Y1 to the left, and a similar branch Y2 to the right, leading to a makeup M2 between the back two pairs of cylinders, and a similar makeup M3 leading up between the front two pairs of cylinders. Mixture is distributed to the respective cylinders through transfer ports within the twin castings, and this scheme of distribution of mixture has been found to eliminate the troubles that are generally threatening in connection with six-cylinder work. In the lower half of the crankcase just in front of the flywheel the oil pump I1 is located precisely as in the 4-40 motor, and the supply pipe P1 occupies a similar location with the distribution of oil to the respective feed points through the connections C2, C3, C4, C5, C6 and C7, the only difference being that there are two additional connections. The oil pump is driven by a vertical shaft to a gear from the camshaft; the oil is spilled into the lower half of the crankcase through a commodious opening in one leg.

Referring to Fig. 5 of the 6-60 motor, it is turned upside down with the lower half of the crankcase removed, showing the main bearings M1, M2, M3 and M4 with caps carrying the crankshaft on the upper half, thus freeing the lower half of any responsibility beyond excluding foreign matter and serving as a receptacle for the lubricating oil. In this view the location of the magneto M5 is brought out clearly, and the flexible coupling C1 is also shown between the magneto and the centrifugal pump P1, the latter being provided as a means for water circulation. The magneto and the pump are driven by a shaft S1, which passes into the half-time gearcase and the pinion on the end of this shaft is a member of the half-time train taking power from the pinion P11 on the end of the crankshaft. The connecting-rod bearings B1, B2, B3, B4, B5 and B6 are of large projected area, and the cap bolts are provided with locks so that when the bearings are properly adjusted they will remain so until the brasses show enough shape to make it worth while to readjust


6-60 Presen
with Drop to


4-40 with Fore-Door Type of Body, Wide Tonneau Entrance and Over-hanging Cowl



Section Axle Starting Crank

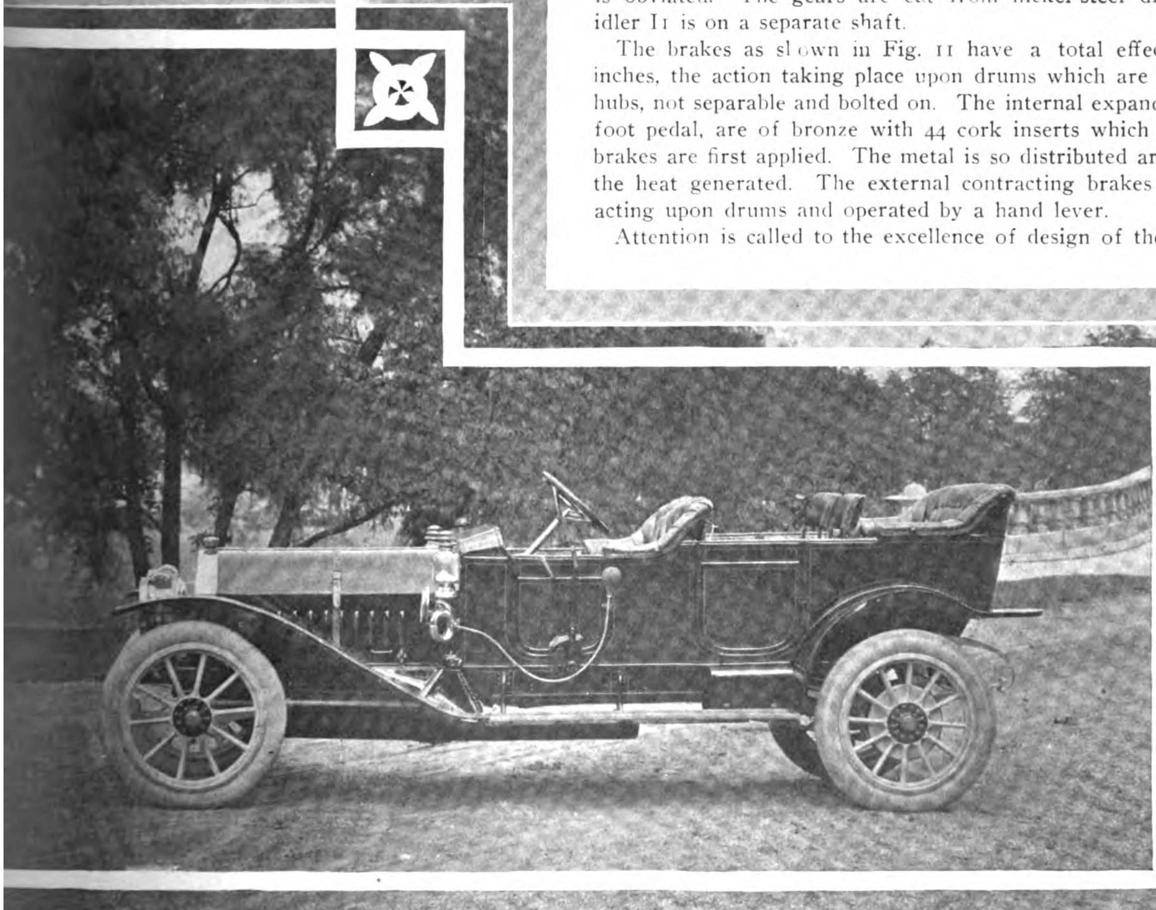
them, but the adjusting operation may be done with but slight labor. Fig. 12 shows the six-cylinder crankshaft removed from the crankcase, and presents one of the connecting rods C1 with the crosshead pin P1 integral, and another of the connecting rods C2 with a piston P2 attached, presenting to view the oil grooves at the lower extremity of the piston, and the piston rings at the upper extremity. The piston is backed off for a part of the distance in the region of the cross-head pin and attention is called to the fact that the construction is light, but care is exercised to afford the requisite strength to prevent deformation under service conditions. The crankshaft is flanged F1 for the flywheel, and the throws are very wide at right angles to the axis, which, together with the use of a fine grade of crankshaft steel and accurate finishing methods, including grinding, bespeaks continuity of service.

The multiple disc clutch is shown in Fig. 7, in which the housing H1 is provided with inverted splines S1 to accommodate the driving extensions D1 and springs S11 are placed between the respective discs for the purpose of separating them when the clutch is disengaged. One of the clutch discs D2 is shown at the left with cork inserts C1 occupying about 20 per cent. of the total area. The clutch shaft S2 has a square end S3 and integral splines S4 with a spline block B1 and integral dogs D3. There are 21 plates having cork inserts and the housing H1 is oil tight into which oil is placed for purposes of lubrication. Driving is done through the housing H1, so that the clutching members that have peripheral extensions engaging the slots S1 take the initial work, and the mating members transfer the load to the shaft S2 Fig. 7, thence to the transmission gear as shown in Fig. 10.

Referring to Fig. 10 of the transmission, it is of the three-speed and reverse selective type with a direct drive on high through the clutch C1, with master gears M1 and M2 imparting motion from the stub shaft S1 to the lay shaft L1, and when the gear G2 meshes with the gear G3 the drive is through M1 to M2, thence through L1 to G3, transferring to G2, and through the prime shaft S2 to the propeller shaft, live rear axle wheels to the point of contact of the tires with the road. To go into low gear, the sliding gear G4 engages the pinion G5 and the drive is through M1, M2, L1, to G5, transferring to G4, thence to S2 and back through the propeller shaft, etc. Sliding of the gears is accomplished by the selectors S3 and S4, using forks F1 and F2. Annular type ball-bearings B1, B2, B3, B4 and B5 support the spindles, which are relatively short and stubby so that deformation is obviated. The gears are cut from nickel-steel drop forgings. The reverse idler I1 is on a separate shaft.

The brakes as shown in Fig. 11 have a total effective surface of 526 square inches, the action taking place upon drums which are integral parts of the wheel hubs, not separable and bolted on. The internal expanding brakes, operated by the foot pedal, are of bronze with 44 cork inserts which act as a cushion when the brakes are first applied. The metal is so distributed around the cork as to radiate the heat generated. The external contracting brakes are fiber-lined steel bands acting upon drums and operated by a hand lever.

Attention is called to the excellence of design of the details and to the locking



6-60 Touring Car with a Fore-Door Body Overhanging Cowl Seating Seven

SPECIFICATIONS FOR PREMIER

MODELS	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		Lubrication
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radi- ator	Pump	Mag- neto	Battery	
Model 4–40......	$3000	32.4	Tour'g*	4	4	4½	5¼	Pairs..	Cellular..	Cent'fl...	High t §.	P'mpelly	Pump
Model 4–40......	3050	32.4	Tour'g*	5	4	4½	5¼	Pairs..	Cellular.	Cent'fl...	Low t...	None....	Pump
Model 4–40......	3100	32.4	Tour'g*	7	4	4½	5¼	Pairs..	Cellular .	Cent'fl...	Low t...	P'mpelly	Pump
Model 4–40......	4200	32.4	Limous.	5†	4	4½	5¼	Pairs..	Cellular .	Cent'fl...	High t....	P'mpelly	Pump
Model 4–40......	2800	32.6	R'ster...	2‡	4	4½	5¼	Pairs..	Cellular .	Cent'fl...	High t. .	P'mpelly	Pump
Model 6–60......	3500	48.6	Clubm .	2	6	4½	5¼	Pairs..	Cellular .	Cent'fl...	High t....	P'mpelly	Pump
Model 6–60......	3600	48.6	R'ster...	3	6	4½	5¼	Pairs..	Cellular .	Cent'fl ..	Low t...	P'mpelly	Pump
Model 6–60......	3650	48.6	Tour'g.	7	6	4½	5¼	Pairs..	Cellular .	Cent'fl ..	Low t.....	P'mpelly	Pump
Model 6–60......	5000	48.6	Limous.	7	6	4½	5¼	Pairs..	Cellular .	Cent'fl ..	High t....	P'mpelly	Pump

*"Touring Clubman." † or 6 or 7. ‡ or 3.

wires L1 with castellated nuts N1 and limit stops S1 and S2, also the long bearing B1 and the drop-forged lever L2.

The steering gear is shown in Fig. 6, it being of the worm-and-sector type with a hardened worm W1 engaging the worm gear G1, enclosed in the housing H1 with a square end shaft S1, and a split hub drop-forged lever L1 with a universal joint U1 in combination with a yoke Y1 connecting with the drag rod. The workmanship throughout is on a high plane and lost motion is absent. The spark and lever control are cared for by means of a pair of beveled sets B1, connecting with a concentric rod and tube T1 leading to the spark and throttle levers on the top of the steering wheel, of Circassian walnut, mounted on a strong spider.

The power is delivered from the transmission to the rear axle by a cardan shaft of liberal size, equipped with two combination slip and universal joints which are packed in grease, and in use over extended periods have given entire satisfaction and excellent service. According to mechanical laws rotary motion can be transmitted uniformly only by two universal joints. At the ends of the driving or propeller shaft are found features of self-evident value, though they have rarely been used in motor cars. These are tapered squares which fit into tapered square holes in the universal joints, and to cut the latter from a solid block of metal was considered impossible until done by Premier engineers. The tapered square system gives a positive connection and is always sure to be of the proper tightness, and is a material advance over the use of a round tapered shaft with key and keyway. The torsion rod is of the double-tube type with the front end retained in a spring-cushioned ball joint.

The rear axle is internally ribbed and needs no external truss rods. It is especially strong under the spring seats where the largest strain occurs, and ensures absolute alignment of bearings under all conditions. The differential is of the bevel gear type and upon it is mounted the main driving gear, which is adjustable laterally, and into it meshes the pinion which is adjustable longitudinally. Eight anti-friction bearings are used in the assembling. The pinion is forged solid with the shaft, contrary to the practice of keying it, and is mounted between two imported annular bearings instead of having both bearings on the front end and leaving the rear unsupported.

At the ends of the axle housing are the brake supports, rigidly attached and hot-riveted. The live axles have three integral large diameter clutch jaws which engage with three clutch jaws on the hubs of the wheels. A liberal annular bearing is placed almost in the direct load carrying center of each rear wheel.

The front axles are single-drop forgings of the Elliott type,

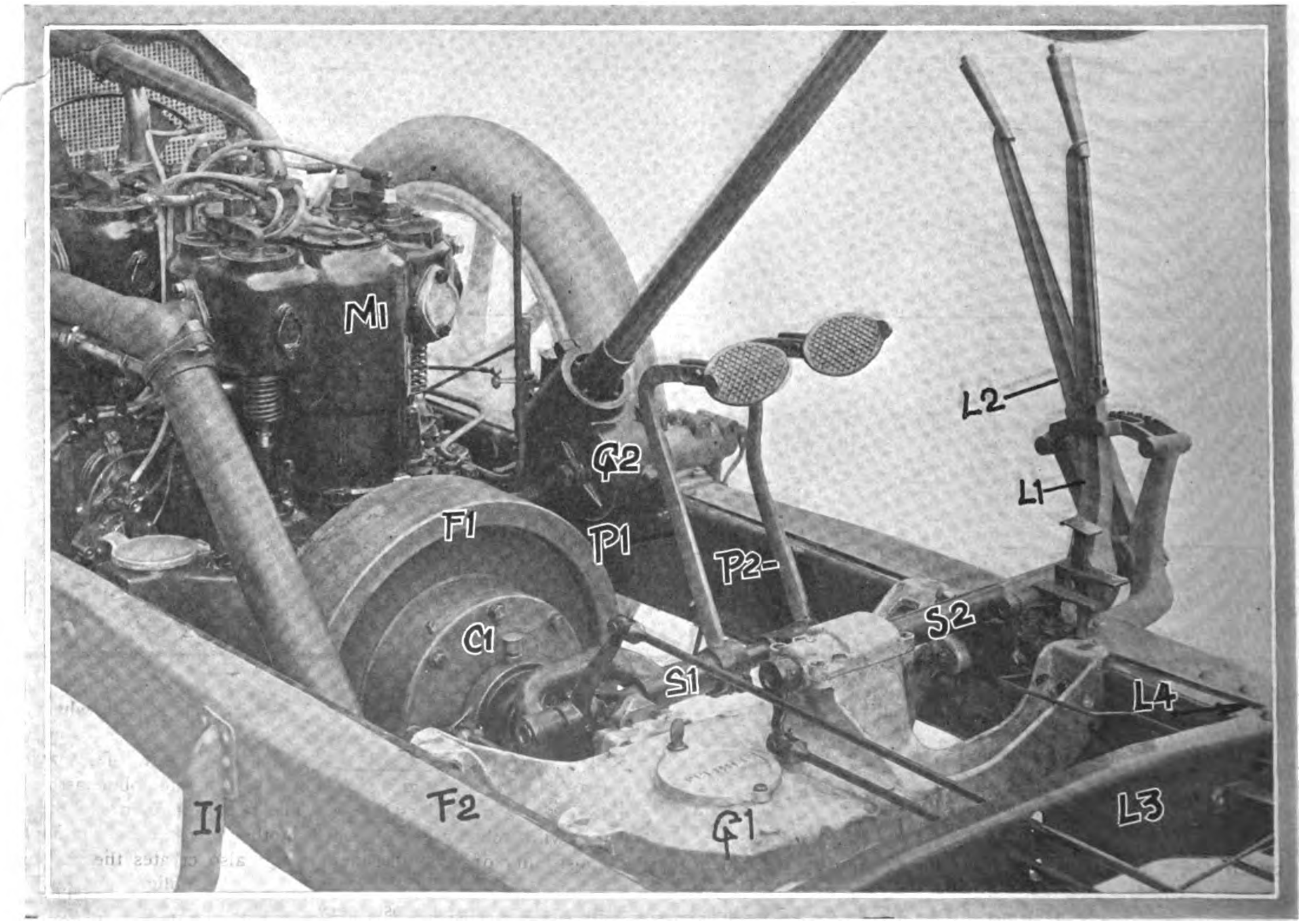


Fig. 4—Looking down on the chassis of the Premier 4-40, showing the location of the motor, enclosed multiple-disc clutch, suspension of the transmission, and strengthening of the frame at the point of narrowing

ARS AS OFFERED FOR 1911

	TRANSMISSION							BEARINGS				TIRES	
	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Trans-mis'n	Axle	Weight	Front	Rear
disc.	Selecti'e.	3	Motor..	Shaft...	126	56½	P. Steel.	3 Plain.	5 Ball...	Ball & r	....	36x4½	36x4½
disc.	Selecti'e.	3	Motor..	Shaft...	126	56½	P. Steel.	3 Plain.	5 Ball..	Ball & r	....	36x4½	36x4½
disc.	Selecti'e.	3	Motor..	Shaft...	126	56½	P. Steel.	3 Plain.	5 Ball..	Ball & r	....	36x4½	36x4½
disc.	Selecti'e.	3	Motor..	Shaft...	126	56½	P. Steel.	3 Plain.	5 Ball..	Ball & r	....	36x4½	36x4½
disc.	Selecti'e.	3	Motor..	Shaft...	126	56½	P. Steel.	3 Plain.	5 Ball..	Ball & r	....	36x4½	36x4½
disc.	Selecti'e.	3	Motor..	Shaft...	140	56½	P. Steel.	4 Plain.	5 Ball..	Ball & r	....	36x4½	36x5
disc.	Selecti'e.	3	Motor..	Shaft...	140	56½	P. Steel.	4 Plain.	5 Ball..	Ball & r	....	36x4½	36x5
disc.	Selecti'e.	3	Motor..	Shaft...	140	56½	P. Steel	4 Plain.	5 Ball..	Ball & r	....	36x4½	36x5
disc.	Selecti'e.	3	Motor..	Shaft. .	140	56½	P. Steel.	4 Plain.	5 Ball..	Ball & r	....	36x4½	36x5

All magnetos are of the Bosch make.

and it is interesting to note that the Premier Company was the first to use a solid one-piece front axle with the spring seats integral and entirely free from one or more welds.

Semi-elliptic springs are used on the front, each 36 inches long, and three-quarter scroll elliptic are on the rear, with the bottom section 50 inches long and the top 26 inches, thus giving exceptional spring length. The steel used is of the best and is an assurance against breakage, and in addition to being closely held by spring clips the front springs, which are subject to the greatest shock, have drop-forged plates which closely bind the several leaves at the center so that they work in thorough harmony and confine the action to points between the spring pad and the hangers.

A comprehensive line of bodies is provided in both the vestibuled and open types, as five and seven passenger touring cars, four and five passenger Clubmen, two and three passenger roadsters, and five, six and seven passenger limousine cars. With the feeling that the superlative has been reached in mechanical construction the Premier production for the coming year will be marked by most careful attention to the perfection of details. Body lines and general contour have been provided which are thought to be particularly effective and impressive. They will be finished in a rich blue-black with panel lines and light striping. The wheels will be a special Premier gray, except in the case of limousine cars, where the running gear is of the same blue-black finish as the body. Fenders are black baked enamel.

Especially liberal tire equipment is an important feature of all the models, and with 36-inch wheels the "4-40" touring cars, Clubmen and Limousines will have 4 1-2 inch tires all around, and the roadsters will have 4-inch tires all around. The "6-60" cars will have 36 x 4 1-2 inch tires front and 5-inch rear.

The Premier price proposition for 1911 affords a wide range of choice. As compared with last year there is a slight increase in prices, the 1911 6-60 touring car, for instance, being catalogued at $3,650, as against $3,500 for the same model in 1910, and so on. The full list is as follows: Model 4-40—"Touring Clubman," four seats, $3,000; five seats, $3,050, and seven seats, $3,100; Limousine, $4,200; Roadster, $2,800. Model 6-60—"Clubman," $3,500; Roadster, $3,600; Touring, $3,650, and Limousine, $5,000.

Paris' Commercial Census

AUTOMOBILE CLUB OF FRANCE COMPILES STATISTICS SHOWING NUMBER OF MOTOR WAGONS OF VARIOUS KINDS IN FRENCH METROPOLIS

OWING to the fact that no taxation is imposed on purely commercial automobiles, it has been impossible to know exactly how many motors of this type were in use in Paris and the surrounding district. This lack of knowledge has just been remedied by carefully compiled statistics secured by the technical committee of the Automobile Club of France. According to these there are 155 large capacity omnibuses owned by the Paris General Omnibus Co., and 48 omnibuses of small capacity, seating 10 to 20 people, owned by other companies. The General Omnibus Co. is under a contract with the City of Paris to increase its motor buses to 800 within a period of three years; this change is being made gradually.

There are 1,095 trucks and motor delivery vehicles in daily service in Paris or its suburbs. These can be classed as follows:

Useful load 1760 pounds to 2 tons	234
Useful load 2 tons to 5 tons	179
Useful load 5 tons and above	143
Other commercial vehicles	120
Postal vans, carrying 1700 to 2600 pounds	156
Tractors and locomotives	60
Total, including omnibuses	1095

These figures do not include taxicabs, which are now slightly more numerous than horse-drawn cabs, nor the city fire engines, all of which must be converted to power within a period of four years.

Figures have been obtained of the fuel employed on the 556 vehicles carrying from 1,700 to 5-ton loads. In 416 cases this is either gasoline or benzol. It is impossible to differentiate between these two fuels, owing to the rapidity with which the change is made from one to the other. Kerosene is only used on five trucks; alcohol in one case only. Coke is employed on 131 vehicles and low grade coal gas on three.

The vehicles using kerosene are Darracq-Serpollet steamers, a type of vehicle which is no longer manufactured. The alcohol was a test case. The coke was employed on such steamers as the Purrey, Turgan and Schars, largely used for carrying paper from the mills in the suburbs to the printing offices in the center of the city. The motors using coal gas are built by the Cazes Company.

French Government to License Foreigners

On the recommendation of the Automobile Club of France the French Minister of Public Works has just announced that his government will take the responsibility of issuing driving and car licenses to persons of other nationality than French. Thus, although America offers no reciprocatory benefits, it is possible for an American automobilist, on landing in France, to obtain an international driving and car license which will allow him to enter eleven countries without formality. This, of course, does not affect customs formalities, which are quite distinct from police regulations on drivers and cars.

During the present season a certain number of American tourists have been touring Europe with international passes obtained in England, but this does not appear to have been altogether in accordance with the convention, according to which it was clearly stated that the holders of the pass must belong to one of the countries having signed the agreement. The passes appear to have been given by the English automobile associations under a misunderstanding. The recent decision of France, which will probably be followed by other governments, removes all possibility of misunderstanding. It also creates the unusual situation of allowing Americans, who are obliged to have a separate license for almost every State at home, to run throughout the length and breadth of Europe without changing their tags. A European crossing the Atlantic receives no such benefit in return.

Acme S. G. V. Model

COMPACT MOTOR ALONG FOREIGN LINES; LIGHT AND TRIM LIVE REAR AXLE; EXTREMELY WELL-DESIGNED DETAILS MARK THE 1911 PRODUCT

DISTINCTLY an innovation as compared with its previous efforts, the Acme Motor Car Co., of Reading, Pa., offers the S. G. V. car in two models, the first of which, Model A, with a touring body, sells for $2,500, and Model B, with a runabout body, at the same price. These models weigh about 2,500 pounds complete, and the motor of the 4-cylinder, water-cooled type has an A. L. A. M. rating of 22.5 horsepower. The fine points in this design are not disclosed in a mere statement of the commercial considerations, but an examination of Figs. 1, 2 and 3 will be sufficient to indicate that the designer was actuated by definite motives, resulting in a power plant that is conspicuous for its clean and crisp adherence to well authenticated engineering methods, some of which are shown in the lines, whereas for the rest it is necessary to unearth the design details and observe that the materials employed, and the methods of adaptation, surpass anything that the Acme Co. has heretofore been able to contrive, despite its experience and the excellence of its facilities.

The motor is of the 4-cylinder, water-cooled type, with a bore of 3 3-4 inches and a stroke of 4 3-8 inches. The cylinders are cast *en bloc* with integral inlet pipes, and referring to Fig. 1, C1 is the carbureter, with a straight intake I1, leading to the inlet orifice O1, which is centrally located between the cylinders C3 and C4. The four cylinders C1, C2, C3 and C4. as a unit, have a common flange F1, bolting to a flanged face on the upper half of the crankcase C6, and the spacing between the cylinders C3 and C4 exceeds that of the cylinders C2 and C3, and C4 and C5. The castings are made with an open head, and in the completed motor a water connection W1 near the front end leads to the radiator. From a point in front of the cylinder C5 a water connection W2 leads to the water pump of the centrifugal type, which is incorporated into the upper half of the crankcase C6 and the water pipe W3 serves as the suction for the water as it comes from the radiator, entering this pipe at the point W4. The motor is suspended between chassis members by the arms A1 and A2, which extend out from each side, and the starting crank S1 is supported by an integral extension of the half-time gear cover G1. The flywheel F1 is of the largest safe diameter and a sufficient width of the flange to afford the maximum flywheel effect with a minimum weight.

Referring to Fig. 3, the magneto M1 is of the Bosch type with a fixed point of firing, thus eliminating a spark advance lever on the steering wheel or other relating mechanisms, and among the attending advantages lies the reduction of the wiring to four leads from the magneto to the spark plugs, they being protected by a copper conduit and quick detachable terminals are used on the spark plugs and magneto; moreover the spark plugs S1, S2, S3 and S4, are of the Bosch type with lava insulation. The exhaust manifold E1 is so designed that the holding bolts B1, B2, B3, and B4, are accessible and the manifold sweeps away as it nears the rear of the motor with a long radius curve at a point C1, so that back pressure is reduced to the absolute minimum.

The lubricating oil is contained in the false bottom of the lower half L1, with oil connections O1 and O2. The oil is circulated by a geared pump driven from the rear end of the camshaft, and is forced through properly contrived tubes to the center and end bearings of the crankshaft; the crankshaft being provided with drilled holes for the passage of the lubricant to the connecting rod bearings, whence it is forced to the wrist pin bearings. The cylinder walls are lubricated by the oil thrown up by the rotating parts. All excesses of oil are carried back to the false bottom in the crankcase, being filtered in transit. A convenient filler is provided in the left rear motor leg.

SPECIFICATIONS FOR S. G. V.

MODELS	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		Lubrication
			Type	Seats	Cyl.	Bore Inches	Stroke Inches	Cyl. Cast.	Radiator	Pump	Magneto	Batter	
Model "A"......	$2500	22.5	Tour'g.	5	4	3¾	4⅜	Block.	Cellular.	Centrif'l.	Bosch...	None....	Pum
Model "B"......	2500	22.5	R'bout.	2	4	3¾	4⅜	Block.	Cellular.	Centrif'l.	Bosch...	None. ..	Pum

As a further indication of the smoothness and symmetry of design of this motor, reference may be had to Fig. 2. Looking at the front of the motor, the arms A1 and A2 are of substan-

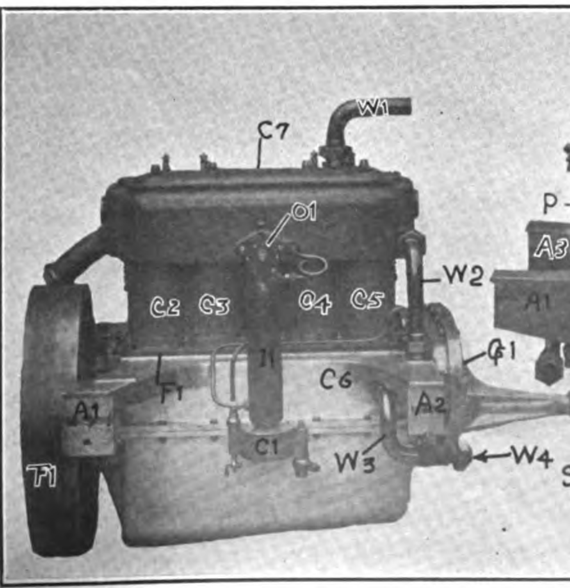


Fig. 1—Carbureter side of the motor

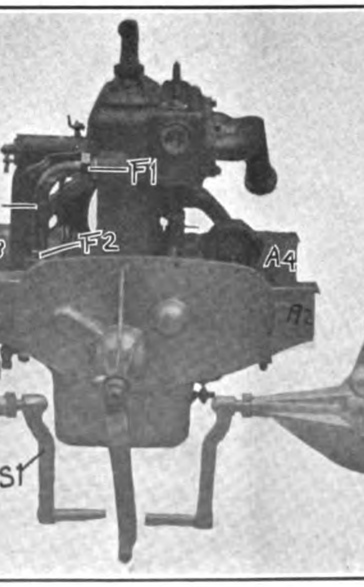


Fig. 2—Front elevation in slight perspective

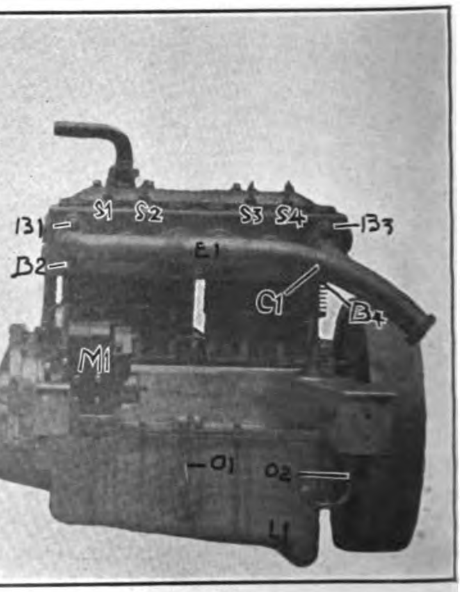


Fig. 3—Magneto side of the motor

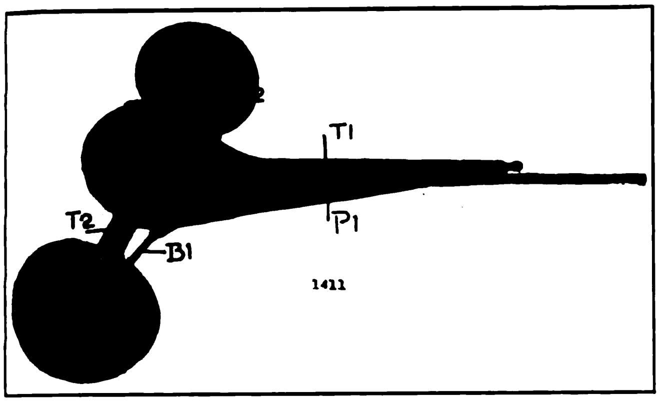


Fig. 5—Live rear axle with bobstays, channel-section torsion tube and rotative perches

tial construction with a considerable depth of web. While the opportunity affords it is pointed out that the arms A3 and A4 are of extra strength, and placed close to the flywheel, so that the gyrations thereof as well as the dead weight are adequately resisted. Coming down to refinements in point of detail, it will be observed that the pipe P1 is provided with accurately machined fittings, F1 and F2, which condition obtains with all the piping around the motor.

In the machining of the motor, in addition to finishing to a definite size and grinding, the domes of the cylinders are machined so that the compression in each cylinder is 76 pounds per square inch absolute, bringing the percentage of compression space to piston displacement of 19.23 per cent., and in fixing upon the proportions of the honeycomb type of radiator as shown in Fig. 4. account is taken of the fact that the flame-swept surface exposed to water circulation is 33.62 square inches per cylinder. In view of the well-defined and accurately governed thermic relations within this motor, the company rating is fixed at 25 horsepower.

RS AS OFFERED FOR 1911

TRANSMISSION							BEARINGS				TIRES	
Type	Speeds	Loca-tion	Drive	Wheelbase	Tread	Frame	Crank-shaft	Trans-mis'n	Axle	Weight	Front	Rear
isc Selecti'e.	4	Frame.	Shaft...	115¾	56	P. Steel..	Plain...	Ball....	Ball....	2500	34x4	34x4
sc Selecti'e.	4	Frame..	Shaft...	115¾	56	P. Steel..	Plain ..	Ball....	Ball....	2500	34x4	34x4

With a view to properly governing the kinetic couples, due to speed, the pistons are made relatively light, and ground to a definite size, with a clearance of 0.003 and limits of tolerance of plus or minus 0.00025. The piston rings are cut right and left-handed to prevent lining up. The piston rings are hardened and ground and are secured in piston bosses with two sets of screws which are provided with jam nuts and cotter pins. The connecting rods are made in the I-section, drop-forged, utilizing vanadium steel and are provided with hardened and ground wrist pin bushings. In view of the character of the material employed and the accuracy of finish maintained, the parts composing the reciprocating mass are light in the aggregate, and in this way the kinetic couples, such of them as are unbalanced, are reduced to a point so low that secondary oscillations do not take place within the working limits of speed of the motor.

The crankshaft is cut from a nickel steel billet and is given a successive series of heat treatments. The journals are ground to exact size, barring tolerance limits of plus or minus 0.00025, at a temperature corresponding to the temperature used in the machining of the bearings. The mainshaft bearings are identical with those of the connecting rods; all bearings are supported from the upper half of the crankcase; the lower half acting merely as an oil reservoir. The flywheel is flanged to the crankshaft.

Passing on to the clutch, it is enough to say it is of the multiple-disc type, with 36 steel discs. The leverage is so arranged on the clutch pedal that the pressure necessary to disengage the clutch is 13 pounds. From the clutch to the live rear axle power is transmitted through a propeller shaft as shown in Fig. 5 of the rear axle set, and torsion is taken by the torsion member T1, so that the propeller shaft P1 is free to do its allotted work without having to withstand the pressure of other forces. The axle tube T2 is supported by bobstays B1, and the housing H1 for the bevel drive and differential is of neat design, relatively light, but of great strength. The support for the propeller shaft at the bevel pinion extremity is in the form of a cylindrical housing H2, carrying annular-type ball bearings. The brake shoes S1 and S2 of the internal expanding type are held in the disengaged position by springs S3 and S4, and are expanded by means of a cam C1 with a hinge H3 at a diametrically opposite point.

The service brake drum is mounted on the drive shaft to the rear of the transmission casing. The bands are in halves and are controlled by a right-and-left-hand screw actuated by the pedal. The emergency brakes as shown in Fig. 5 are actuated by a side lever B1, Fig. 6, and the speed changes are manipulated through the side lever S1, Fig. 6. The substantial chassis frame S2 is shown, the shaft of the control coming through the web W1 and the extension shaft of the steering gear passing through the web W2.

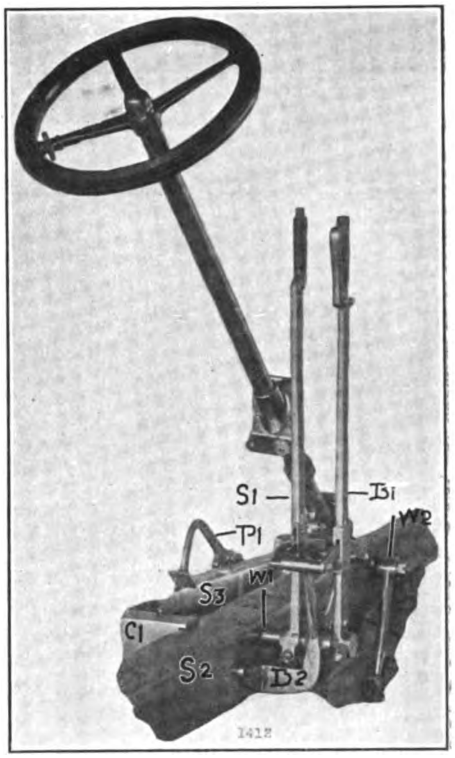


Fig. 6—Detail of the chassis frame at the point of fastening of the side levers

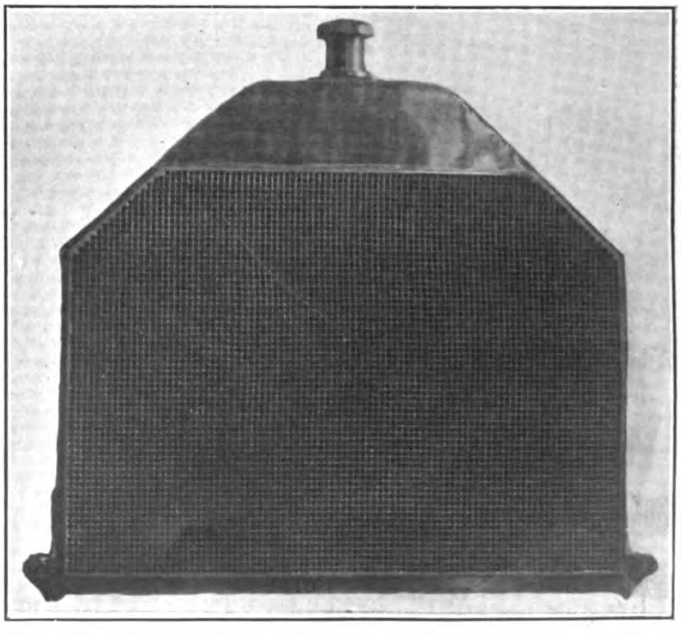


Fig. 4—Presenting the true honeycomb type of radiator with a liberal filler and cap and flexible mounting

The 1911 Roader Car

A CLEAN-BUILT, COMPACT, LOW-PRICED PROPOSITION THAT WILL APPEAL TO THOSE IN SEARCH OF A SERVICEABLE SMALL AUTOMOBILE

SPECIFICATIONS OF THE ROADER CARS

Bore—20-horsepower motor, 3 5-8 inches; 30-horsepower motor, 4 inches.
Stroke—20-horsepower motor, 3 5-8 inches; 30-horsepower motor, 4 1-4 inches.
Wheelbase—104 inches.
Tread—56 inches.
Number of speeds—Two and reverse.
Type of gears—Sliding.
Weight—20 horsepower, 1350 pounds; 30 horsepower, 1500 pounds.
Clutch—Cone, leather.
Cooling—Thermo-syphon.
Lubrication—Splash.
Ignition—Mag. Bosch, H. T.
Springs—Rear, 3-4 elliptic; front, semi-elliptic.
Prices—20-h.p., $650.00; 30-h.p., $750.—F.O.B. factory.

FOR the coming 1911 season a new car of moderate price is being manufactured by the Roader Car Company, of Brockton, Mass. Two models are being placed on the market, the one here illustrated being the 20-horsepower model. The other is built along the same lines except that the motor is larger and gives 30 horsepower. The general lines of the car are very pleasing and with a good rake to the steering post and well-upholstered seats should fulfill the requirements of a comfortable and snappy runabout.

The chassis is of U-section stamped steel to which are attached ample mud guards with side valances to keep out all dust and mud. Both models are fitted with a four-cylinder motor.

The four cylinders are cast *en bloc* and outside the moving parts there are only two castings. The bore of the 20 horsepower is 3 5-8 inches and stroke 3 5-8 inches, and the 30 horsepower has a 4 1-4 inch stroke and the bore is increased to 4 inches. A main feature of the motor is its smooth running, and silence has been attained without loss of power, the flywheel being partly the cause of this, as it is so designed as to allow the car to run on the high gear as low as 4 miles per hour without perceptible jerk. Good hill-climbing qualities are claimed for the car. The combination of flywheel, compression and length of starting crank makes the motor easy to start without unnecessary exertion.

Included in the price of the car is a Bosch high-tension magneto, which is the system of ignition employed on the car, thereby eliminating all battery inconveniences. The splash system of lubrication is used, by which the entire mechanism is kept constantly bathed in oil. The water-cooling is effected by thermo syphon, thus doing away with all pump troubles.

The circulation leads are of ample diameter and the water capacity is extra large. The radiator is a combination of a tubular and cellular type. The gasoline tank is placed at the rear of the bucket seats high enough to give a good head of fuel for the carbureter even on the steepest hill. The gasoline is fed by gravity, and the capacity of the tank is 15 gallons.

The gears are located in the rear axle casing, doing away with an extra casting for the gear box and following a practice that is being adopted by several makers of high-priced automobiles. It also simplifies the car to a certain extent for the novice, giving him less lubrication to look after, and reduces weight quite perceptibly besides eliminating intermediary shafts and joints. The sliding-gear principle is used and provides two forward speeds and reverse. Shaft drive substantially built is the method of transmission.

The suspension has been well thought out and the rear springs are three-quarter elliptical, 1 3-4 inches wide; the front springs are semi-elliptical, insuring an easy-riding car. Two independent brakes are fitted and both operate on the drums at the rear wheels.

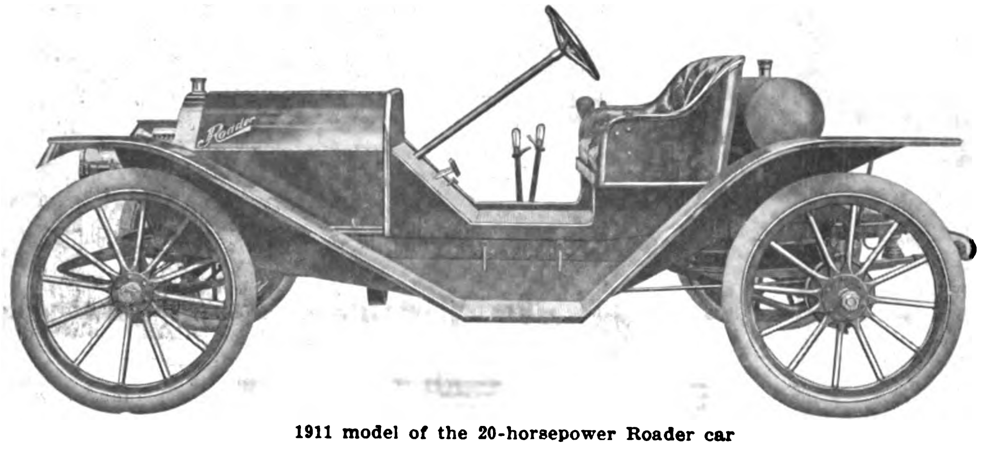
The foot brake is of the external contraction, while the emergency, operated by a lever placed in a convenient position to the driver's hand, is of the internal contraction type. The wheels are 34 inches in diameter and are fitted with 34 x 3-inch tires. The wheelbase is 104 inches and the tread 56 inches. The speed claimed by the makers should satisfy those looking for a fast car; they state that the 20-horsepower model will attain 50 miles per hour and the 30-horsepower a mile a minute.

The standard colors of the Roader car are Roader red or lead gray, and the equipment included in the price consists of two side and tail lights, tools, tire repair outfit and pump. The price of the 20-horsepower model is $650 and of the 30-horsepower, $750, both f.o.b. factory, and when crating is necessary an extra charge of $5 is made.

The firm manufacturing these cars is not new to engine manufacturers, as it has for several years been engaged in the manufacture of motorcycles and engines for same. New machinery of the latest and most up-to-date type has been installed to cope with car building, and although the factory output for 1911 will be limited, no pains are being spared to make everything to standard gauge.

Germany's New Automobile Law

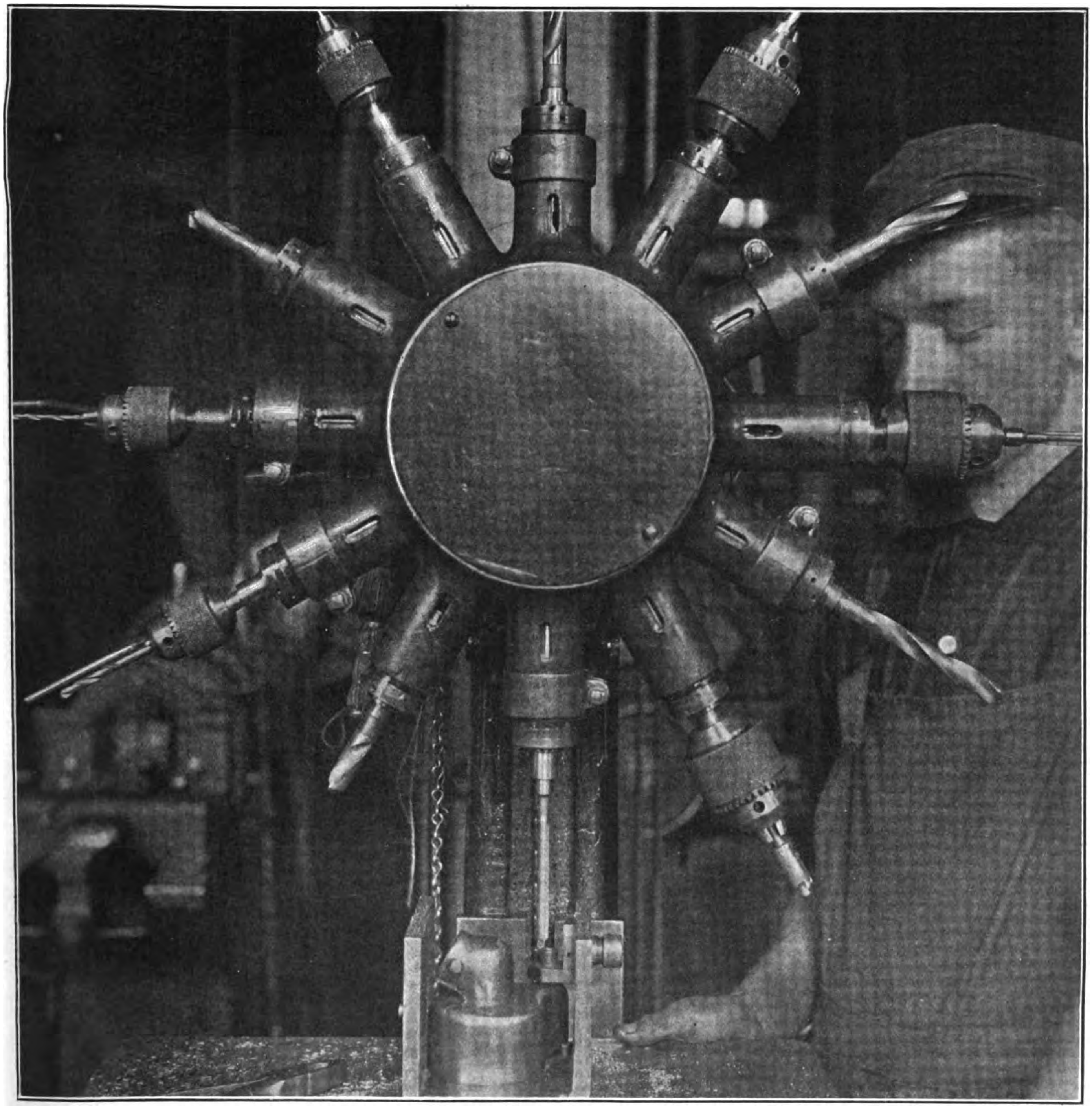
New German regulations for automobile traffic prescribe that only such persons shall have licenses as drivers whose vision is two-thirds perfect without the use of glasses. The new law seems to be enforced in all its strictness mainly against professional drivers, but the physicians entrusted with the examination of the eyesight refuse in many places to make any discrimination in favor of owners, and it is feared that the law, if it remains on the statutes, will eventually affect one-half of the officeholders and other academically educated persons who generally drive their own automobiles without the assistance of chauffeurs. It is suggested that some very beneficial results may in the end be derived from this hardship, since it may lead to renewed investigation of the true causes of myopia in school children, with regard to which much of mystery obtains, and eventually to a material reduction in that mass-murdering or at least crippling of the sense of sight which may be charged against every school system which is otherwise efficient. It is also argued by the advocates of the law that as railroad men have to submit to eye tests, it is but just that those who drive automobiles should similarly qualify themselves



1911 model of the 20-horsepower Roader car

Engineering Section

DEVOTED TO THE DISCUSSION OF ENGINEERING PHASES OF AUTOMOBILING, INCLUDING DESIGNING AND CONSTRUCTION FEATURES OF PRODUCTS, AND INFORMATION TO AUTOISTS



TURRET-HEADED DRILL PRESS WITH GIG FIXTURE USED IN THE ELMORE PLANT

IN the process that is now going on, having for its basis the standardization of the automobile, there is just a little opposition on the part of the purchasing public, due to the fact that the average autoist has an "ideal" in his mind's eye, and, unfortunately, this ideal bears but little relation to good practice as it is based upon experience. It will be found in the long run that experience counts, and if the maker is not conforming to the ideal of the new autoist it is due to the fact that the siren call of experience tells the maker that the things that look so good to the man who has not tried them are not just what they ought to be.

If men who build automobiles for a living find that certain things do not continue the good promise that the first glance would seem to indicate, purchasers will be wise when they bow to the dictates of experience.

Novel Two-Cycle Motor

LESLIE WALKER'S DESIGN OF AN INTERNAL COMBUSTION ENGINE WHICH IS AN ENTIRELY NEW DEPARTURE IN AUTOMOBILE PRACTICE

SINCE the advent of the valveless motor, automobile engines incorporating new ideas have cropped up on all sides. A novel type of construction, particulars of which appeared in the *Automotor Journal,* does away with the usual type of crankshaft and uses what might be termed a wobble block. The designer, C. Leslie Walker, is taking active steps to complete one of the engines in order to test its anticipated merits.

Referring to Fig. 1, it will be observed that in this "wobble-gear" type of engine construction the cylinders A, which may consist of any desired number arranged parallel with the main shaft and equidistant around it, have their pistons B coupled up by ball-ended connecting rods C to a disc D, which is mounted freely upon the main shaft E, but upon a special portion of it that lies at an angle to the axis of the shaft instead of being coaxial with it. A little consideration will show that as the shaft revolves, the disc D will follow the path that is indicated in the diagram, and that if it is prevented from rotating with the shaft it will cause the pistons B to reciprocate to and fro in their cylinders just as though they were arranged in conjunction with an ordinary crankpin. The all-important point, however, to observe is that the ring D must be suitably anchored, and that everything depends upon the exact motion that it is compelled to take by the anchorage mechanism, as to whether or not smooth running will be secured such as can only result from a steady rate of acceleration and deceleration of the pistons, as they start from rest at one end of their cylinders, and as they come to rest at the other end. In many forms of "wobble-gear" engine hitherto proposed, this lack of correct control on the part of the anchorage device has led to abnormal degrees of vibration as well as to resultant excess of strain on the moving parts, rendering the system impracticable.

Diverting one's attention now to Fig. 2, it should first of all be recognized that there are five cylinders, A arranged in the manner described about the hollow main shaft E, and that the wobble ring D is mounted upon that shaft in just the same manner that is indicated in Fig. 1, except that a double row ball-bearing designed to take the end thrust as well the load is introduced between them. Also it will be seen that the shaft E is carried on large ball-bearings suitably formed to withstand the end thrust that is of course inseparable from engines of this type.

One of the most important things to observe in Fig. 2 is the layshaft D_2, which is mounted parallel with the main shaft E and is carried by the stationary portion of the engine which includes the cylinders and the oil-tight casing E_1 around the shaft E and its specially-shaped flywheel E^2 that gives a true rotational balance to the wobble disc D and its moving masses. This layshaft D_1 is driven through gear wheels D_2 from the main shaft, and the speed at which it is caused to rotate is double that of the main shaft. Its central portion (between the two bearings D^3) is eccentric with its axis of rotation, and thus it may be regarded as a kind of crankshaft having a very long crankpin on which is free to slide a large ball D^4 mounted axially with the crankpin, and this ball is in turn provided with a spherical socket in the wobble ring D. It is sufficient for the purposes of this article merely to state the upshot of the anchorage device of which we are now speaking upon the connecting rods C and their pistons B. These connecting rods have ball-and-socket joints, as in our diagram, Fig. 1, and it is through them that the power is transmitted from the five pistons B to the main shaft E during the five consecutive and overlapping firing strokes that succeed one another in regular rotation around the shaft. And it is, of course, also these connecting rods that cause the wobble ring D to make the pistons travel back again to the far ends of their cylinders during the ensuing exhaust and intake stroke. That which is important, however, is that during each revolution of the main shaft E the big end of each connecting rod C is caused twice to describe a small circular path, using the spherical small end as a pivot. The actual degree of angularity of the connecting rod is therefore at all times constant, even though the direction of angularity is continually changing, and is, moreover, very small in itself. Movement of this kind is entirely free from jerkiness, and the corresponding travel of the piston B is similiarly admirably suited for smoothness of running—being that which would result with a connecting rod of infinite length on an ordinary crank engine.

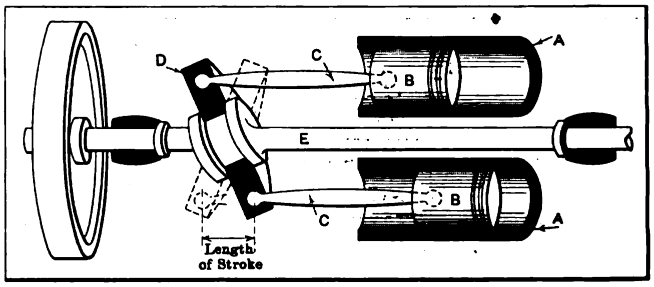


Fig. 1—Diagrammatic sketch indicating the principles of a "wobble-gear" engine

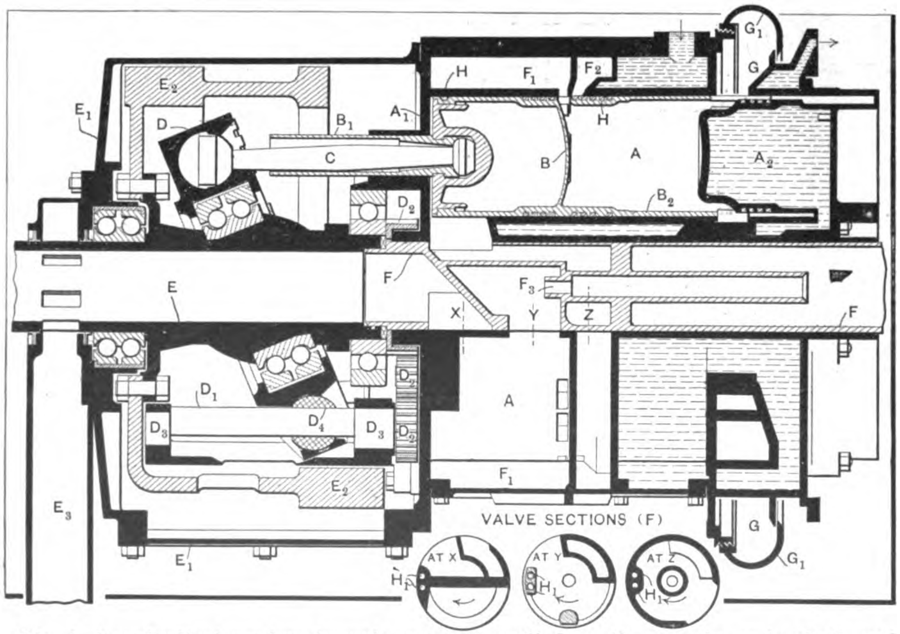


Fig. 2—Longitudinal section through one of the cylinders, through the main shaft, and through the anchorage device, of the Leslie Walker 5-cylinder 2-stroke "wobble-gear" gasoline engine.

Owing to the small angular movement of the connecting rod C it is possible to utilize the front ends of the cylinders A as pumps for feeding the combustion chambers. This is done by fitting each piston B with a tubular piston rod B^1, inside which the connecting rod is free to move, and by fitting a front cover A^1 on each cylinder with a sleeve portion for the piston rod B^1 to slide within. An unusually effective air pump results, since the piston B can be made virtually to sweep out the whole contents of the front end of the cylinder, and to draw in a full charge of air during each succeeding stroke. This construction, however, involves a closed type of piston in which the piston head is no longer cooled by open communication with the atmosphere as in ordinary cases. To overcome this objection, however, it is proposed to imprison within the hollow piston a small quantity of oil, the idea being that this will act as a conveying medium whereby to equalize the temperature of the entire piston, thus enabling its heat to be imparted to the fresh charges of air and to the cylinder walls.

The next matter of importance is to recognize that the long sleeve F, which engages with and rotates with the main shaft E, constitutes a rotating sleeve valve for placing the pump chambers in communication with the hollow shaft E and its stationary feed pipe E^3, for subsequently placing the pumps in communication with the combustion chambers, for introducing the liquid fuel into the air charges and for feeding oil to the reciprocating pistons. In Fig. 2 this sleeve F is purposely shown out of its proper position in relationship to the positions of the other moving parts, but this has been done in order to include a good view of the internal construction of the sleeve—the shape of which is still further made clear by the three transverse valve sections which will be observed at the bottom of the drawing.

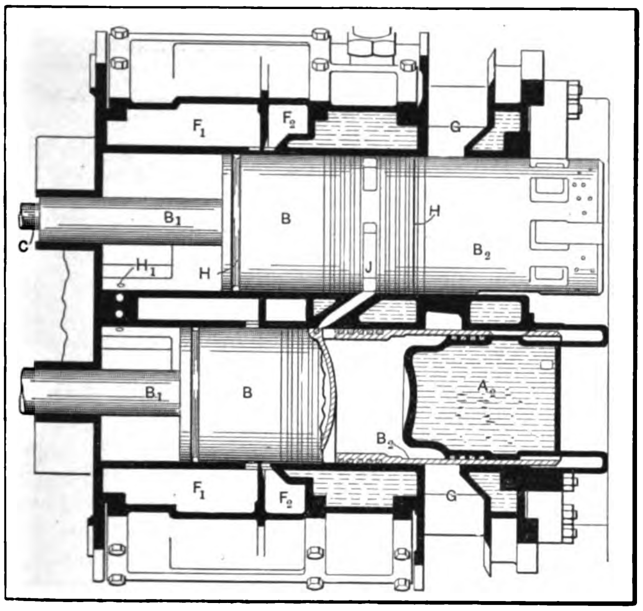


Fig. 3—Longitudinal section through two adjacent cylinders of the Leslie-Walker gasoline engine, indicating the proposed scheme for automatic ignition

A little study of the drawings will show how the valve F places each pump cylinder in open communication with atmosphere through the pipe E^3 during each suction stroke of the piston, and then causes the air to be delivered into the large space F^1, which is formed around the lower ends of all five cylinders A as well as into the separate small passage chambers F^2 that lead to each of the five cylinders. All the pumps are more or less continuously feeding into the large chamber F^1 and this they are intended to do in such a way that the air is carbureted by means of a petrol spray jet situated at F^3, although not shown in the drawing, while, on the other hand, pure air alone is fed consecutively into each of the five smaller chambers F^2 just at the moments when a scavenging air charge is required for exhausting the burnt gases out at the rear ends of the combustion chamber into the common annular exhaust passage G.

Coming now to the control of the combustion chamber, it will be observed that a large water-jacketed cylinder head A^2 is provided for each cylinder, very much as on the "Silent Knight" type of engine, and that the piston B has a long extension sleeve B^2, which fits in beween piston rings on this cylinder head member A^2 and the cylinder wall proper. Ports are cut in the sleeve B^2 close up to the head of the piston proper B and also near the opposite end, the former serving to act in conjunction with similar rows of annular ports leading from the chambers F^1 and F^2 through the cylinder walls, and with other open ports through the cylinder walls into the exhaust chamber G. Hence the actual control of the fresh charge into the combustion chambers, and of the exhaust gases away subsequently, is brought about by the sleeve B^2 alone, its action being, initially, a moment before the completion of the firing stroke to allow pure air to rush in from the chamber F^2, displacing exhaust gases through the port just previously opened to the exhaust, and, secondly, a moment later, to open up communication with the chamber F^1, allowing the fresh charge to be admitted prior to the ensuing compression stroke.

Quite one of the most essential features of the design is the shape of the chambers F^1, F^2 and G in the immediate neighborhood of the peripheral ports leading from them through the walls of the working cylinders. Fig. 4 clearly demonstrates the manner in which the gases are compelled to set up a swirling action in a plane at right angles to the axis of the cylinder itself. The idea, therefore, is to prevent these gases from passing along with any rapidity direct from end to end of the cylinder in a manner that would allow admixture of the fresh combustible charge with the cushioning air charge and with the old mass of exhaust gases, and in this way virtually to form a compact gaseous piston of each of these three sets of gases, so that stratification may eliminate the well-known drawbacks hitherto encountered with engines operating on the two-stroke cycle.

It will of course be observed from Figs. 2 and 3 that the combustion chambers are water-jacketed as well as the cylinder heads, and that two sets of piston rings encircle the pistons in addition to the rings around the head members A^2. Two other details also call for attention, one relating to the means adopted for lubricating the pistons and the other relating to the adjustable ring G^1 for the exhaust gases. Dismissing the latter first, the idea of the inventor is to be able to dispense with any other exhaust box or silencer by so regulating the endless slot G^1 that a constant flow of gas will issue from the five cylinders, while

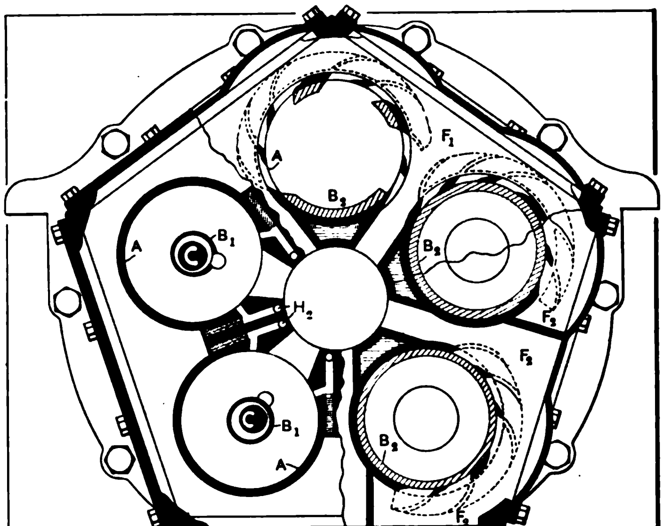


Fig. 4—Transverse sections—taken at X (left), Y (top), and Z (right), respectively—as denoted in Fig. 2

in addition to this a means is provided that may be found useful in controlling the back resistance to the outward flow of the exhaust, thereby varying the compression prior to ignition. As regards lubrication, there are grooves H formed at either end of each piston, these grooves passing around the greater part of the periphery, but not being complete circles. In conjunction with them are feed and return ports H^1 in the valve sleeve F and passageways H^2 in the cylinder castings, the result of these being that oil which is circulated through the ports H^1 in the sleeve F is caused to flow around the grooves at each end of the piston at each dead center from a period representing approximately 20 degrees prior to dead center to 20 degrees after dead center.

Concerning carburetion, we have purposely only cursorily described the means of introducing the fuel to the air charge. Nothing short of experiments can determine whether it is preferable to embody a type of carbureting mechanism into the sleeve F itself, or whether to use an external carbureter of an ordinary type feeding into the supply pipe E^2. In the former case the advantages of the scavenging air charge by way of the chambers F^2 can be retained, and in the latter instance it may, perhaps, prove disadvantageous to have present so large a volume of explosive mixture in case of back fire in the induction. Regarding ignition, since although ordinary plugs would, of course, be provided to begin with, the ignition in each successive cylinder might be effected automatically from a flash obtained from a prior combustion chamber.

A glance at Fig. 3 will reveal the port, J, shown communicating between two adjacent cylinders, the idea there being that the burning gases in the cylinder actually doing its work might be placed in communication with the next cylinder about to fire and thus transfer the ignition continuously around the entire ring. Details of timing, of lag, and so forth necessarily render it impossible usefully to indulge in much surmise in advance on this particular point. A close examination of the views will show several points worthy of notice.

Permanent Wind Shield

THE FEATURE OF THIS MINIATURE TORPEDO BODY DESIGN AS APPLIED TO A MERCER CHASSIS IS TO MINIMIZE WIND RESISTANCE, BY GEO. J. MERCER

THE accompanying illustrations show the picture effect and the working instructions of an entirely new feature in body designing, i. e., the incorporating of the wind shield on the body as a part of the permanent structure. This idea is quite an easy one to apply; it affords good protection during inclement weather in addition to accomplishing the usual functions of a windshield, and, with a transparent portion at the top, it protects the occupants and permits the driver to see ahead. Also, as the illustrations in Figs. 1, 2 and 3 show, the true non-wind resisting effect can be gained by sloping the sides and top of the shield from the engine hood, and this will have, as the illustration shows, the effect of dividing the wind and throwing it off to the side, thereby minimizing effect of wind that actually strikes the glass.

The body is designed for and is shown mounted on a Mercer chassis with 116-inch wheelbase. The front seat on the left side is shown offset back and the door for entrance to the tonneau is on the right side only. A small seat for a mechanician is located on the left side on the runboard. The capacity of the body is for four adults inside and with the additional carrying space in the torpedo stern it makes a snappy car for long touring and the illustration shows the trimming or upholstering plain without tufting. This type of body will look well finished in this manner, and beside the smooth-trimmed body does not hold the dust as the plain surface eliminates the creases.

The important measurements are indicated by figures and the construction is the wood framing and metal panel, the framing is indicated by the dotted lines. As the body is designed the fore-door is left off; should it be desired by a patron, it will be a simple matter to attach a fore-door, and, when the same is being arranged, it will also be proper to consider whether or not it is to be so fitted that it may be removed. While it is admitted that fore-doors are of decided advantage, it remains to be seen whether or not they will prove too warm for Summer use, but it is quite an easy matter to utilize the "Dutch" plan so that the door can be unhinged at will.

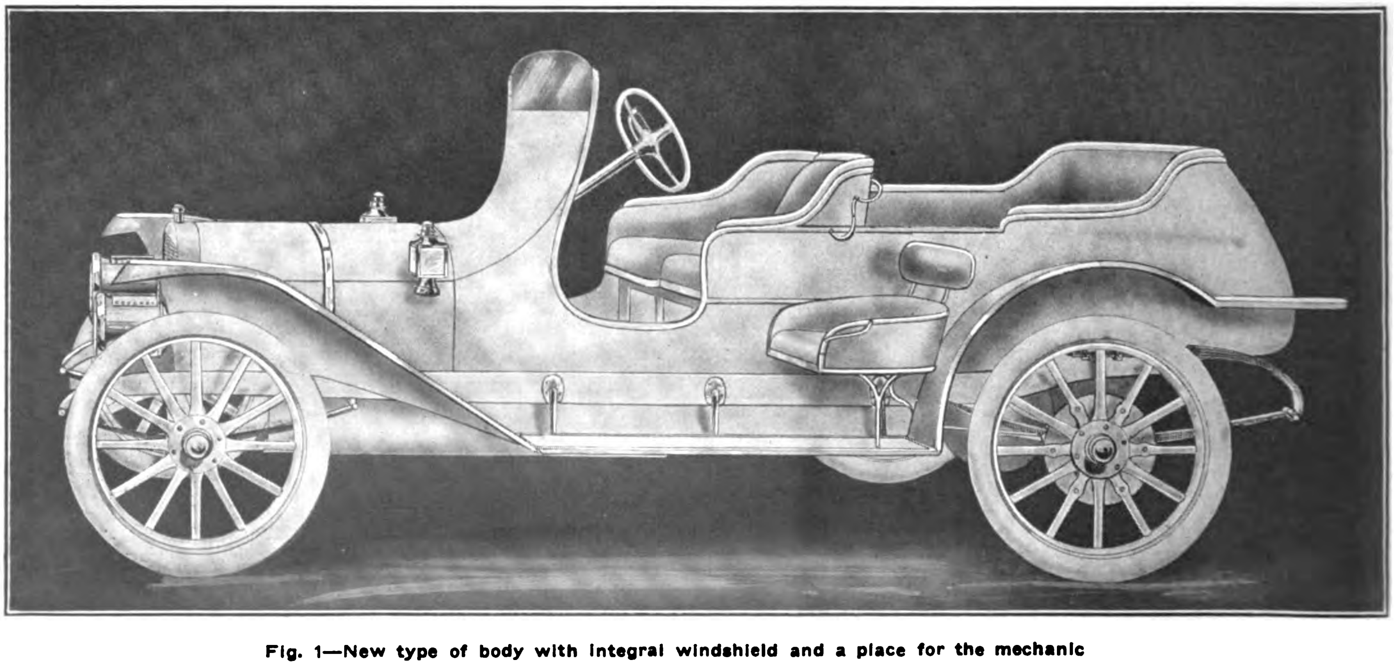


Fig. 1—New type of body with integral windshield and a place for the mechanic

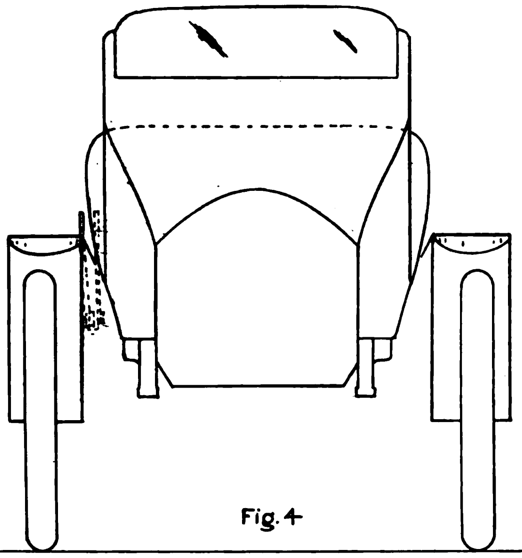


Fig. 4

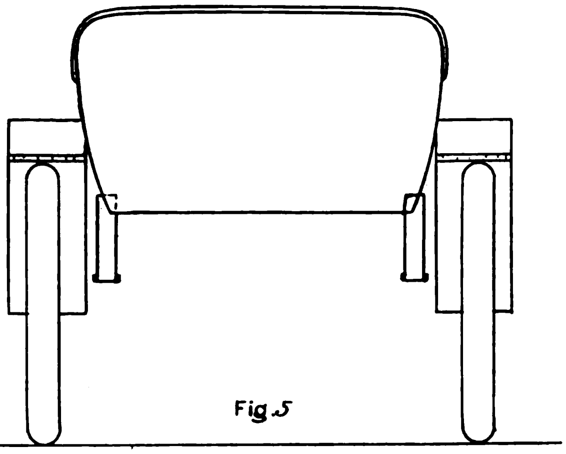


Fig. 5

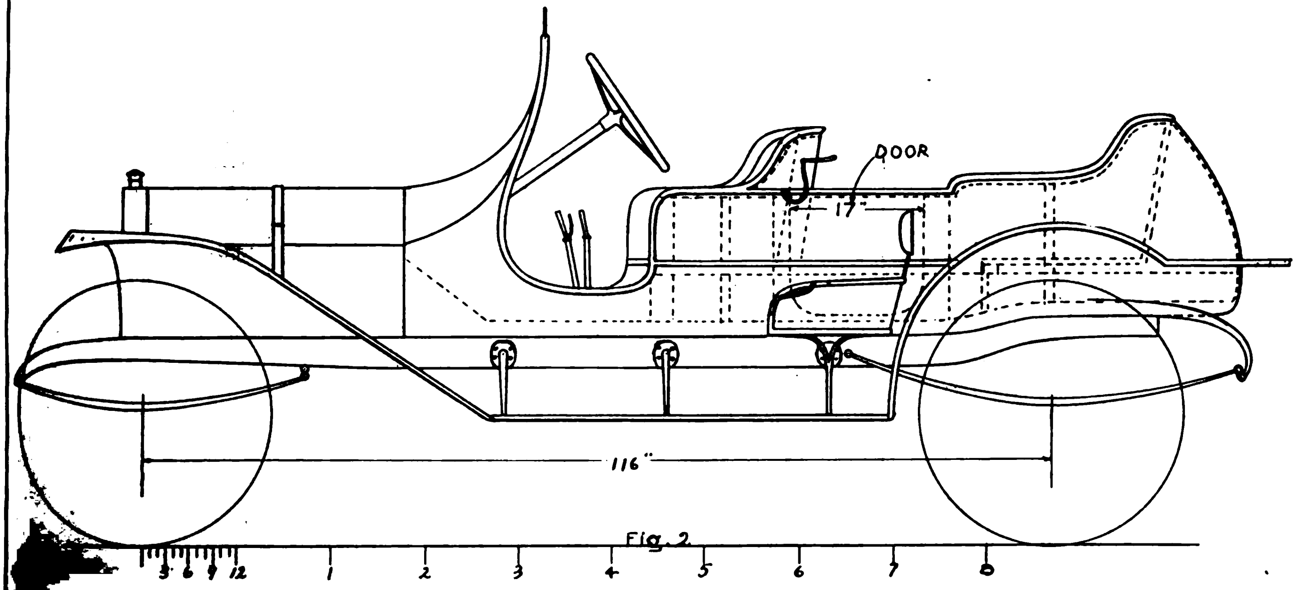


Fig. 2

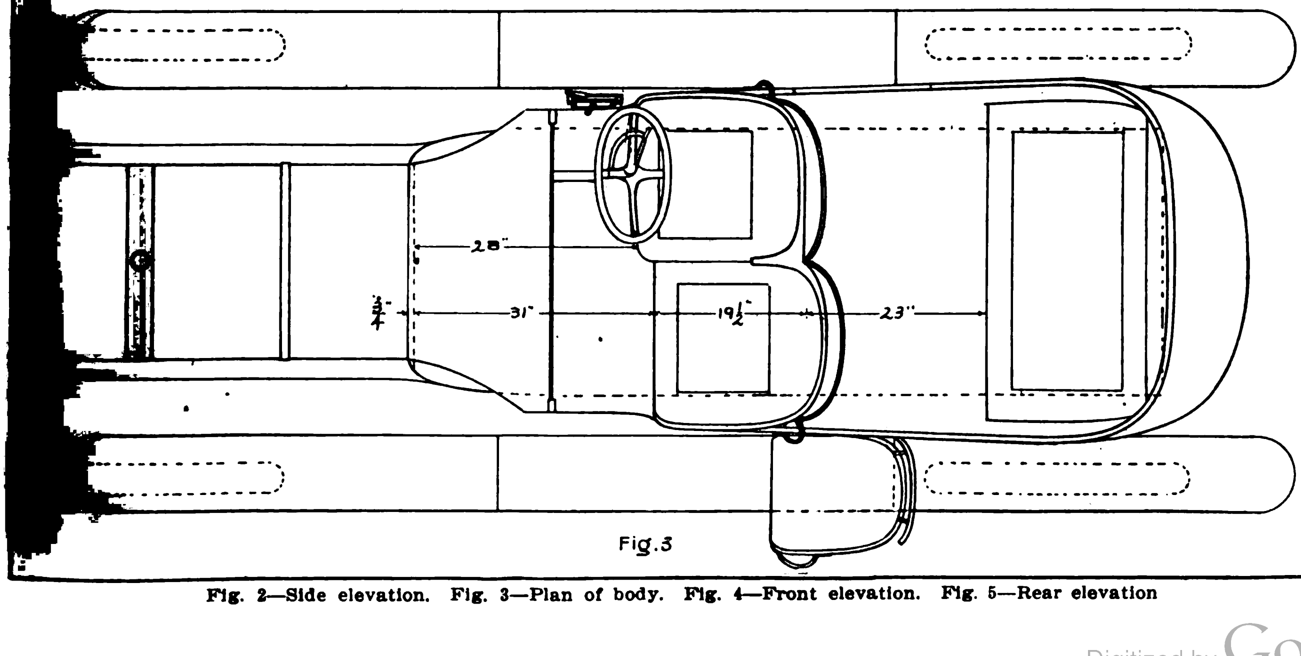


Fig. 3

Fig. 2—Side elevation. Fig. 3—Plan of body. Fig. 4—Front elevation. Fig. 5—Rear elevation

Communications

AN ENGLISH RACING EXPERT GIVES HIS VIEWS ON THE VANDERBILT RACE AND COMPARES IT WITH SIMILAR AFFAIRS ABROAD, WHICH HE SAYS ARE MUCH BETTER MANAGED

What a British Racing Driver Saw at the Vanderbilt.—Exactly how much the promoters received from grand stand letting, trade and other entrance fees matters little; but one fact remains and stands clear—the embellishments of the race were conspicuous by their absence. Not a sprig of greenstuff, not a particle of bunting to adorn the weather-stained boards of the grand and press stands. We must not thank the officials who presided over the starting and stopping of the race for its interest; this was provided by the man who paid the piper, and the tune he called was good and gave those who journeyed to Long Island as fine a day's entertainment as they could wish to see.

In a European race meeting the grand stand is covered with bunting and gay festoons. From the tops of the stands fly the flags of all nations, which give a general holiday appearance to the whole gathering. The military is called out to patrol the road and even the color of their uniforms is a relief to the seething masses of people. Automobile races are not conducive to gay colors on the part of the spectators and the early hour of the start necessitates heavy wraps, as comfort is more studied than outside show.

On all sides it is admitted that from a spectacular point of view the race was a great success, the speeds attained phenomenal, the control of the course at dangerous points lamentable, and the condition of the corners bad. A cemented parkway is ideal from a racing point of view as compared with ordinary dirt roads, but level straightaways smooth as a billiard board are less necessary than good surfaces at the corners.

The homogeneity of the surface at the turns was greatly disturbed in the practice on the days preceding the race, but sufficient time remained to remedy this. On the night before the race the corners were quite two inches deep in dust and loose stones, and some idea of how they were on the day of the race can be seen from photographs taken as the racers struck them.

If a man wishes to take his life there is nothing to prevent him throwing himself in front of a locomotive and hurting nobody but himself, but to think that they deliberately cross a course while an automobile race is in progress in a cloud of dust to see the agonies of an injured contestant is beyond all understanding. The words of the acting Mayor of New York will be voiced by everyone interested in the sport of racing. He said, "I believe that the Vanderbilt Cup race should be regulated. Under the present condition it is a menace. These races should be restricted because the danger involved is too great. I do not mean that all automobile races should be stopped, but when the question of inadequate protection arises and when the lives of the contestants are endangered something should be done."

These last few words strike the right keynote. The lives of the foolhardy spectators who venture on the course are of little value compared to those of the participants; the former go on the course at their own risk, and, further, have no right there, consequently cannot claim any sympathy, whereas the competitors are entitled to a free road, and if any accident happens to them through trespassing of the spectators it is impossible to say what further damage may be done through the machine running amuck at about 60 or 70 miles per hour.

The old adage of "*Væ Victis*" is as applicable to-day as it was in the days of the gladiators, but at any rate the vanquished then had equal chance with the victors and fair play. The race just run ended in a victory by the close margin of a few seconds and as the second man actually hit two spectators who were on the course it cannot be estimated how much Dawson on the Marmon was retarded, but anyone can imagine the shock to any human being's *sang-froid* after mowing down his fellow-creatures.

Tales are told of soldiers who before a battle are as nervous as children, but the moment the first shot has been fired are transformed into fiends incarnate, willing to brave anything and to court death at any moment. The same cannot be said of a motor racer; as long as he has a clear road his nerve stays with him, but as soon as the course is encroached upon by the public the fear of hurting somebody robs him of his nerve. The nerve of an automobile racer is the most precious thing he has; we have heard of men driving to victory after an eye, a leg, or an arm has been put out of use, but never after a man has lost his nerve. A case happened in Italy in one of the big road races there. A young amateur started full of hope of victory and ran well for three circuits of forty miles; but at the end of the fourth circuit after seeing the débris of four wrecks strewn along the course he lost all his nerve and wanted to stop, and give up. His friends persuaded him to continue, which at last he did. Three miles further he struck a large mile stone and was instantly killed, although the road was perfectly straight at the spot.

The less said about the press accommodations the better; the announcer's enunciation was clear, but the information was meager.

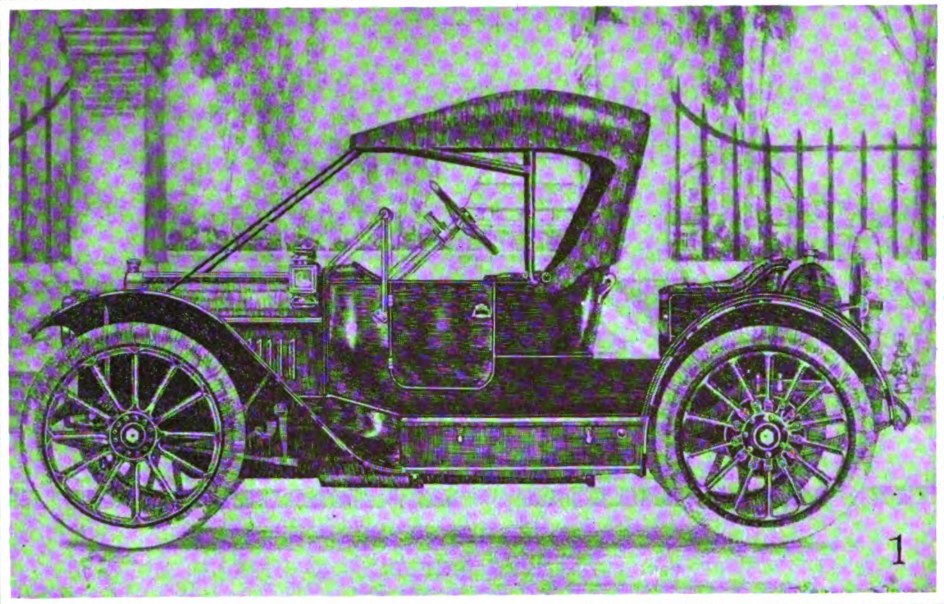
At the pits, for the most part, bungling and confusion were responsible for the loss of valuable time to such an extent that expeditious work is worthy of special note. The Benz team had a system of tire changing that others might copy with advantage. An eight-foot lever jack was placed under the axle of the car the moment it came to rest by one man while another undid the locking arrangement of the demountable rims with a brace. By this time a new tire was handed to him to replace the old one taken off, by simply lifting it; a few turns of the brace to tighten it up, take the jack away, and off again. Mulford, on the Lozier, changed a valve very quickly in full view of the grand stand, and it was fascinating to watch his composure adjusting the points of a new spark plug. The lightning change of tire on the Alco at the commencement of the 21st lap was a *chef d'œuvre* and the slightest mistake at this point would without doubt have cost him the race.

The foreign method of adjustments seems better than that employed during this race. The pits are manned by assistants to hand out to the driver and his mechanic what they require, but are not allowed on the course at all, everything having to be done by the contestants themselves, in which case each man has an equal chance with the others, the rapidity of work depending, as it should, upon the skill of the men and not on the length of the pocket of the entrants.

It is almost unnecessary to allude to the corners, where the sensation-mongers flocked. Of course, it is only natural that where there is greatest excitement there is bound to be the largest attendance; this being so, the patrolling at these points should be adequate to prevent the crowd from overflowing the course. A suggestion might be offered after last week's experiences. Besides the boards that were put at the turns (these should be much longer), wire screens about 15 feet high should be erected; they would protect the spectators from the showers of stones and be an additional prevention in keeping people off the course. No one should be allowed within 20 feet of the danger zone and the police empowered to arrest anyone crossing the course, treble the police at the danger spots and remove all wreckage as soon as an accident happens, pad the wooden structures erected at the turns with hay so that if anyone is thrown against them there will be a chance of them striking something soft to deaden the impact.—M. J. H., London, England.

Some Body Creations for 1911

Owen



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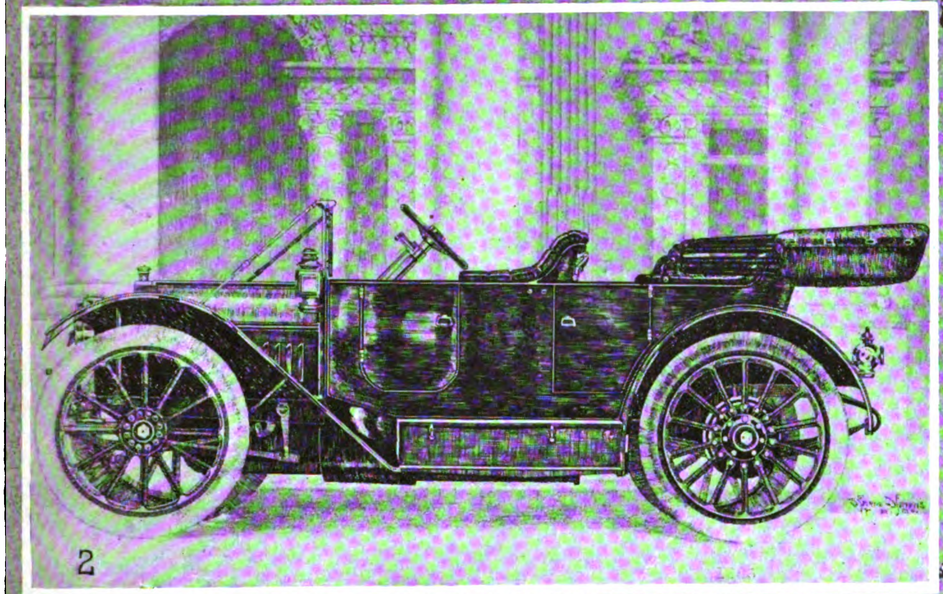

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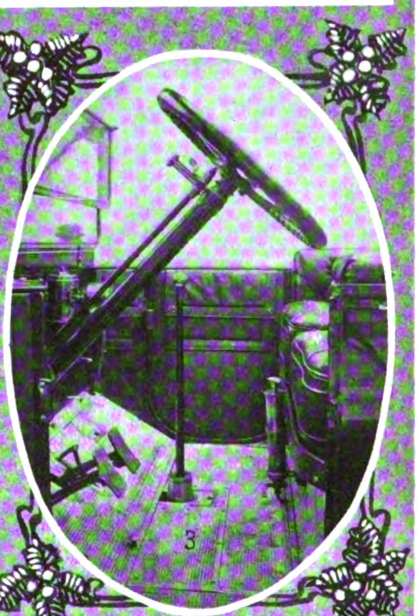


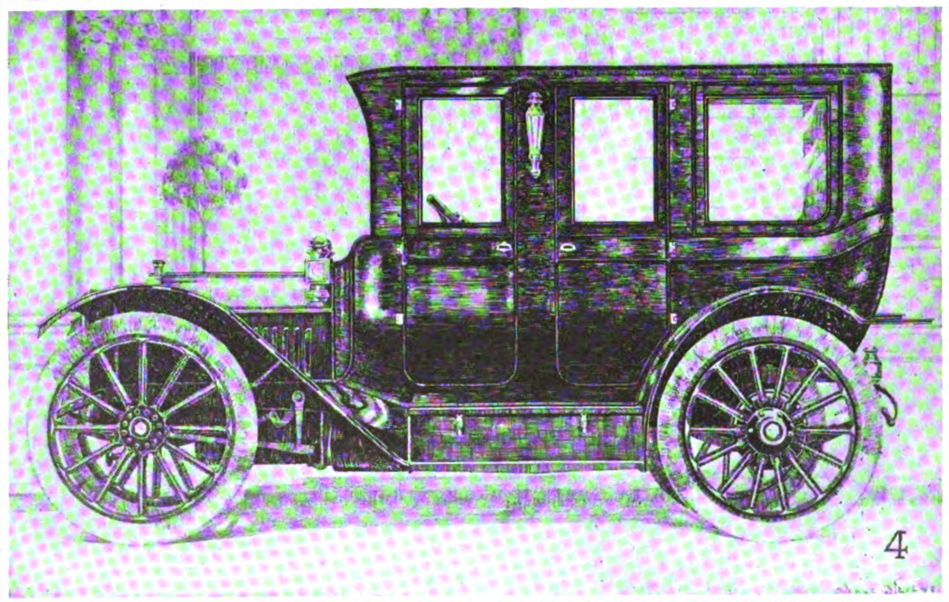
3

1 Fore-Door Roadster with Rumble

2 Five Passenger Fore-Door Touring

3 Left Hand Control

4 Six Passenger Berlin



4

An Ideal Automobile

THAT THE AVERAGE AUTOIST IS HARD TO PLEASE IS FEARED; PERHAPS THE IDEAL AUTOMOBILE AS HERE SUGGESTED WILL ACCOMPLISH THE IMPOSSIBLE

MATHEMATICIANS would say that the ideal automobile would have in its make-up the square root of mean square of all the good points that are to be found in all the automobiles that were ever made; each autoist would argue for a car that would meet with his approval, and in trying to settle upon just what he would approve of he would be sure to exclude everything that ever gave him any trouble at all, especially if there was a cost question to be considered.

As an ideal proposition, however, it takes a "wag" to firmly grasp the situation, and the following is one wag's version of the qualities that an ideal car should hold in the hollow of its horny hand.

A Wag's Version of an Ideal Automobile

It would:

(a) Cost nothing to run.
(b) Settle for the tire bill.
(c) Execute the road hog.
(d) Snub the joy rider.
(e) Never go astray.
(f) Improve the roads.
(g) Lay the dust.
(h) Chastise the chauffeur.
(i) Manufacture gasoline.
(j) Improve lubricating oil with age.
(k) Persuade the farmer to love the automobile.
(l) Subdue the politician who thinks he can frame wise automobile laws.
(m) Keep water out of the gasoline.
(n) Side step punctures.
(o) Be gearless.
(p) Pipe the latest air instead of making a noise.
(q) Put a conscience in the anatomy of the repair man.
(r) Clean itself.
(s) Dodge the neighbor who wants to fill the spare seat in the tonneau.
(t) Keep up to the latest style without having to dress up in a new body each year.
(u) Clear the roadway ahead, eliminating the need of a horn.
(v) Light the way o'nights.
(w) Keep it's own brass work shining.
(x) Get along in cold weather without freezing up.
(y) Go like the wind.
(z) Stop in its own length.

Dont's

INJUNCTIONS COVERING A VARIETY OF SUBJECTS BEARING UPON THE AUTOMOBILE FROM THE SEVERAL POINTS OF VIEW AND SAGE ADVICE TO THE MAN WHO WOULD ENTER WHERE ANGELS FEAR TO TREAD

Don't purchase a motor so small that a muffler cutout will have to be used in order to make the power patch out—what you really need is a motor that will deliver the required amount of power cutout or no cutout.

Don't go rushing across space with a screeching muffler cutout as much as to say, "Here I come (a beggar a car-back) out of an obscure past, ready to show the stripes on a new suit of clothing and make myself conspicuous."

Don't try to determine the ratio of alcohol to gasoline—that makes the automobile lead up to the front of a hospital; it is a variable quantity in any case—a very little alcohol does the trick in some instances, especially if it is placed in a certain tank.

Don't argue with the chauffeur about what he is to do—get one that will know without having to be persuaded.

Don't try to acquire all the cardinal virtues in a chauffeur; he will shine too brilliantly in your presence if you get him.

Don't be satisfied with a man who says he is thoroughly capable, especially if he is good at making excuses.

Don't take excuses—demand that the automobile be in serviceable condition, or learn the reason why.

Don't expect the automobile to be in serviceable condition if it is old and is in need of an overhauling; it is cheaper in the long run to give it the periodical overhauling that will offset depreciation.

Don't forget that it is in just as bad taste to toot the horn of your automobile continuously as it is to toot your own horn—let up.

Don't sign contracts to leave your car for an indefinite period with a second-hand dealer.

Don't believe a man can easily sell a second-hand auto.

Don't agree to pay for all sorts of extras for car selling. Agree upon either a fixed sum net for the car or place your reserve on it and allow a commission.

Don't expect to obtain the same price for the car after it has run as it cost new. If you intend to sell the car immediately after you have bought it don't run it.

Don't expect people to think that after a car has only run 1,000 miles it is always a journey abroad that causes you to sell it; they may blame the car.

Don't buy a second-hand car by the outside looks; get someone who knows to look inside.

Don't run away in case you have an accident. If you are to blame you will be treated worse if you run away than if you stop; if you are not to blame you will be if you decamp.

Don't use force on nuts; patience, persuasion and kerosene are infinitely better.

Don't drive past a sign post if you don't know the way. Stop. It is quicker than to go on and wonder if you are right and come back 20 or 30 yards on the reverse, especially at night.

Don't spirit your good intentions away while you hesitate long enough in front of a road house to beat your will into abject submission—drive right along.

Don't pose on the pinnacle of success; some one will come along and pull the pinnacle out from under you.

Don't strap yourself to the idea that the last good task that you may have performed is the record—the real record is as yet nestled on the bosom of future possibilities.

Questions That Arise

CONCERNING THE THEORY OF WIND RESISTANCE; LOCATING LOSS OF PRESSURE IN PRESSURE-FED CARS; FORMULAE FOR SUSPENSION SPRING DESIGN; CAUSES OF HOT MOTORS, ETC.

[246]—What is the force per square foot pounds as compared with the velocity of wind?

A formula often accepted is $P = 0.005V^2$, in which V is the velocity in miles per hour. It was put forward for surfaces in use in windmill practice. Smeaton's table is as follows:

Velocity and Force of Wind, in Pounds per Square Inch

Miles per hour.	Feet per second.	Force per sq. ft. pounds.	Common Appellation of the Force of Wind.	Miles per hour.	Feet per second.	Force per sq. ft. pounds.	Common Appellation of the Force of Wind.
1	1.47	0.005	Hardly perceptible.	18	26.4	1.55	Very brisk.
2	2.93	0.020	Just perceptible.	20	29.34	1.968	
3	4.4	0.044		25	36.67	3.075	
4	5.87	0.079	Gentle pleasant wind.	30	44.01	4.429	High wind.
5	7.33	0.123		35	51.34	6.027	
6	8.8	0.177		40	58.68	7.873	Very high storm.
7	10.25	0.241		45	66.01	9.963	
8	11.75	0.315	Pleasant brisk gale.	50	73.35	12.30	
9	13.2	0.400		55	80.7	14.9	
10	14.67	0.492		60	88.02	17.71	Great storm.
12	17.6	0.708		66	95.4	20.85	
14	20.5	0.964		70	102.5	24.1	
15	22.00	1.107		75	110.	27.7•	
16	23.45	1.25		80	117.36	31.49	Hurricane.
				100	146.67	49.2	Immense hurricane.

Other formulæ put forward are:

Professor Martin, $P = 0.004V^2$

Whipple and Dines, $P = 0.0029V^2$

At 60 miles per hour these formulæ give a pressure per square foot of 18, 14.4 and 10.44 pounds, respectively.

[247]—How to locate loss of pressure in pressure-fed cars.

The most vital part of a pressure system is the relief valve, and it is more often due to trouble here that the pressure will not hold. Nothing is more annoying than to continually have to pump up pressure by hand owing to a leak. If exhaust gases are used a strainer or filter should be placed between the exhaust outlet and the valve, otherwise all impurities such as carbon and burnt oil will clog it or find their way under the seats of either of the mushrooms. The component parts of this valve are two small checks in the nature of a back pressure and safety valve combined with springs to hold them in tension on their seats and regulating screws. The amount of pressure passing into the tank can be regulated from below and the point at which the pressure is released is altered by turning a screw above.

A pressure of from two to four pounds is necessary to give the required head of gasoline in cars where the tank is placed at the rear. The filler cap being loose or the washer defective will cause a leak; the best material for such washers is leather, and a spanner should be used to tighten the cap. If the oil is under pressure and in the same circuit as the gasoline a leak at the oil tank cap will prevent the gasoline from reaching the carbureter, and the same effect will be produced if the oil runs out; then the pressure will go into the tank and escape through the lubricator. In the types of relief valves where a steel ball is used this should be taken out often and cleaned, otherwise it will become pitted and the smallest quantity of this is sufficient to cause a leakage.

It should not always be imagined because gasoline does not flow at the carbureter that the pressure is at fault; the first thing to look at is the level of the gasoline in the tank. This may sound too trivial to mention, but many an autoist has gone over his car from one end to the other only to find that a few gallons of gasoline would have remedied his troubles.

The pipe in some pressure tanks is fed from the bottom to the top, and while climbing a hill with little gas in the tank it flows toward the rear and uncovers the pipe, leaving it nothing to feed from and allowing all the pressure to escape.

[248]—What are the formulæ for the correct design of suspension springs?

The method often followed is one of trial and error. For single springs the following by D. K. Clarke is often used:

$$\text{Safe load in tons} = \frac{BT^2N}{CS}$$

in which

B = width of plates.

T = thickness of plates in 1-16 inch.

N = number of plates in spring.

S = span of spring in inches.

C = constant = 11.3.

To determine the deflection in inches per ton-load the following formula is sometimes used:

$$D = \frac{L^3}{CBT^3N}$$

where

D = deflection in inches per ton of load.

L = span of spring in inches.

C = constant = 40,000 for single springs.

= 20,000 for double springs.

T = thickness of plates in inches.

N = number of plates in the spring.

When the springs are first put to work they will probably take a certain set and this must be allowed for.

[249]—What are the causes of overheating of a gasoline motor?

Insufficient supply of water.

Failure of the water pump, caused through breakage of the spindle, shearing of the key holding vanes to axle.

Air lock in the water system.

Slipping clutch.

Excessive lubrication or bad quality oil.

Wrong timing of the exhaust valves or too little lift of same.

Car being too low geared for speed of the engine.

Close proximity of the water circulating pipes to the exhaust manifold.

Presence of grease or other foreign matter in the circulating system.

Too much gasoline in the mixture.

Running with the ignition retarded.

Fan belt slipping.

Pump running too fast, causing the water to accumulate at the top of the radiator and pass away out of the overflow before it has time to pass through the radiator.

[250]—What is the solution and force of current used for nickel plating?

The solution mostly used is made from the double sulphate of nickel and ammonia, with the addition of a little boracic acid under certain conditions.

The double salt is dissolved by boiling, using 12 to 14 ounces fo the salts to a gallon of water. The bath is then diluted with water until a hydrometer shows a density of 6.5 degrees to 7 degrees Baumé. Cast anodes are to be preferred, as they give up the metal to the solution more freely. Anodes should be long enough to reach to the bottom of the work and should have a surface greater than that of the objects being plated.

The current should be moderate. Voltage may vary from 3.5 to 6 volts and from 0.4 to 0.8 ampere per 15 square inches of surface of the object. Zinc requires about double this current. A nickel bath should be slightly acid; an excess of alkali darkens the work and an excess of acid causes peeling.

Letters

COMMUNICATIONS FROM READERS MAINLY ALONG TECHNICAL LINES; CORRECT SHAPE OF PISTON RINGS; TO STOP OIL LEAKS FROM BASE CHAMBERS; HOW TO INSTALL A CONSTANT-LEVEL LUBRICATOR; NEW TWO-CYCLE MOTOR; MAKING A HEADLIGHT BRACKET

Cap Shape of Piston Rings

Editor The Automobile:

[2,389]—Having been informed on many valuable points in automobile design by your paper, I am taking the liberty of asking you a question.

If a piston ring is turned and cut to make a true arch with its outside circumference before being compressed to fit into the cylinder, does it form a true circle when compressed in the cylinder, unless the side where the ends of the ring meet have been made thinner? To be more explicit should the piston ring not appear when in perfect finish as in B (Fig. 1)?

Ardmore, Pa. E. Radifer Stancliff.

It is common practice to make piston rings as you suggest, as when the ring is made a true circle within its inside diameter there is a likelihood of its expanding in a more or less oval form and there are the chances of the cylinder being worn oval before the rings have worn to a circular shape. The outside circumference should be a perfect circle with the slit closed. Another method employed is to take a concentric ring as in A, and place it round the extension of a vise in the manner shown in the diagram. A pien hammer is used (C) and blows are struck on the ring at a true tangent point and not, for instance, at b; otherwise the result will be a broken ring. This method of tapping at every 3-8 of an inch causes a small indentation as shown and gives them a perfectly uniform spring. The blows should be harder opposite the slit and soft near the slit.

To Stop Oil Leaking

Editor The Automobile:

[2,390]—I have constant trouble to keep the oil from running out of the joint between the two halves of the base chamber of my engine. Can you suggest anything to remedy this trouble?

Portland, Me. P. F.

You can either cut a piece of brown paper to the shape of the face, cover it with a thin coat of white lead, turn the bolt up tight, and it should hold; but every time you break the joint you will have to make a fresh one.

Another method is to cut a small groove around about 1-8 inch deep and insert some string asbestos in it, as in Fig. 2. With the pressure this will tighten up and act as a washer; at any time you have to take the motor apart all that is required is a new piece of asbestos string.

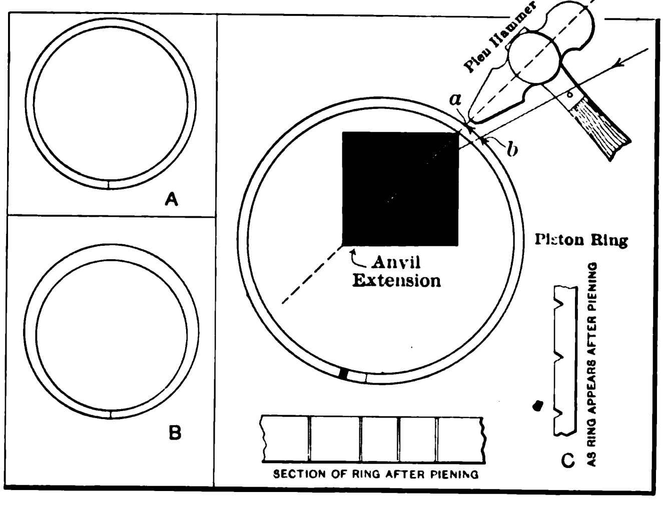


Fig. 1—Method of piening piston rings

Installing a Constant Level Lubricator

Editor The Automobile:

[2,391]—I want to install on my Mitchell 1910 car a lubricator for purpose of maintaining a constant level in crankcase. Only available place to hang the tank is about 17 inches above level of oil in crankcase. Tanks to be about 4 in. x 12 in. hung horizontally. What size pipe shall I use to carry oil to crankcase and must it be choked? If so, where? How far below the desired level should outlet end of pipe be placed? Will appreciate any advice you can give me.

Mineral City, O. J. Ira Davy.

An easy method of maintaining a constant level in the crankcase of your engine can be readily seen by referring to Fig. 4. In the existing plug holes 3-8 inch standpipes are fitted to the correct oil level as shown, and from these 3-8 inch copper pipes carry the oil to an ordinary gear pump. This should be attached to the base chamber, if possible below the level of the oil, and a shaft run from it to which is attached a pulley wheel in line with the existing lubricator wheel. The belt can then be utilized to run both without doing away with the existing oiling system to the bearings.

The oil is then led from the pump as the sketch shows to a sight lubricator on the dash and passed through a sight feed to a reservoir situated on the dash or some other convenient place above the crankcase, from where the oil is returned to the crankcase by two pipes in its upper part. A tap should be fitted under the reservoir to cut off the supply if necessary during running and when the engine is stopped.

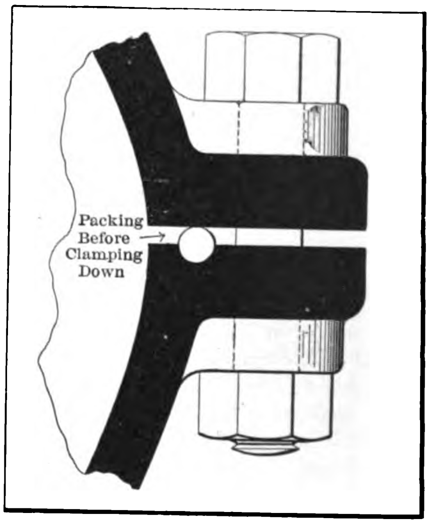


Fig. 2—Making an oiltight joint for two base chamber halves

Running Electric Light Off Magneto

Editor The Automobile:

[2,392]—I am a reader of your magazine, The Automobile, and would like to ask for some information in regard to electric lights. I have a Haynes car with low-tension magneto which runs through a condenser and would it affect the running of the car on the magneto, and if not would it be best to connect before or after the current goes through the condenser, and please describe as near as possible the size lights, etc., for such an arrangement. Find enclosed self-addressed letter for return.

Thanking you in advance, I am,

Gonzales, Tex. C. A. Hoskins.

You cannot use the magneto on your car for electrically illuminating it. You must either use a storage battery or small dynamo.

Left or Right Hand Running Motor

Editor The Automobile:

[2,393]—I have pleasure in handing you a sketch (Fig. 5) showing a method of altering the timing of a four-cycle engine to allow it to run in either direction.

A is a gear free upon the crankshaft and B is a sprocket wheel also free upon the crankshaft. *C* is a jaw clutch, yet it can be slid back and forth up the crankshaft upon a four cut keyway. The gear *A* and the sprocket *B* are set in such a way that when the engine is on dead center the jaws *I* and *K* are at the upper side of the shaft and exactly opposite. Let clutch *C* be engaged with gear *A* and the valves are timed; run engine clockwise, looking from the front. The sprocket *B* runs in the opposite direction, but always passes at the bottom and top of the shaft.

Now, if you stop the engine and disengage the jaw clutch *C* from gear *A* and at the same time apply a brake to the camshaft, turn the engine over in the opposite direction until clutch *C* matches jaw *K* and engage them, you will be able to run the engine in the opposite direction counterclockwise.

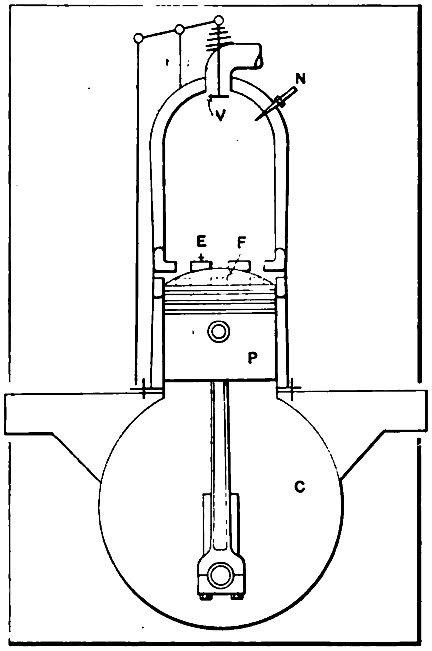


Fig. 3—A new two-cycle motor

Keep in mind that while you are turning the engine over to engage *C* with *K* the camshaft has been kept in the same position as it was when engine was stopped.

Although now the crankshaft is running in the opposite way the camshaft is not, and therefore the valves are opened in the same rotation.

New York. Subscriber.

A New Two-Cycle Motor

Editor The Automobile:

[2,394]—I should be glad to have the opinions of your readers upon an idea I herewith send you upon something new in the two-cycle line (see Fig. 3).

Referring to sketch: V represents exhaust valve; N, fuel injector nozzle; E, a series of exhaust ports; F, a series of inlet ports. The action of the motor is as follows:

Piston P on the downward stroke uncovers exhaust ports E, allowing the hottest gases to escape through them. At this point the exhaust valve V opens simultaneously with the inlet ports F, thus allowing the charge of cold air that has been previously drawn in crank case to fill the space above the piston and to force out the charge that has been burned. Exhaust valve V remains open until the piston has returned to a position on its upper stroke, where it has displaced the contents of the combustion chamber, thus affording perfect scavenging of the burned gases. No fuel enters the cylinder until all ports are closed and the cylinder has entrapped a charge of fresh air.

Cleveland. A. E. P.

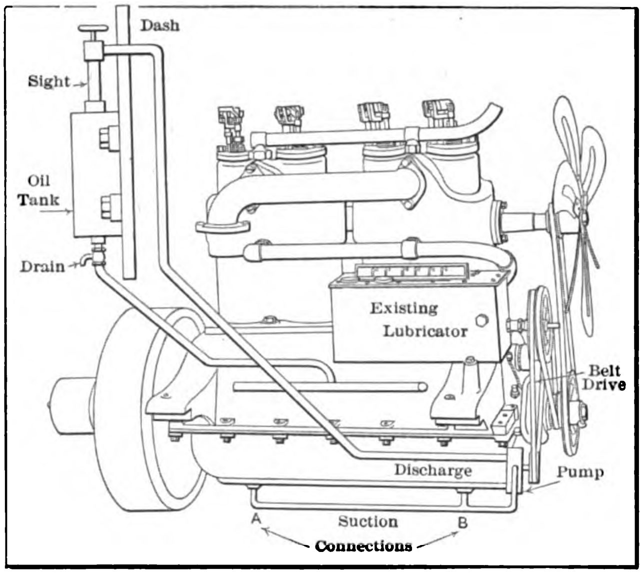


Fig. 4—Supplementary oiling arrangements to maintain constant level of lubricant in base chamber

Too Much Gasoline in Float Chamber

Editor The Automobile:

[2,395]—As a reader of your publication will you advise me through your columns what caused the following difficulty with my carbureter?

Car running smoothly, but obliged to stop engine half-way up a steep hill on account of slipping clutch, and on trying to proceed after ten minutes' halt, the engine declined to respond to cranking of the motor.

Wiring and ignition were found in order, but I noticed gasoline was dripping from carbureter, probably due to flooding, possibly caused by the car standing on the steep grade. Opened petcock beneath the carbureter and after closing same, allowed engine to remain idle for a few minutes, whereupon cranking the motor vigorously, she started off all right.

Was this due to the car standing on a steep grade? If so, why should carbureter flood? Same is gravity fed and was well filled with gasoline at the time, as observed through the glass bowl of the Stromberg.

James W. Worth.

New York.

The cause may be that the adjustment of the level is incorrect, allowing too much gasoline into the float chamber; not sufficient, however, to cause an overflow when the car is standing still, but

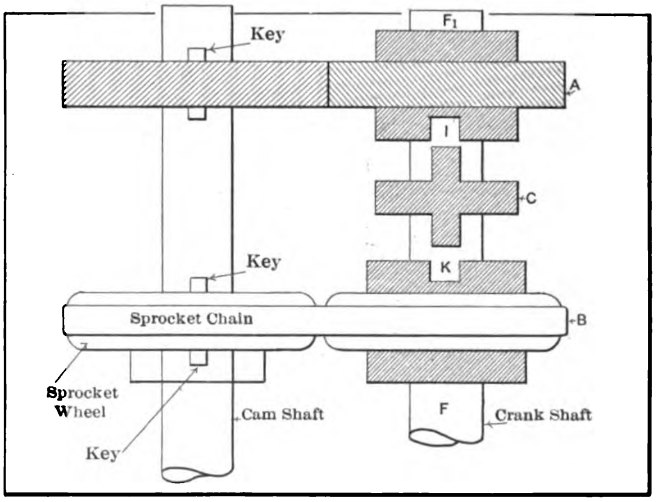


Fig. 5—Arrangement for altering timing of a four-cycle motor to permit it to run either way

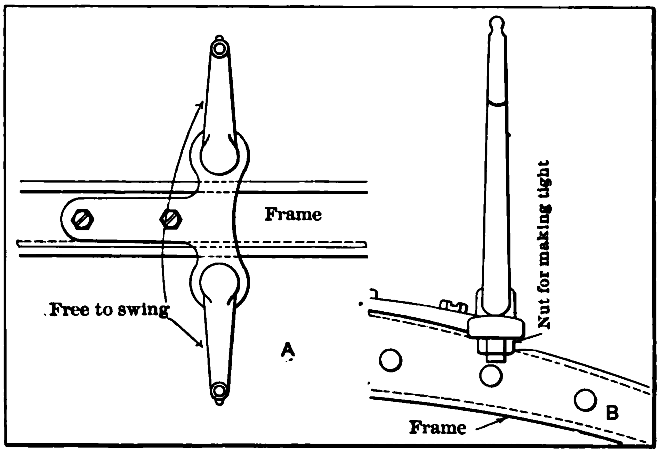


Fig. 6—Headlight bracket to fit any lamp

as soon as it is inclined and allowed to stand still on an upward grade it overflows the jet, causing the flooding.

The layback of the needle valve while the car is standing still on an up-grade will cause an overflow at the jet if the seat of the needle is not a perfect fit on its seat or any small impurity finds its way underneath same, rolling back owing to the inclined plane of the car.

The effect of flooding will not be noticed as long as the car keeps going, as the extra amount of gasoline will be used up by the extra work called upon the motor to perform; in fact, it will improve the running of some cars to place the float chamber in front of the jet.

Headlight Brackets to Fit All Lamps

Editor The Automobile:

[2,396]—What method would you suggest for making lamp brackets to fit several types of cars and different lamps?

South Amboy, N. J. Inquirer.

The accompanying sketch (Fig. 6) shows a method of making headlight brackets to answer your requirements. It is made in three parts, the T-piece to be bolted to the extension of the dumb-iron of the frame in front of the radiator. The side arms that hold the lamp fit into the two holes and are held securely by a split washer and nut; by undoing the nuts the arms can be adjusted to fit any lamps of ordinary size. If extra large lamps are used, new arms can easily be made.

Notable Speed in Voiturette Race

Editor The Automobile:

[2,397]—In the recent Voiturette race in which the times were so phenomenal it is very surprising that such small engines could develop such speed. Kindly inform me of sizes of respective engines?

Madison, Wis. A. T.

The winner's average speed was 56 miles per hour over a circuit of 23.7 miles, which had to be covered 12 times to make up the 284 miles. The fastest lap was made by the Lion Peugeot driven by Goux in 24 min. 33 sec. Zuccarelli's time for the entire circuit was 5 hours, 4 minues, 50 seconds. The sizes of the engines are as follows:

Car	No. Cyl.	Bore	Stroke
Tribel	4	65 mm. (2 9-16 in.)	180 mm. (7 3-32 in.)
Hispano-Suiza	4	65 mm. (2 9-16 in.)	200 mm. (7 7-8 in.)
De Bezelaire	4	69 mm. (2 23-32 in.)	110 mm. (4 11-32 in.)
D.S.P.L.	4	65 mm. (2 9-16 in.)	140 mm. (5 33-64 in.)
Lion Peugeot	4	65 mm. (2 9-16 in.)	260 mm. (10 1-4 in.)
Lion Peugeot	2	80 mm. (3 5-32 in.)	280 mm. (11 1-32 in.)
Calthorpe	4	65 mm. (2 9-16 in.)	170 mm. (6 45-64 in.)
Calthorpe	4	65 mm. (2 9-16 in.)	150 mm. (5 29-32 in.)
Corre Licorne	1	100 mm. (3 15-16 in.)	300 mm. (11 13-16 in.)
Corre Licorne	1	100 mm. (3 15-16 in.)	250 mm. (9 27-32 in.)

1911 Models Knight Daimler

NOVELTIES IN DESIGN INCLUDE ADOPTION OF WORM GEAR DRIVE, INCLINED MOTOR AND SPECIAL LUBRICATION SYSTEM

IN the particulars of new models of the English Knight Daimler that have appeared recently there are several new features worthy of note, particularly in the 12 horsepower model. The cylinders are cast en bloc with a bore of 69 mm. (2 23-32 in.) and stroke 114 mm. (4 1-2 in.). The engine is set in the frame at a considerable angle, sloping rearward, thus saving the uni-

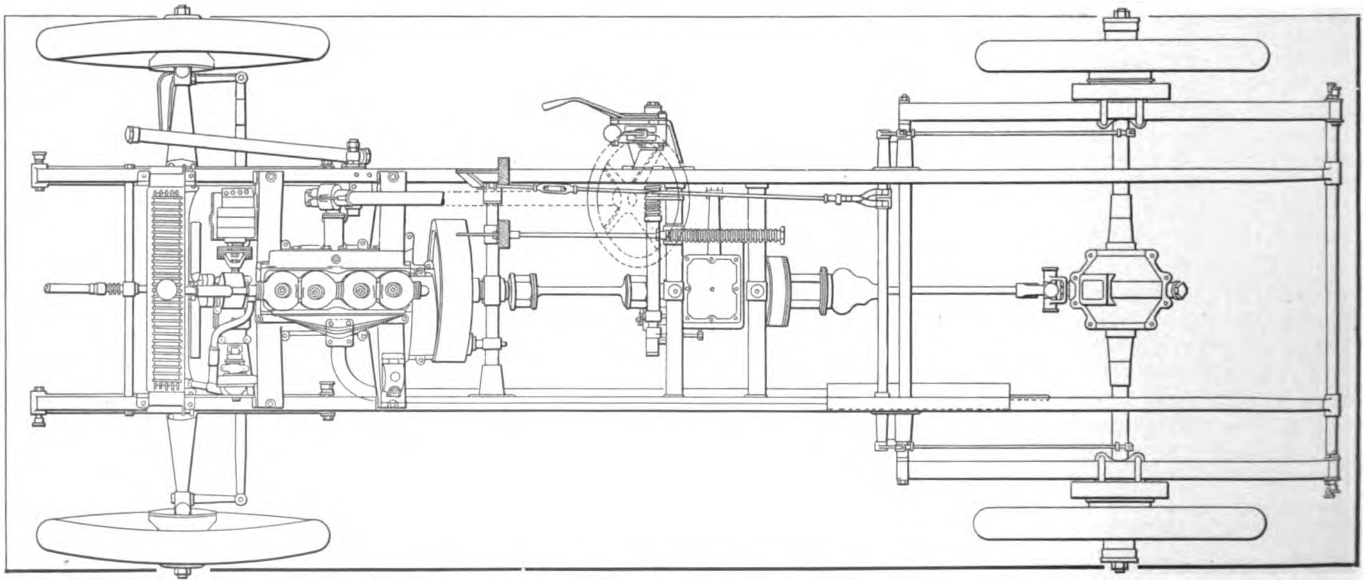


Fig. 1—Plan view of Knight Daimler chassis, showing external clutch spring and double universal jointed shaft between gear box and engine

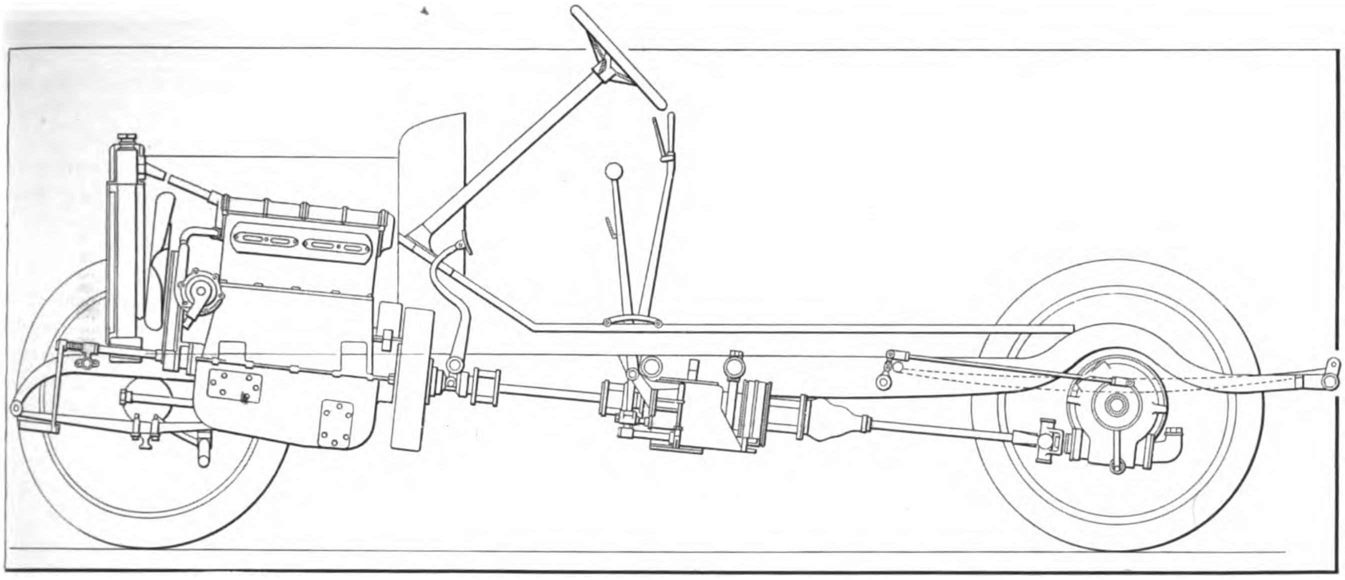


Fig. 2—Side view of Knight Daimler chassis, showing straight line between engine, gear box and rear construction, worm drive and upswept frame

versal joint on the propeller shaft from a great deal of wear. As in usual slide valve practice the exhaust and inlet manifolds are placed on opposite sides of the motor, the designs of which are very clean. Ball bearings are fitted to the crankshaft and there is also a thrust bearing at the forward end of the crankshaft. The chain wheel that drives the eccentric or valve shaft is located at the rear end. The pump and magneto being driven by helical gear from the front end makes these organs very accessible. The carbureter has two jets, and a similar system to that used by the G. & A. (recently described in THE AUTOMOBILE) is employed for the extra air intake, consisting of a series of balls that are lifted from their seats by the engine suction.

The lubrication system on this new 12-horsepower model, says *The Autocar*, is decidedly interesting and ingenious, and is the subject of a special sketch given herewith. A sump is formed at the bottom of the crank chamber, and situated therein is a plunger pump driven by an eccentric off the eccentric or valve shaft. In connection with the base of the pump is an oscillating two-way valve operated from one of the eccentric pins on the valve sleeves, the function of this two-way valve being to open up the pump barrel as required to allow oil to enter on the suction stroke at one side, or, on the other side, to find exit on the pressure stroke to the main oil lead shown in the sketch. The oil from the pump is delivered to a shallow trough at the front end of the engine, and thence gravitates, owing to the rearward inclination of the engine, over the surface of a foundation plate to four main troughs, one under each connecting rod. The surplus oil from the fourth trough finds its way by gravity back to the sump in the usual manner. On each side of the row of troughs is placed a baffle-plate extending along their whole length, so that when the oil from the earlier of the four troughs is splashed out by the connecting rods it runs back on the foundation plate and thence to one of the other troughs. A new feature in connection with this type of lubrication is that the depth to which the connecting rod ends dip into the oil is varied to suit different conditions of running. The foundation plate of the troughs is anchored upon two rods, which in turn take bearing upon four short levers, one at each corner. By these means the troughs can be raised or lowered in their position relative to the connecting rods, the controlling rod of this motion being interconnected with the throttle. When the engine is running at slow speeds with the throttle nearly closed, the connecting rod ends only just reach the oil level, but gradually, as the throttle is opened, the troughs are raised, and, as required by the conditions obtaining at the moment, the engine receives more and more oil. It is claimed, and seems probable, that economy of oil will result from this arrangement, for with fixed troughs the amount of dip allowed to the connecting rods must naturally be sufficient for all and any conditions, resulting sometimes in oil being wastefully used at low speeds when but little is really required. Smoking from over-lubrication is also reduced to a minimum.

The transmission gear arrangements follow usual practice, three speeds and reverse being fitted, with worm drive, the inclination of the crankshaft allowing a practically straight drive from crankshaft to the worm under the back axle.

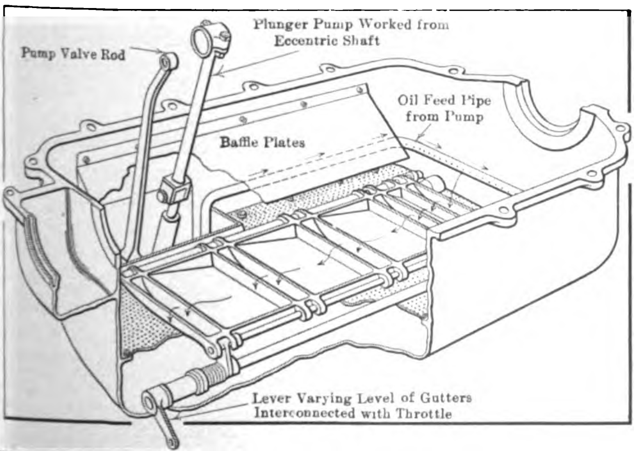


Fig. 3—Diagram of Daimler lubrication, showing varying level of gutters

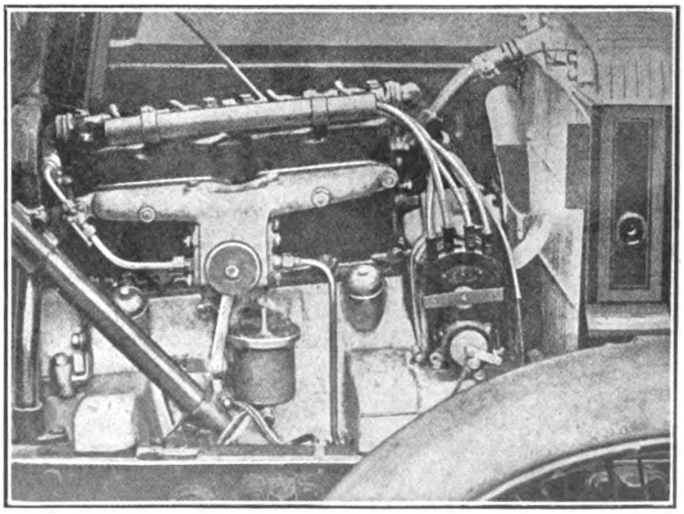


Fig. 4—Intake side view of Knight engine, showing clean intake manifold, accessibility of magneto and water connections to carbureter

Digest

EXTRACTS FROM CONTINENTAL JOURNALS ON SUBJECTS ALLIED TO AUTOMOBILE ENGINEERING: KEROSENE MOTORS FOR BOATS—DESCRIPTION OF SABATHE MOTOR—NOISE FROM TRANSMISSION GEARS—COMPOSITION OF BENZOL—INFERIORITY OF PLANTATION RUBBER

Ordinary automobile motors are unanimously condemned for marine purposes, according to the reports made to the "International Congress on the Application of Internal Combustion Motors to Marine Craft for Naval, Commercial, Fishery and Pleasure Purposes." The fact that the kerosene motor has not yet become exclusively adopted for these ends in French waters is ascribed to the unfavorable conditions created by the import tariff. In the recent contest conducted by A. Lumet for the Automobile Club of France, the Sabathe motor was adjudged superior to the competing motors of Danish and American manufacture which have been used by the thousands for fishing boats for a number of years, and also superior to the Aster and the Peugeot-Tony Huber, competing French kerosene motors. The author describes the Sabathe and the Diesel motors, and dwells on the principles of ignition as modified by the nature of the fuel, with special reference to the Sabathe type. If one were to employ kerosene in gasoline motors of high rotary speed and light parts there would be trouble. With an almost constant maximum power output and a gasifier giving a fulminating mixture, this type of motor will not last. The explosion must be tempered by injection of water, but this method for regulating combustion is exceedingly delicate and can be achieved only in stationary practice. Reduction of the compression reduces efficiency. To effect complete combustion of kerosene in a motor of high rotary speed is rendered difficult by the time required for vaporization of kerosene except at high temperatures. Ignition by high-tension magneto is impracticable, as the spark will not burn an unexplosive mixture. The low-tension magneto does better, but a jet of flame is the only really suitable means. As the mixture ignites only with difficulty, there should be an effort for concentrating its molecules by compression up to the point where self-ignition is reached. At this point the flame jet will be necessary to assure precision in the timing of the ignition, and these considerations explain the hollow hot wall ignition chambers or balls with which the "Dan" and the Mietz & Weiss kerosene motors are equipped. Both turn at 400 to 500 revolutions per minute and the mixture is not prepared outside the cylinder. Only the air is compressed and the kerosene is injected at the end of the compression stroke and burns rapidly after self-ignition. In the Diesel motor the air is compressed at the rate of 30 to 35 kilograms per square centimeter, which raises the temperature to 500 deg. or 600 deg. Cent. The kerosene is injected near the dead center, the rule for its injection being determined by the condition that the temperature shall increase as nearly as possible in the same proportion by the combustion as it is reduced by the piston displacement. This feature is termed the isothermic expansion. The injection is then discontinued and the expansion continues adiabatic.

In the Sabathe motor, which functions according to the cycle of mixed combustion, the air is also compressed at the rate of 30 kilos and a temperature of about 600 deg. Cent. is produced. The fuel is injected in two doses. The first portion is injected before the dead center and serves to raise the compression to 40 kilos per square centimeter. The second portion is so injected as to produce a combustion giving substantially constant pressure. But when less than normal power is required of this motor, the second dose is omitted and the first dose burns in that case with "constant volume." The Sabathe motor which was tested by Mr. Lumet had the following measurements: 220 millimeters bore, 220 millimeters stroke, 350 revolutions per minute. The number of cylinders was three. It has been submitted in another form to tests by the navy department, having a bore of 485 millimeters, a stroke of 480 millimeters, four cylinders and 700 effective horsepower at the normal speed of 300 revolutions per minute. It is reversible by displacement of the camshaft while running. It weighs 19 tons, including an air compressor, making its weight per horsepower 30 kilograms. The lower half of the pressed-steel crank casing, comprising the supports for the crankshaft bearings, is mounted on a cast foundation, and the cylinder jackets are bolted to the upper portion of the casing, supporting the cylinders by means of projecting annular flanges, so that the cylinders may be turned around their axes if required. The pressed-steel piston is cooled by spraying from a pump actuated from the crankshaft. To provide perfect tightness of the piston and obviating the danger of fire from escaping gases, the spaces between piston rings is closed by rings of anti-friction metal, and the space below the piston rings is similarly closed, four anti-friction metal rings being used here. The half-speed camshaft actuates the admission and exhaust valves, the kerosene fuel injection valve and the compressed-air valve by which the motor is started. The kerosene flows to a chamber below a valve which is centered around and slides on the discharge needle, and the valve is raised by means of two lugs secured to the needle. When small power is required, the kerosene fills this chamber, and when the needle is raised the fuel is injected and burns at "constant volume." For greater power, more fuel is admitted and passes to above the valve, and when the needle is raised, causing the kerosene in the chamber to be discharged first, the lugs come in contact with the valve and take it with them in their upward movement. And then the kerosene which is above the valve, being subject to pressure from the compressed air, enters into the cylinder where it burns, the progress of the combustion depending upon the profile of the cam, which is designed to produce approximately a constant pressure. Kerosene pumps, one for each cylinder, distribute the fuel. They are actuated by cams and pistons and their discharge is regulated by varying the shape of the cams. Two air compressors are used for this motor, one being operated from the crankshaft and reducing the power of the motor to 650 horsepower, while the other is operated by a special motor. The small Sabathe motor intended for fishing boats developed at the tests 36.9 horsepower and used 0.309 kilograms of fuel per horsepower hour and 0.015 kilograms of lubricating oil. At half angular speed the corresponding figures were 0.399 and 0.028.—*La Vie Automobile*, September 17.

Among the causes of noise from transmission gears, which make the vehicle "sing," a writer mentions the following: Long shafts, ball-bearings, deformation of gears due to the hardening process and not properly rectified, the tangential speeds of the gears, the shape of the gear teeth, the quality of the metal used in gears, shafts and casings, the shape of the casing, the suspension of the casing in the chassis or subframe. The effect of long shafts may be directly one of vibration or it may be the noise due to the less perfect mesh resulting from the bending of a long shaft. It is claimed that ball-bearings take play much more rapidly than plain parallel bearings, and the writer points to the noiseless motors in which parts are moved with much greater speed than in the transmission, but which, nevertheless, make no sound because the bearings are all plain. He proposes to have the subject investigated by building two cars identical in all respects, excepting that the bearings in one should be plain and in the other on the ball-bearing plan. It is claimed that the more the transmission casing approaches the cylindrical form the less sound is emitted, and also that a steel casing "sings" less than one made of light metal. It is suggested to interpose a thin layer of soft metal between the crown of a pinion and the spider or shaft.—*La Pratique*, September 10.

Investigations of the elasticity of rubber derived from varied sources have been begun by Dr. J. C. Willis, director of the botanical garden at Peredeniva, and have already resulted in establishing the fact that rubber which comes from the plantations, whether in Asia, Africa or Oceanica, is inferior to the rubber which grows wild in the same regions in the forests. Its elasticity varies unaccountably, being very good in some cases and very poor in others without it being found possible so far to arrive at any explanation of the variation.—*Omnia*, September 17.

[While all reports relating to the rubber supply, even those apparently best authenticated, must be received with some degree of distrust, owing to the stock manipulations which are constantly taking place in the rubber market, the above report gains interest from the implication it contains to the effect that the plantation rubber in some instances, though these be rare, is found even better than that grown in the forests. Investigation of the causes should eventually lead to a systematic culture by which the plantation rubber may be rendered uniformly superior, and thereafter a rubber famine would become practically impossible and adulteration unnecessary.]

Benzol, now largely used as automobile fuel in Germany, and somewhat in France, is a mixture of benzine, toluene and xylene. The 90 per cent benzol, which is the grade employed for automobiles, contains about 84 per cent. benzine, 15 per cent. toluene and 1 per cent. xylene. The 50 per cent. benzol, which is usually a crude and impure product, contains only 60 per cent. to 65 per cent. of benzine. The specific gravity of 90 per cent. benzol at 15 deg. Cent. is 0.885. Benzol as extracted from coal by dry distillation is a by-product either from the manufacture of illuminating gas or that of coke. In point of fact nearly the entire output of benzol is now derived from the cokeries connected with the steel mills. Here the gases resulting from the distillation are generally utilized for heating the very furnaces in which they are produced and play only a secondary economical part. There is nothing to hinder the removal of all the benzol which they contain. Each ton of coal used in the cokeries yields 4 to 5 kilograms of benzol, which is ten times more than may be obtained by treating the tars from the gas plants.—*Cosmos*.

Among the means discussed for getting high power from a motor by increasing the number of revolutions and thus avoiding an increase of weight, the employment of a fan or air compressor for forcing as large an explosive mixture into the cylinder at high speed as the cylinder is capable of taking in by its own suction at the lower speeds has exerted great fascination over the minds of designers, and recently the designers of aviation motors have taken up the idea. As well understood, the standard automobile motor shows a torque curve shaped as the back of a shad, because it is impossible to draw in as large a charge at high speed as at low speed, and the force of each explosion is reduced in proportion to the amount of fuel consumed in it, granting that the mixture is maintained constant in composition. A motor which would give a straight line torque curve, the power being strictly proportionate to the number of revolutions, is conceivable by two means. Either the charges introduced at the low speeds must be throttled or those at high speed must be forced. When the question is of producing a maximum of power only the latter alternative is of interest. A motor of 100 millimeters bore, which may give 10 horsepower at 1,200 revolutions per minute. should with a successful system of forced admission give 48 horsepower at 4,800 revolutions per minute. Supposing such a motor could be made to operate, as perhaps is possible, it would lack the flexibility which the automobile motor now derives from the very fact that the power does not drop as rapidly as the number of revolutions per minute. For example, on a hill the number of revolutions dwindles, but the power keeps up pretty well, because each explosion does more work than at the higher motor speed, and as a result it does not become necessary to change gear. With a view to obtaining a maximum of power, it is more important that any small motor designed to produce power by increase of the motor speed would need to be constructed with all its organs of extremely robust dimensions. The cylinders would need thick walls, yet the cooling would have to be very energetic, and a large quantity of water would have to be carried. The radiator would need to be large and the lubrication system more effective than any now in use. With the reciprocating parts heavy enough for their work and most carefully balanced to offset the effect, as far as possible, of their increased weight, it seems very unlikely that the proposed system of forced admission could be materialized at as low a weight per horsepower as is attained by the methods now actually adopted in the most advanced practice; namely, by a long stroke which diminishes the rotary speed while increasing the piston speed and by multiple valves of large areas which assure a good filling of the cylinders even at high rotary speed.—*La Vie Automobile*, September 17.

Generating teeth from a rack-shaped cutter of the Sunderland type of gear shaper is the latest idea in shop equipment in England. It is claimed by the makers of this type of machine that the cost of doing the work is lower than when the hobbing machine is used, and that it is more accurate.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL CLIMBS, ETC.

Oct. 18	New York City, Madison Square Garden, Electric Car Day at the Electric Show.
Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11.	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 15-21, 1911	Detroit, Wayne Gardens, Detroit Automobile Dealers' Association.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4,'11.	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11,'11.	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Mch. 4-11, 1911	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.

Races, Hill-Climbs, Etc.

Oct. 14-18	Washington, D. C., Start of Washington Post Reliability Run to Richmond, Va.
Oct. 15-16	Philadelphia, Roadability Run, Automobile Club of Philadelphia.
Oct. 15-18	Chicago, Ill., Chicago Motor Club's 1,000-Mile Reliability Run.
Oct. 22-30	Belmont Park, New York, International Aviation Tournament and Show of Licensed Automobile Dealers of New York City.
Oct. 27-29	Dallas, Tex., Track Meet.
Oct. 28-29	New York City, New York "American's" Motor Truck Contest.
Oct	Exhibition Auto vs. Aeroplane, Dutchess County Fair, Poughkeepsie, N. Y.
Nov. 3-5	Atlanta, Ga., Speedway Meet, Atlanta A. A.
Nov. 5-6	New Orleans, La., Track Meet.
Nov. 10-12-13	San Antonio, Tex., Track Meet.
Nov. 11-12	Savannah, Ga., Grand Prix, Automobile Club of America.
Nov. 24	Redlands, Cal., Hill Climb.
Nov. 24	Savannah, Ga., Road Race, Savannah Automobile Club.

THE AUTOMOBILE

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THE broad field of the automobile includes three generic types of machines, i. e., the steamer, then the electric, and finally the gasoline car, named in the order of their commercial introduction, with some mixing of dates, which might afford ground for controversy without affecting the points that are to be made here.

* * *

GRANTING that the steamer has survived, the fact remains that it is extremely well represented by a very limited number of designs, and it has been admitted by men who have made a study of the situation that activity in this field has been suppressed largely on account of the concentration of basic patents, thus prohibiting those who might like to build steamers from making a stable investment.

* * *

WHETHER or not it is a good idea to suppress broad activity by enforcing patent rights is too much of a subject to be handled with brevity, but the fact remains that the internal combustion motor, using gasoline at $32 per ton for fuel, has almost monopolized the field, although it, too, is somewhat affected by the patent situation.

* * *

ELECTRIC vehicles occupy a unique position in the battle for automobile supremacy. If they have failed to make sufficient headway, it is because the problems involved are insurmountable to the average engineer, and the work to be done must be assigned to the hands that respond to the motive power of a sufficiently vigorous set of brains.

* * *

EVERY trolley car in America pays tribute to the qualities that reside in electric motors, and the electrical method of doing work is so thoroughly established in a thousand ways that to come to its defense would be a waste of ill-directed effort.

* * *

SINCE it is not feasible to attach a trolley pole to a vehicle that is not confined to tracks, the source of electric energy must reside in a battery. It is in this battery problem that the retarding factor has ever resided, but despite the shortcomings of batteries of past history the electric vehicle has survived and thrived.

* * *

WHEN a doctor refers to a man with "vulgar" health, the possessor thereof is regarded as capable of devouring raw clams without being discommoded, and it is this vulgar health that has been missing in batteries as they were utilized in connection with electric vehicle work.

* * *

THE hope of the new generation from the electric vehicle point of view lies in the future good performance of the nickel-iron battery. It is a great misfortune that its qualities are under the shadow of too much talk. The public ear seems to have been wide open and the rubbish that has been poured into it for four or five years has clogged it up.

* * *

THE time has arrived when the plain truth is the only medicine that will be of any value whatever, but this truth will have to emanate from unbiased and reliable sources. That there is a reservoir of truth it is believed. The sooner it is permitted to flow through an unpolluted conduit, and its pure stream is focused upon the debris that litters up the public ear, the better it will be for all concerned.

* * *

CONVINCING evidence abounds at every hand which clinches the contention as previously made to the effect that despised stock cars are showing superiority over special racing machines, and the most substantial affirmation comes in the report of the Fairmount Park automobile race. A perusal of the tabulation of the score card, as printed elsewhere, shows that it was a stock car victory, and that foreign racing machines made a very poor showing.

* * *

THE time was when only specially made models were worth entering a race, and one of the strange things about these special models lies in the fact that very few of them ever finished. Those who abhor racing, and throw their weight against utilizing the automobile for such purposes, will scarcely need worry about it; as the situation presents itself now, there are so many stock cars crowding in at the finish that it lifts the whole performance out of the racing category. The life of racing depends upon a hard contest for the winner, the placing of two or three cars at the most, and a pack of wrecks.

Toronto, Oct. 4/10.

Gentlemen, Please discontinue my subscription, as I now have a car, , which is absolutely satisfactory in every way & I consider it wiser not to read anything at all about other cars. Yours truly,

C.H. Fleming

LAPSE OF 10 YEARS

"Road 12.47—"

BY MARIUS C. KRARUP—THE DEWEY INDEX SYSTEM APPLIED TO ROADS, MAPS AND GUIDE BOOKS—A BOON FOR TRAVELERS AND TOURISTS—A BOOST FOR A NATIONAL ROAD SYSTEM

JUST because the United States is not yet a finished country, but one whose institutions are largely open framework to be filled out as modern progress shall dictate from time to time, the opportunities for improving here upon suggestions received from the more systematic but less elastic governmental supervision of public affairs which prevails in Europe are practically without limit. In matters of road building and road improvement American conditions have presented special difficulties, due to the predominating importance of railroads, to the relatively low prices for land, to the relatively thin population, to the scarcity of accumulated capital, as compared with the large number of undeveloped enterprises begging for investment, to the high cost of road construction, to the absence of military necessities and to a certain stiff-mindedness, which is essentially sound and goes with the institution of self-rule for communities, but which, on the other hand, delays and impedes all united effort from which direct economical reward is not self-evidently to be the result. Under these circumstances the American road system has probably been developed as rapidly as reasonably could have been expected and, when everything is said, perhaps more rapidly than that of any other country, although a much earlier start has given other countries the lead for the present. Comparison on more nearly even terms could be established with reference to the modern problems of rendering roads dustless and with regard to the suitability of the means adopted in the various countries for reducing the cost and improving the quality of the roads beyond the traditional standards for judging quality, in which respect America has a free hand and wider scope than Europe and ought to be leading.

The ultimate purpose of roads is, of course, to afford the best possible facilities for the transportation of persons and goods from one place to another, and to have these facilities accord with the tastes and preferences of the population, as well as with all economical and financial requirements. All other advantages of a perfect road system may be summed up as a general and very effective tendency toward raising the standard of civilization by advancing co-operation between town and country in business and pleasures, but these, however important, are only incidental.

In order that people may be enabled to travel with facility and dispatch from one place to another over a network of roads, by day or by night, not only roads of good quality are required, but it is necessary that the traveler shall be able to pick his way without tedious inquiries, often resulting in unreliable answers, and without risk of straying from the good and the short road to the bad and the devious one. Signposts and guide books and maps serve this purpose in a most cumbersome manner, as all tourists know, mainly because no rational system has been devised for distinguishing the road which leads to A from the road which leads to B. Signposts as a rule indicate only the nearest town, and the traveler whose destination is farther on must consult his memory, his map or his book to make sure whether that town is on his best route or not. The two roads look alike in the landscape or, if they look different, the meaning of the difference is not clear. Means for identifying the road in the landscape with the lines which mark the road on the map have been developed ingeniously by private enterprise, but depend on scattered landmarks, far between, on the cyclometer reading and on a nomenclature for the roads which is not always recognized locally, neither in word of mouth or by inscriptions on signposts. The name of a road, if one exists, is necessarily either lengthy or indefinite. To paint it on signposts is expensive, and it is not done.

These troubles for the traveler exist in greater or lesser degree in all countries. They have been accentuated through the universal use of automobiles. They interfere seriously with that freedom of movement which is one of the chief charms of automobile touring, and by that much they lessen the value of automobiles as well as of roads. In the countries of Europe, however, and particularly in France, where the care of roads and bridges is in the hands of the department of *Ponts et Chaussées,* the roads are listed in the archives of the administration and on the maps used for its officials, by number. The national pike is marked N. 32, or whatever the number be. The departmental chaussée is marked D, followed by the numeral distinguishing it from other departmental chaussées, all of which are in the same class. The road of *"grande communication,"* or highway, is marked such as G. C. 67 or G. C. 289, and even the roads of lesser degree and excellence are denoted by the initials of their class and a distinguishing number. A prominent tire manufacturer in France, who is naturally much interested in fostering touring, discovered that it would be a great help to have the official designation by class and number extended to the maps in the hands of the public, and he had such maps printed. Their usefulness was much reduced, however, because the numbers were not to be found on the roads themselves. He proposed that signposts and kilometer stones should be marked with the numbers, too, but nothing was done. Others have taken up his cry, but the hide of French administration is thick. The local authorities are averse to expense, even one which would seem petty in America. The speed of automobiles on French roads is so high that rural communities look with scant favor upon anything which might make it higher or the number of automobiles greater.

Not France but the United States is the country which needs the numbering system most, and, starting with a clean slate, the United States has an opportunity for developing the numbering system in a modern manner and rendering it much more thorough and useful than it could be made on the basis of the existing French official classification. The Dewey system for card indexing and for finding one's literary way among the labyrinthine shelves of a big library offers a solution whose manifold advantages for the traveler and eventual influence for the orderly development of an economical road system can scarcely be fully perceived at the first glance. As is well known, the Dewey system gets definition and boundless elasticity alike by the simple use of a period and decimals. Large and fundamental divisions of a subject are classified by the numeral to the left of the period and all subdivisions by the decimals. A designation such as 123.147 indicates the seventh subdivision of the fourth classification under the first distinct branch of subject No. 123. It may just as well be made to indicate the seventh country road branching from the fourth county road running from the first State road starting from trunk highway No. 123. Evidently a road—if it is not in the immediate vicinity of some highly specialized destination, such as one of the minor streets of a village or a country place reached by a number of private lanes—may practically always be indicated as briefly as, for example, 26.94. The finesses of the Dewey system by which more than nine subdivisions of the next higher classification may be included, are not required for road classification. The signposts need not give room for more than a few numerals, usually not more than three or four. The expense of painting these brief indications on a post, with or without crossboard, is slight. The posts need not be higher than three feet above the ground. Indeed, to facilitate night driving, the low location of the numbers is preferable, as in that case the light from the lamps of an automobile may be turned upon them without special difficulty. But at all events an arrangement by which a small lamp attached within reach of the driver may be turned so as to throw a cone of light in any desired direction, high or low and to the side, would be a small price to pay for the convenience of knowing the road with certainty in the dark. To insure absolute definition, it might be desirable to paint a horizontal line on that side of the number which points to the beginning of the road, and on a signpost at one side of the road this line would precede the number while on a signpost at the opposite side it would follow the number. Rapidity in deciphering a sign while driving would be served by painting the leading number larger than the decimals. A sign, then, would look as follows:

—12.^{47} or, on the other side of the road, **12.**^{47}**—**

A traveler having directions to follow trunk road 12, State road 12.4 and county road 12.47, would not need to trouble himself about crossroads, as he would know that any crossroad, starting from a different trunk road would have a different initial numeral or, if by some rare chance of devious ramifications it came back across the trunk road to the system of which it belonged, it would be denoted by more than one or two decimals. On the other hand, if his directions told him to follow 12, then 13.5 and finally 14.7, he would know that 13.5 was a road crossing and not branching from 12, and similarly that 14.7 was a crossroad with relation to 13.5.

Just as French officials know by the prefix N or D or G.C. of what degree and quality a road should normally be, the American traveler would have a strong indication of the quality by the number of decimals, provided the whole numbering system were laid out with some reference to the importance of the different roads.

At this point the question arises, how the authorities may be made to co-operate in instituting a numbering system and instituting it in the best possible manner. The first requirement for obtaining a suitable foundation would seem to be the selection of trunk roads. In practice they do not exist, but there exists a network of roads varying in quality, by which a traveler can get from New York to Buffalo or from New Orleans to Chicago by following a stretch of good road here and a stretch of bad road there. The long-distance haul is of no importance; hence a straight line connection between distant points is less to be aimed for than a trunk road following the lines where a considerable established traffic justifies the expense of road improvement. The trunk roads should, then, follow the lines of established traffic as closely as possible. Preparatory work is wanted for ascertaining beyond dispute the amount of traffic over various routes throughout the United States. The trunk roads should connect these routes on the plan of securing the largest possible traffic per mile. By counting the traffic on predetermined (but not necessarily advertised) days and simultaneously at a large number of points, the mileage as well as the number of the travelers could be approximately fixed, and the short-distance, inter-village traffic would not count for more than it should. Apparently a special road commission, specially authorized by Congress, would be required for uniting all efforts and laying out on the map the system of trunk lines from which a numbering system would have to take its beginning. The drawing of a bill specifying the composition, the authority and the work of such a "Special Federal Commission for Preparing a System of Road Numbering" would seem to be the first step to be taken. And at this point the suggestion may be left for the present.

Many 1911 Models at National Vehicle Show

CHICAGO, Oct. 11—The motor car division of the National Vehicle Show which opened in the Chicago Coliseum yesterday formed no inconsiderable part of that affair. Twenty-four different makes of cars are represented by sixty-five machines. The Martin Carriage Works of York, Pa., has on view three commercial motors in addition to its regular line. There are two huge Sternberg trucks, the Kisselkar Leviathan, the Hupmobile, Cutting and Owosso lines.

In the Auditorium proper, there are eighteen different makes, including the Warren-Detroit, the International Harvester, Studebaker, E-M-F and Flanders, the Powercar and the Ames, besides five Imperials, two Schachts, three Patersons, three Lamberts, four Whitings, one Staver, three Readings, six Michigans, two Zimmermans and four Abbott-Detroits.

International Show Dates Announced

Formal announcement of the "Eleventh International Automobile Show" to take place in Grand Central Palace, New York, from December 31, 1910, to January 7, 1911, has been made by the American Motor Car Manufacturers' Exhibit Association.

The association has announced that it has been working on the details of the show since last January and declares that so far the prospects for a successful show are excellent.

Big Dash to Phoenix from Los Angeles

Eleven entries are of record in the run that is to take place from Los Angeles to Phoenix, Ariz. The run will start from the Hollenbeck hotel on the night of November 5. Entries will close October 21. A four-cylinder Knox car, driven by Joe Nickrent, accompanied by his father and brother, left Los Angeles last Thursday to make the preliminary dash. This is to be the big event of the year in Southern California. The entries now include Maxwell, Kissel-Kar, Apperson, Ohio, Pope-Hartford, Velie, Ford, Rambler, Franklin, Mercer and Knox cars.

Atlanta Meet Has 45 Entries to Date

ATLANTA, GA., Oct. 11—Work is nearly completed on the surface of the Atlanta track and it is practically ready for the practice work for the Fall Speedway meet, set for November 3, 4 and 5. A considerable strip of the back stretch has been torn up and resurfaced, a couple of thousand small holes in the surface have been filled in and the bumps have been thoroughly tamped down. Entries to the number of 45 have been received.

Electric Vehicle Association to Meet

The First Annual Convention of the Electric Vehicle Association of America takes place at the concert hall of Madison Square Garden October 18.

The meeting will be of interest to manufacturers of electric vehicles, storage batteries and their attendant appliances; to those representing central stations as indicating a field in which exist large possibilities of future growth; to those considering the use of electric vehicles, and especially to those who are engaged in the practical work of operating and maintaining transportation equipment of this type.

An interesting and practical program has been arranged.

Selden Cases Set for November 9th

A motion was heard Monday by the U. S. Circuit Court of Appeals for the Second Circuit, to give preference to the hearing of the appeal in the suits under Selden automobile patent against the Ford Motor Company and Panhard Company and the other test suits. The court has set these cases, which are on appeal from the decision of Judge Hough sustaining the Selden patent, at the head of the Court of Appeals' calendar for hearing November 9.

In the case of injunction under Selden patent against John Wanamaker, a motion was brought by the defendants to suspend. This was opposed and Judge Hough denied the application for suspension, so that the injunction continues in force.

Recent Events Among Aviators

NO CHICAGO-NEW YORK CONTEST—ALTITUDE RECORDS—NEW PRIZE FOR BELMONT PARK MEET

THE number of fliers competing for the $25,000 prize offered by New York and Chicago papers for a flight between these two cities was finally reduced to one before the start was made. The two others made a perfunctory hop over the fence of the Hawthorne racetrack and retired, this action being in accordance with an agreement made between the fliers themselves and ratified by the newspapers in question. Among the three entrants, Eugene B. Ely was the one selected to fly, while J. A. D. McCurdy and C. F. Willard retired in his favor and offered to do all in their power to help Ely finish the flight, by placing spare motors and parts at his disposal when needed. They are all identified with the Curtiss type of biplane. In the views offered in explanation of the change of plans on the part of the aviators, who may be considered as a Curtiss team, it is stated that none of the special aviation motors at the disposal of the fliers could be expected to endure the strain of being operated near its full capacity for seven days in succession, even only for a limited number of hours each day, and that consequently any contestant, in order to have reasonable hope of reaching New York, must have several motors at his disposal, a condition which, for lack of motors, could only be met by two of the contestants traveling by rail with their motors and having them ready for the assistance of the third contestant when needed. Ely started from Chicago Sunday instead of Saturday, though the weather on Saturday was favorable. He had repeated troubles with the carbureter and by Monday night had reached no farther than East Chicago. After a repetition of his former troubles on Tuesday he finally announced his abandonment of the enterprise.

William R. Hearst, the owner of the Hearst chain of newspapers, has offered a prize of $50,000 for the aviator who first accomplishes a flight from Boston or New York to Los Angeles or San Francisco, going by way of Chicago and finishing the flight within thirty days after starting and before the expiration of one year after October 8, 1910.

Archibald Hoxsey in a Wright biplane flew on October 8 from Springfield, Ill., to the grounds of the St. Louis Country Club, at St. Louis, making a detour to Staunton, Ill., the aviator's home town, and covering in all a distance of 104 miles in one continuous flight. He started at 11:56 a. m. and landed at 3:35 p. m. Hoxsey's arrival was the signal for the opening of the St. Louis aviation meet, which will be continued until October 16, and includes an international balloon tournament. Five Wright biplanes are represented at the meet, and Alfred Leblanc will fly in his Blériot monoplane equipped with a 100-horsepower Gnome engine.

A new altitude record, beating that made by Chavez shortly before his fatal flight over the Alps, was made by Wynmaelen, a Dutch aviator, at Mourmelon, France, on October 1. According to the dispatches Wynmaelen used a biplane and reached a height of 9,174 feet. Descending without power in 13 minutes he suffered none of the nausea which overtook Morane when the latter descended in less than 8 minutes from a height of about 7,800 feet. The previous altitude record with a biplane was made by Brookins at Atlantic City with a motor of about 28 horsepower.

Leon Morane, with his brother Robert as a passenger, attempted on October 5 to win the Michelin prize of $20,000 for a continuous flight from Paris to Puy-de-Dôme, a mountain 4800 feet high, near Clermont-Ferrand, but fell near Boissy and broke one leg. His brother was probably mortally injured. The machine was a Blériot. Morane held the record for altitude with a height of 8,471 feet, which was subsequently beaten by Chavez. In one of his descents from a great height Morane shut off the spark without shutting off the gas, and the cooling effect resulting from the continued aspiration of vapor was sufficient to congeal the lubricating oil, causing the piston to stick and preventing the restarting of the motor.

Whoever at the International Aviation Meet beginning at Belmont Park, L. I., on October 22, shall fly from the aviation field to Liberty statue in New York harbor, circle the same and return to the grandstand in one continuous flight and faster than any other will receive a prize of $10,000 offered by Thomas F. Ryan for any performance which his son, Allan F. Ryan, the general manager of the meet, and De Lancey Nicoll might agree upon as most suitable. René Barrier, E. Audemars and Roland Garros are new foreign entries. Barrier will take the place of Léon Morane, using the latter's 100-horsepower Blériot monoplane, which had been shipped before Morane was injured. Audemars flies a Nieuport monoplane and Garros an improved Demoiselle, the diminutive monoplane designed by Santos-Dumont. Charles K. Hamilton is practising at Hemstead Plains with his new 110-horsepower biplane, which is said to be largely of his own design, and much interest is awakened in the competition for speed and endurance between this flier and the French aviators, Leblanc and Barrier, who use 100-horsepower Gnome engines and Blériot monoplanes.

"T. R." added the air to his list of conquests last Tuesday.

First Open-Air Show for New York Motordom

Announcement has been made that the Licensed Automobile Dealers of New York will take part in an exhibit of cars at the International Aviation Tournament, which is to be held at Belmont Park, October 22 to 30. M. J. Budlong, president of the association, has secured the exclusive right for the members to show their cars at the meeting. The floor space in the betting ring and under the grandstand amounts to 40,000 square feet available for exhibition purposes.

The show will be the first outdoor affair ever undertaken by the New York dealers, and in connection with the aviation meet is expected to draw an attendance of not far from 500,000.

The meeting has been sanctioned by the A. L. A. M.

Many Cars at Illinois State Fair Show

SPRINGFIELD, ILL., Oct. 11—Automobile exhibits formed an important item at the Illinois State Fair, held in Springfield, September 30 to October 8, thirty makes being shown, among them the Midland, Winton Six, Halladay, Westcott, Overland, Davis, Staver-Chicago, Case, Zimmerman, Inter-State, Lexington, Auburn, Regal, Black Crow, Glide, Rambler, Jackson, Cadillac, Studebaker-Garford, E-M-F, Flanders, Mitchell, Studebaker, Chalmers-Detroit, Stoddard-Dayton, Cutting and Velie.

Candidates Buy Lozier Automobiles

Lozier touring cars recently have been purchased by John A. Dix, Thomas F. Conway and Jay Cothron. All three are ardent motorists and forceful advocates of good roads. Messrs. Dix and Conway are leading candidates for high State offices.

Oldfield Falls Under Official Ban

Barney Oldfield was indefinitely suspended by the Contest Board, Tuesday, for insubordination and disrespect in advertising an unauthorized race.

The new Waters road ready for use

Near Ferguson Avenue, as level as a floor

Savannah Gets Grand Prix

BIG RACE TRANSFERRED FROM LONG ISLAND TO SOUTHERN COURSE AND WILL BE RUN NOVEMBER 12—CLASS RACE TO PRECEDE GREAT EVENT

SAVANNAH, GA., will be the scene of the second Grand Prize race for the emblem of the Automobile Club of America, sanction for the event having been recommended for that city at a meeting of the Contest Board of the club on Monday afternoon. The race will take place November 12 and will be preceded by a contest under piston displacement classes, November 11. While the exact limits of this race have not yet been defined, it is said that as many as five divisions under class B or C will be provided, but the probability is that the racers in this section will be limited to divisions 2 and 3 of Class C.

The conditions of entry to the big race will remain the same, that is, unlimited as to size and power, save for width, which must be less than 68.89 inches.

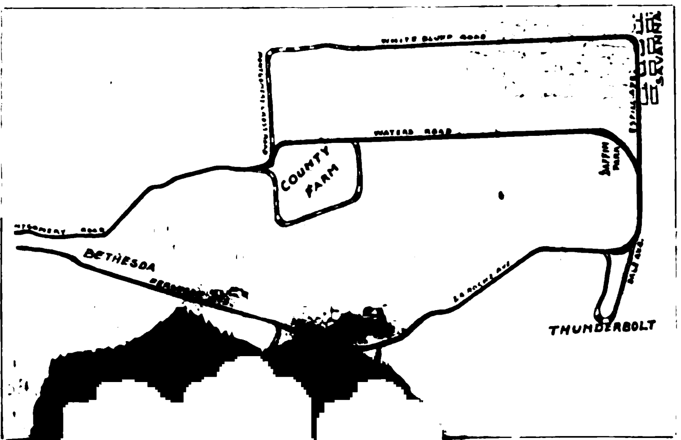
When the Motor Cups Holding Company abandoned the race, which was scheduled for next Saturday on the Long Island Parkway, several other cities applied for permission to stage the race. Among these were Savannah, Philadelphia, Los Angeles, Atlanta and Indianapolis. The city of Savannah, however, went after the race with a vim and dispatched a delegation to New York last Saturday consisting of Mayor George W. Tiedeman, Harvey Granger, O. T. Bacon and A. B. Moore, county commissioners, and Arthur Solomon, secretary of the Savannah Automobile Club, as well as several others.

These gentlemen conferred with the Contest Board of the club from Sunday afternoon until Monday evening, and at the conclusion of the deliberations the Contest Board announced that it would recommend a sanction for Savannah.

One of the considerations in granting the recommendation was the assurance carried to the Contest Board by the delegation that the Governor of Georgia would order out at least a regiment of State troops to police the Savannah course during both races.

The course, as promised by the delegation, will be 18 miles long, with only seven turns. The route over which the 1908 race was run was 25 miles with 19 turns. The improvements in the roads contemplate the following changes: The old White Bluff road will be eliminated. The starting point will be on Waters Road, which was used in the light car race two years ago. Much work has been done to perfect this stretch and it is in excellent shape. The course generally is composed of hard-packed cement gravel, the turns are banked rather high and all but two of them may be taken at speed. Leaving the Waters road, the course is laid out over the Intermediate road, Whitefield avenue, Montgomery road, Ferguson avenue, Norwood avenue, La Roche avenue, Thunderbolt road, Dale avenue to the Waters road. This route eliminates the Isle of Hope, as Norwood avenue cuts through in a direct line to Ferguson avenue and gives a straightaway of more than eight miles. The widest stretches of the course are about 50 feet and the narrowest 20 feet, generally level and as smooth as a billiard table.

Showing one of banked turns, ready for use—the speed possibilities are great



Sa [illegible] hich Grand Prix will [illegible] ine, old course

Draw Space for Chicago Show

MAKERS AND ACCESSORY MEN SECURE ALLOTMENTS AND ALMOST ALL ROOM IS ASSIGNED FAR IN ADVANCE

ABOUT seventy-five manufacturers attended the drawing for space at the Chicago show which took place at the office of the National Association of Automobile Manufacturers, Inc., last week. All the space for pleasure cars was assigned.

Applications from makers of commercial vehicles for such space as remains in the Coliseum and in the armory will be received up to October 31.

Following is a list of makers to whom space was allotted:

PLEASURE VEHICLE SECTION

Coliseum:

Winton Motor Carriage Co.
Buick Motor Co.
Stevens-Duryea Co.
Chalmers Motor Co.
National Motor Vehicle Co.
Pierce-Arrow Motor Car Co.
Moline Auto Co.
Hudson Motor Co.
Lozier Motor Co.
Reo Motor Car Co.
H. H. Franklin Mfg. Co.
Olds Motor Works.
Packard Motor Car Co.
Thomas B. Jeffery Co.
F. B. Stearns Co.
E-M-F Co.
Cadillac Motor Car Co.
Peerless Motor Car Co.
Maxwell-Briscoe Motor Co.
Willys-Overland Co.
Pope Mfg. Co.
E. R. Thomas Motor Co.
Locomobile Co. of America.
Dayton Motor Car Co.
Woods Motor Vehicle Co.
Columbia Motor Car Co.
Atlas Motor Car Co.
Premier Motor Mfg. Co.
Knox Auto Co.
White Co.
Matheson Motor Car Co.
American Locomotive Co.
Baker Motor Vehicle Co.
Corbin Motor Vehicle Co.
Elmore Mfg. Co.
Haynes Auto Co.
Metzger Motor Car Co.
Mitchell-Lewis Motor Co.
F-A-L Motor Co.

Coliseum Annex:

Brush Runabout Co.
Studebaker Bros. Mfg. Co.
Nordyke & Marmon Co.
Inter-State Auto Co.
Jackson Auto Co.
Bartholomew Co.
Babcock Electric Carriage Co.

First Regiment Armory:

Hupp Motor Car Co.
Waverley Co.
Dorris Motor Car Co.
Kissel Motor Car Co.
Selden Motor Vehicle Co.
W. H. McIntyre Co.
Pierce Motor Co.
American Motor Car Co.
Cartercar Co.
Austin Automobile Co.
Garford Co.
Royal Tourist Car Co.
Anderson Carriage Co.
Moon Motor Car Co.
Pullman Motor Car Co.
Buckeye Mfg. Co.
Speedwell Motor Car Co.
Fiat Automobile Co.
Diamond T Motor Car Co.
Auburn Automobile Co.
Streator Motor Car Co.
Simplex Motor Car Co.
Black Mfg. Co.
Rauch & Lang Carriage Co.
Ohio Motor Car Co.
Courier Car Co.
Midland Motor Co.
Chadwick Engineering Works.
Staver Carriage Co.
Schacht Motor Car Co
C. P. Kimball & Co.

Coliseum Basement:

Southern Motor Works.
Great Western Auto Co.
Metz Co.
W. A. Paterson Co.
Ohio Electric Car Co.
Enger Motor Car Co.
Benz Auto Import Co.
Cole Motor Car Co.
Westcott Motor Car Co.
Diamond Auto Co.
Otto Gas Engine Works.
Middleby Auto Co.
Lexington Motor Car Co.
The Carriage Woodstock Co.
B. C. K. Motor Car Co.
Rayfield Motor Car Co.
McFarlan Motor Car Co.
Parry Auto Co.

COMMERCIAL VEHICLE SECTION

Mack Bros Motor Car Co.
Mais Motor Truck Co.
The U. S. Motor Truck Co.
The White Company.
Hart-Kraft Motor Co.
Studebaker Bros. Mfg. Co.
Alden Sampson Mfg. Co.
Courier Car Co.
Peerless Motor Car Co.
Packard Motor Car Co.
W. H. McIntyre Co.
The Waverley Co.
Reo Motor Car Co.
Willys-Overland Co.
Cartercar Co.
Grabowsky Power Wagon Co.
The Garford Co.
Avery Co.
The Pope Mfg. Co.
American Locomotive Co.
Rapid Motor Vehicle Co.
Pierce-Arrow Motor Car Co.
Metzger Motor Car Co.
H. H. Franklin Mfg. Co.
Knox Automobile Co.
Kissel Motor Car Co.
The Gramm Motor Car Co.
The Kelly Motor Truck Co.
Harder's Fire Proof Storage & Van Co.
Adams Bros. Co.
Randolph Motor Car Co.
Chase Motor Truck Co.
Saurer Motor Trucks.
Chicago Commercial Car Co.
Lamsden Company.
Federal Motor Truck Co.
Automobile Maintenance & Mfg. Co.
Washington Motor Vehicle Co.
Economy Motor Car Co.
Marquette Motor Vehicle Co.
Monitor Automobile Works.
Clark Delivery Car Co.

1910 Edison Storage Battery

(Continued from page 612)

This monstrous abuse is at the bottom of all the failures that have been made heretofore, and it is yet to be said that the batteries used in vehicle work are made as light as possible, nor must it be forgotten that the lighter they are the more frail they will be. In central station work the questions of weight are handled on a basis of the advantage afforded from the investment point of view, and cognizance is taken of the fact that it pays to add to the weight of the battery up to the limit where the increased life ceases to pay the current rate of interest on the investment. In vehicle work, however, all such considerations are cast adrift; the sole requirement is to so design the battery that it will come within the allowable weight, afford the requisite energy for the desired radius of travel, and last long enough to make it worth while, taking into account the absence of electrochemical skill on the part of the owner of the car and the wish on his part to go somewhere and come back again.

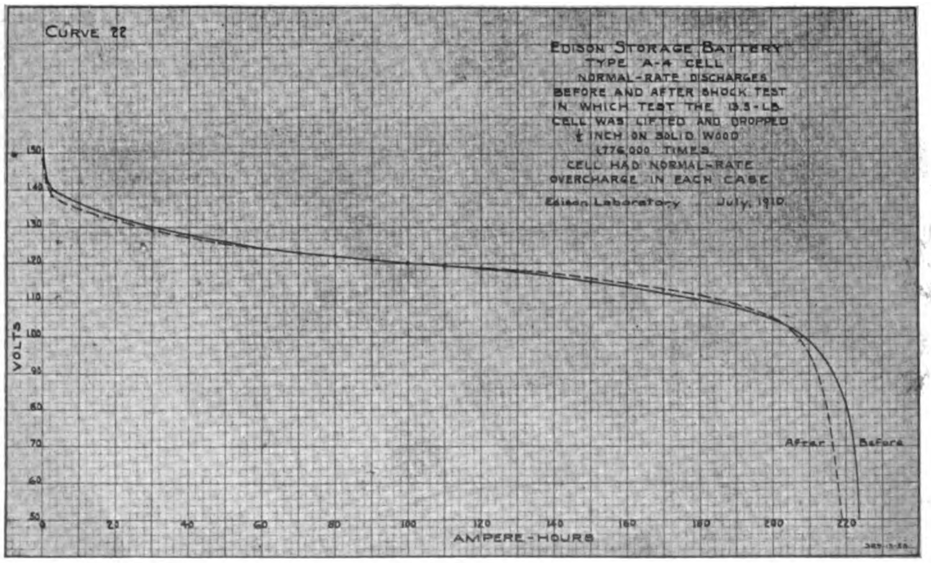


Fig. 3—Chart showing normal rate of discharge of a Type A-4 cell before and after shock test

The Edison vehicle battery, as shown in Fig. 1, is composed of a plurality of cells, made up of positive and negative elements in a steel can, the latter being sealed, and as the illustration shows, six of these cells of battery are joined together and assembled in a wooden crate. Three crates of cells are shown, but there may be any number, depending upon the potential difference required in charging, and the design of the charging equipment. The general appearance of the cells composing the battery is shown in Fig. 2, indicating five sizes, as used in general service, vehicle transportation, vehicle lighting and ignition work. These cells of battery are known at the Edison plant as type "A" or "B." and are marked A-4, if there are four positive elements, A-6 if there are six positive elements, and A-8 if there are eight

Detroit Automobile News

E-M-F CUT, NEW FOUR-PASSENGER MODEL HUPP, AND A DOZEN OTHER SUBJECTS OF LIVE INTEREST TO MOTORDOM GENERALLY ARE CHRONICLED

DETROIT, Oct. 10—Something of a stir was created last week by the announcement of the E-M-F Co. that it had decided to reduce the price of the E-M-F "Thirty" from $1,250 to $1,000, and the Flanders "Twenty" from $750 to $700. President Flanders gave as the reason for this action the fact that manufacturing facilities had increased to an extent where it was possible to make cars at this figure without sacrificing quality or workmanship and still have a reasonable profit left. It is strongly intimated, however, that an inkling that some other manufacturers were contemplating a cut in price was responsible for this sudden action on the part of the E-M-F Co. The cut was announced at a meeting of E-M-F branch managers.

Robert K. Davis, manager of the United Motor Detroit Co., Michigan distributor of the Maxwell-Briscoe and Columbia cars, entertained the company's Michigan agents at luncheon in the Griswold House, Saturday, when the policy for 1911 was outlined. Mr. Davis announced positively that there would be no cut in Maxwell and Columbia prices.

Another low-priced automobile claiming Detroit as its home will shortly make its appearance, announcement being made that before Nov. 1 the Hupp Motor Car Co. will place on the market a four-passenger car selling for $900. The car will have the same 20-horsepower motor that has been used in the Hupmobile, but will have a wheelbase of 110 inches and sell for $900. At the same time the Hupp Company announces that it will guarantee all its cars for life.

The Wolverine Motor Club, organized some months ago, and already counted among the most energetic of local bodies, is making a vigorous campaign with a view to securing 3,000 members by Jan. 1. A club house is also in prospect. The club has proffered the services of its members to Police Commissioner Croul in the campaign against reckless driving.

The Reo Motor Truck Co., of Lansing, has filed $1,000,000 articles of incorporation with the Secretary of State. R. E. Olds, James H. Thompson and J. Edward Roe, of Lansing, are named as stockholders.

The Motor Manufacturing Co., of Muskegon, has increased its capital stock from $100,000 to $150,000.

The Demot car plant will shortly be put in operation again, the receiver of the company having been ordered by the court to take such a course. The receiver has accordingly contracted with the Ross & Young Co. to do the machine work and assembling.

The Detroit Metal Founding Co. has been incorporated with a capital stock of $25,000.

The Oliver Motor Car Co. has just moved into its recently acquired plant in the western part of the city, and is installing mechanical equipment which will give it one of the best commercial car plants in the city.

Much of the uneasiness which prevailed in motor car circles has been removed by official announcement of the closing of the $15,000,000 loan by the General Motors Co. The news was particularly welcome in Flint, where it is taken to mean a speedy resumption of activities at the Buick and associated plants on a wide scale. Other General Motors plants throughout the State also expect to be favorably affected by the settlement.

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positive elements, or B-2 if there are two positive elements, and B-4 if there are four positive elements. The B-4 size is rated at 90 ampere hours, and besides offering a wide opportunity in ignition work, is available for the electric lighting of gasoline automobiles. The B-2 size is rather too small (45 ampere hours) for electric lighting and is confined to ignition work. The "A" series are designed specifically for electric vehicle service and street car work.

Of the remaining important general considerations not heretofore discussed, one takes into account the effect of shock and jar upon the battery and vehicle service, and in the Edison Laboratory a machine was devised by means of which a cell of battery undergoing a shock test is lifted and dropped (falling under the force of gravity) once every second, continuously, and this process has been going on for a couple of years, so that the effect of shock and jar upon the Edison battery was determined in this way. Fig. 3 is a chart so contrived as to show the normal rate of discharge of a type A-4 cell, before and after shock test, in which the cell weighing 13.5 pounds was lifted and dropped ½ inch on solid wood 1,776,000 times. The solid line in the curve represents the discharge before the shock test, and the dotted line is plotted from the discharge after the shock test.

The remaining general consideration, not considering electrochemical phenomena, involves the effect of short-circuiting the battery. Fig. 4 shows the apparatus used in the short-circuiting test, in which A-4 is the cell of battery, S1 is the breakdown switch, C1 and C2 are large diameter electrical conductors of very low resistance, used in making the connections between the battery terminals and the terminals of the switch. A1 is the ampere meter of the Weston type, with a shunt S11 used in conjunction with the ampere meter in taking the readings in amperes during the short-circuiting period.

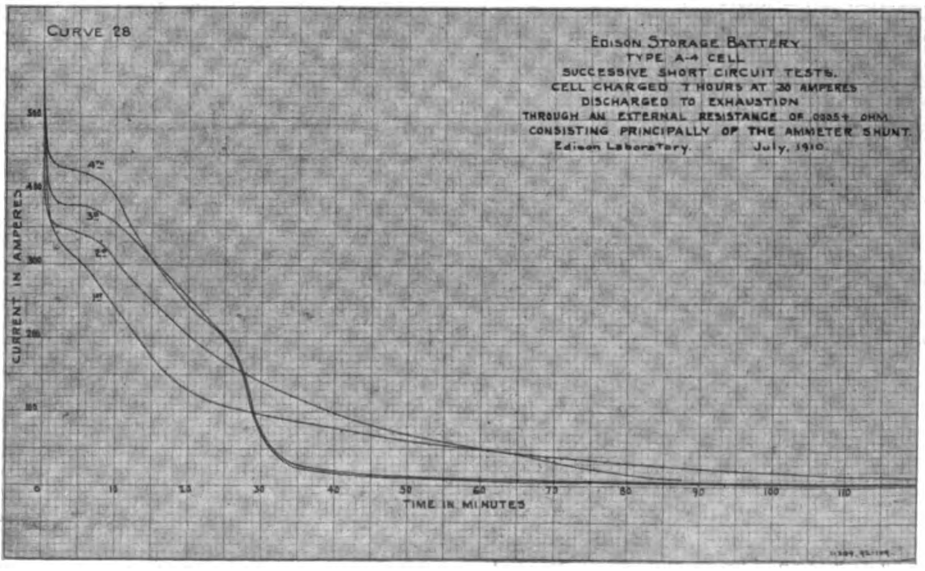

Fig. 5—Chart showing the discharge of a Type A-4 cell under short-circuiting conditions

Prominent Automobile Accessories

CONFORMS WITH THE LAW

A new lamp that fully complies with the law that compels cars in some States to have rear number plates illuminated at night has been placed on the market by John L. Parker Company, 62 Jackson street, Worcester, Mass.

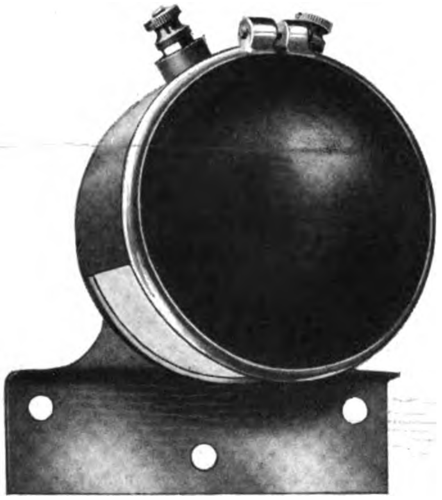

Fig. 1—A rear lamp that conforms with law

It is a combination lamp and number-plate holder and its appearance is very neat and compact. The large red lens is a semaphore pattern ruby and shows a clear light for a great distance. The bottom of the lamp is fitted with a clear white glass set in such a position that the light is thrown upon the number. The current is supplied from a six-volt storage battery to a two-candlepower lamp (Fig. 1).

LIGHT WHERE YOU WANT IT

To wash a car properly—and in the majority of garages it is necessary to carry this operation out at night—a good light is required. The ordinary ceiling or drop lights are inadequate as there is more dirt under the car than on the top surface. A handy portable wash rack light is marketed by The Brown Company, of Syracuse, N. Y., and when this is in use all other lights can be extinguished. It is easily portable and consists of a four-footed cast-iron base with slats and solid quadrant for holding small pieces of sponges, chamois, soap, etc. Extending upward from the base is a 3-foot riser. Attached to this and held at any height by a thumbscrew is a twin socket and 12-inch reflector. With the outfit is an 8-foot covered wire extension and socket wired for immediate use (Fig. 2).

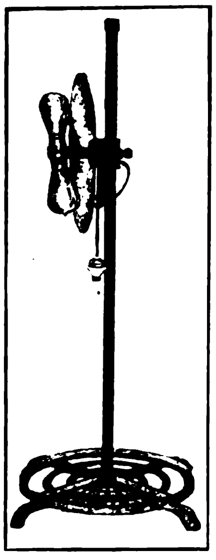

Fig. 2—Can be carried around the garage

SPARK PLUG SWITCH

An accessory that will save the autoist much time and trouble is manufactured by the H. S. M. Auto Switch Company, of 1118 Betz Building, Philadelphia, Pa. It consists of a cut-out switch to be attached to the spark plugs. In the endeavor to locate which cylinder is missing fire under ordinary conditions one has to use some tool, as a screwdriver, which, to say the least, is primitive, and unless properly insulated will result in a shock. By attaching the H. S. M. auto switch to the plug at one end and the high-tension at the other it is possible to ascertain in a minute where the trouble lays, and if the handle is held in the position indicated in Fig. 3 in the majority of cases oil or carbon will be burnt away without taking the plug out, owing to the spark being intensified crossing the gap made by the switch. It also obviates dropping plug terminals in the pan as there is no necessity to undo the terminal completely to remove the switch. If the cause of the misfire is in the circuit and not the plug this can instantly be seen, as when the switch is raised no spark will jump to the plug.

THE KELLOGG FOUR-CYLINDER PUMP

The pump illustrated in Fig. 4 is manufactured by the Kellogg Manufacturing Company, of Rochester, N. Y., and can be used for pumping up the tires or used in connection with a distributor for cranking the motor. It consists of a four-cylinder motor built along the lines of a gas engine and the method of its attachment can be changed, when desired, to suit any particular car.

Fig. 3—Time-saving spark-plug switch

It is being fitted to all 1911 Peerless cars in the manner illustrated, driven direct from the secondary shaft of the gear box. This is operated by a lever at the side of the car. A hose which is connected to the pump is coiled under the front seat. To inflate a tire, merely couple this hose on to the tire, move the lever and start the engine. It can be fitted to any car and if room cannot be found to couple up to the gear box a belt transmission from the propeller shaft would answer equally well provided it was only required to pump the tires. The base is cast aluminum with a shaft running in bronze bearings. The lift is effected by a hardened-steel cam which runs to a bath of oil. The pump is 8 inches long, 7 inches high and 2 3-4 inches wide. Each cylinder pumps free air, and as one of the cylinders is always on the up stroke a steady flow of air is obtained at all times.

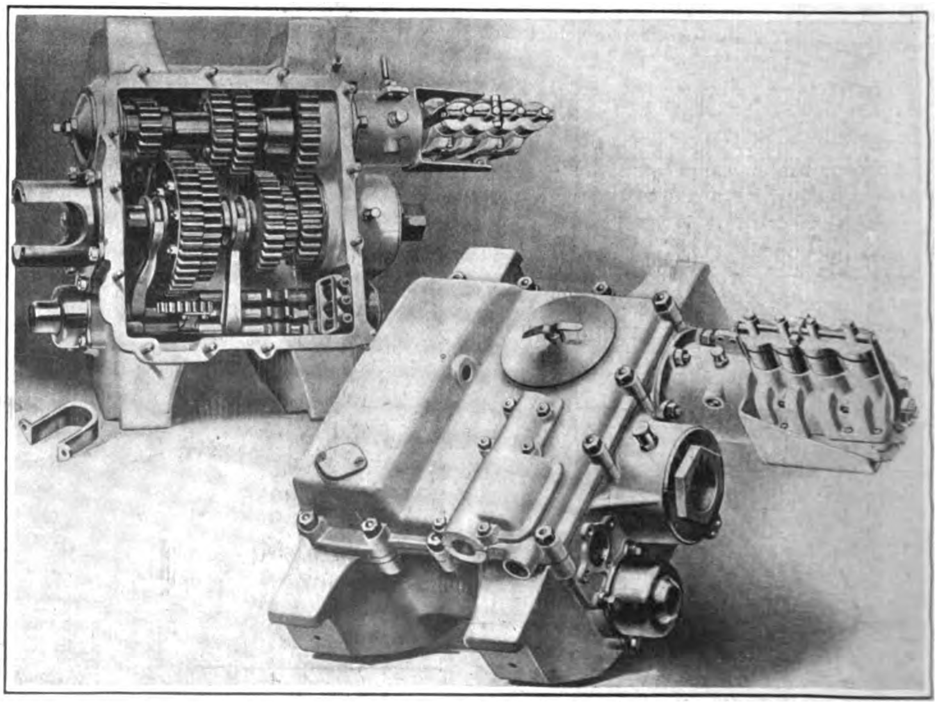

Fig. 4—A useful four-cylinder pump

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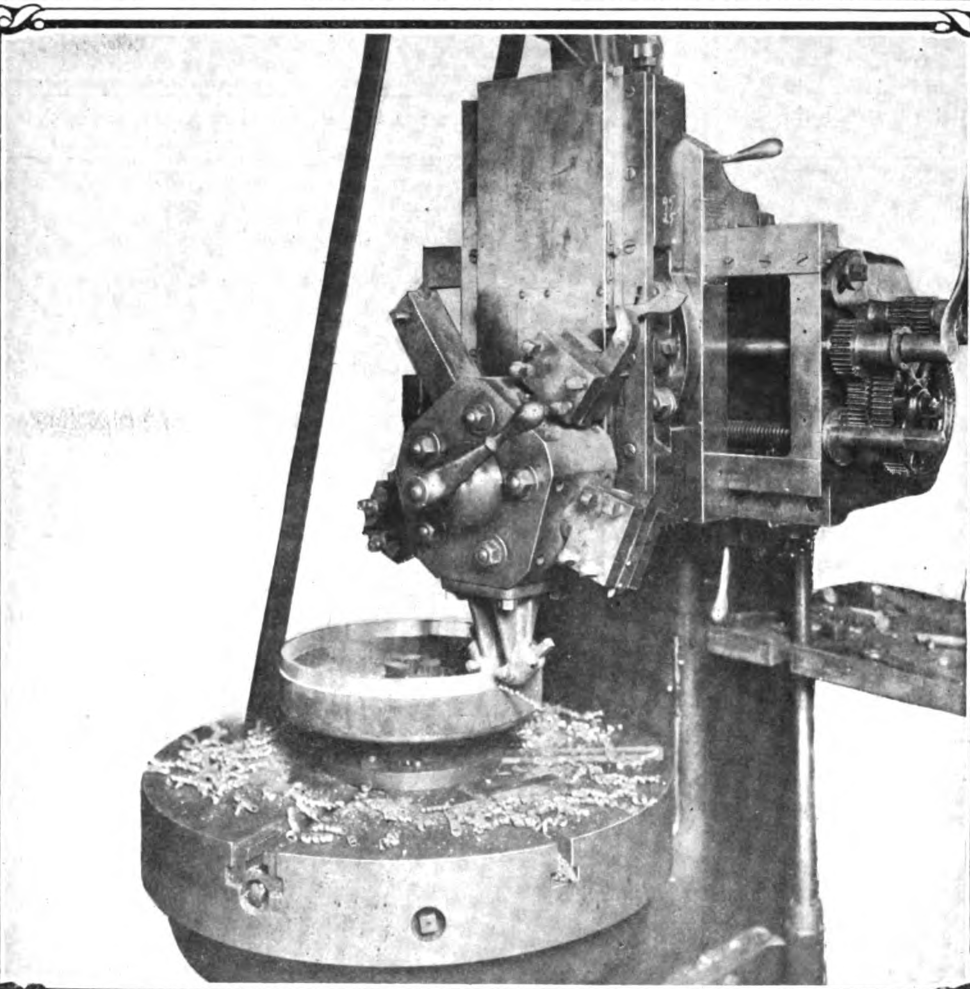
The Automobile

Duplication Methods Supreme

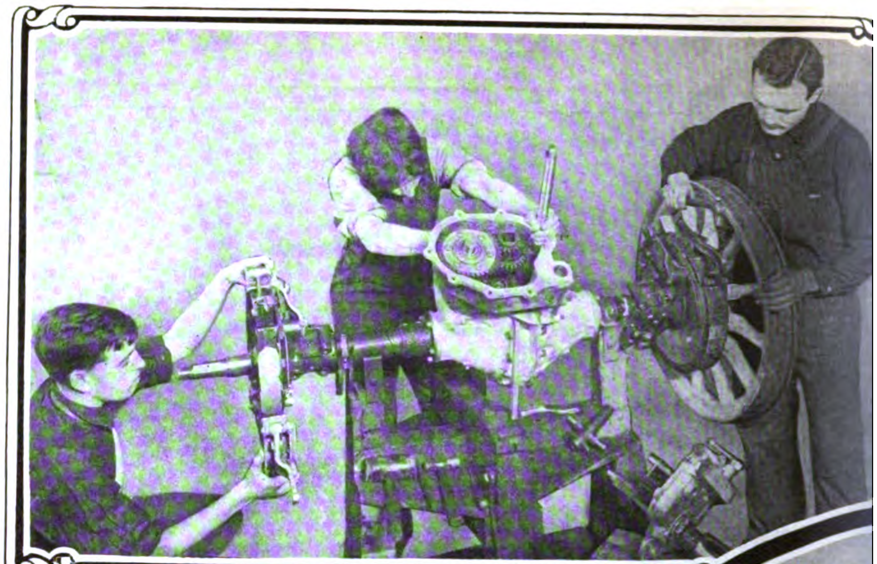


Vertical turret mill in the Premier plant on brakedrum work, simultaneously tooling inside and out

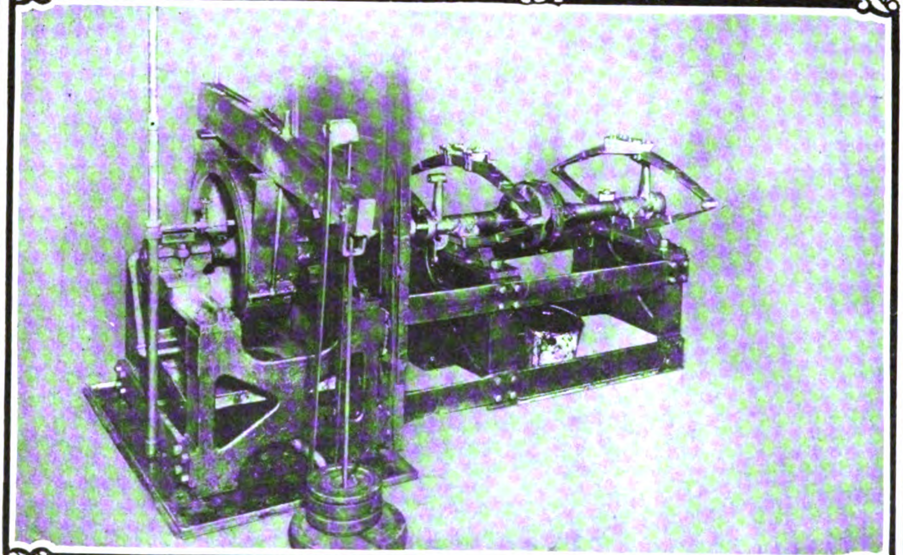
TEN YEARS of persistent effort on the part of American automobile builders, beginning in sharp competition with the foreign makers of cars, has resulted in the final supremacy of the methods involving the duplication of parts as practiced in American shops as against the methods demanding employment of a surfeit of labor, more or less skilled to be sure, but unguided by processing pictures and special machine tools of the character that compel uniformity. But it was not the primal idea of American makers to struggle against foreign competition; every skilled shop manager in this country is fully alive to the enormous handicap that anchors the foreign shops to an ancient precedent that puts a bar on quantity production, rendering it impossible for all such makers to consider, even for a moment, the enormous initial investment that must be made ere quantity production on a duplicating basis can be recognized as a reality.

During the formative period in American plants the output of automobiles suffered somewhat in comparison with importations of cars. Those who failed to see the dawn of the real automobile of the future were led to believe that foreign cars were better; that the materials were more suitable, the designs more scientific, and the workmanship on a higher plane. Purchasers of these automobiles found that they would not last forever, and when they went to the makers for repair parts they were astounded at the enormous cost thereof; but that was not all. It seemed strange to these purchasers that the parts as purchased, despite the beauty of their finish, would not go into place without being tinkered with, and they finally found out what every American builder predicted, *i.e.*, no two workmen, no matter how skilled they may be, will ever succeed in making two parts and have them on a duplicating basis.

It was soon discovered that the mere purchasing of a well-made automobile was not the whole story. The quality of a car will only be known to the buyer thereof after he finds out how much the maintenance cost will be. The price of an automobile is not determined by the amount of the initial payment; the real cost, in fact, is a matter of bookkeeping, and the final balance can only be struck when the life of the car is ended. The patrons of high-priced hand-made automobiles, while they could not have been purse-proud after they settled for the cars, looked down upon those who were far-sighted enough to go in for machine-made American automobiles for even a whole year after they took title to their rather nice-looking creations. The surprise came when repair accounts were put into contrast with each other. The less pretentious American automobiles naturally looked better after a year of service because it was possible to keep them in a state of good repair with the money that was still hiding in the purchaser's pocketbook after title was taken to the car. The cost

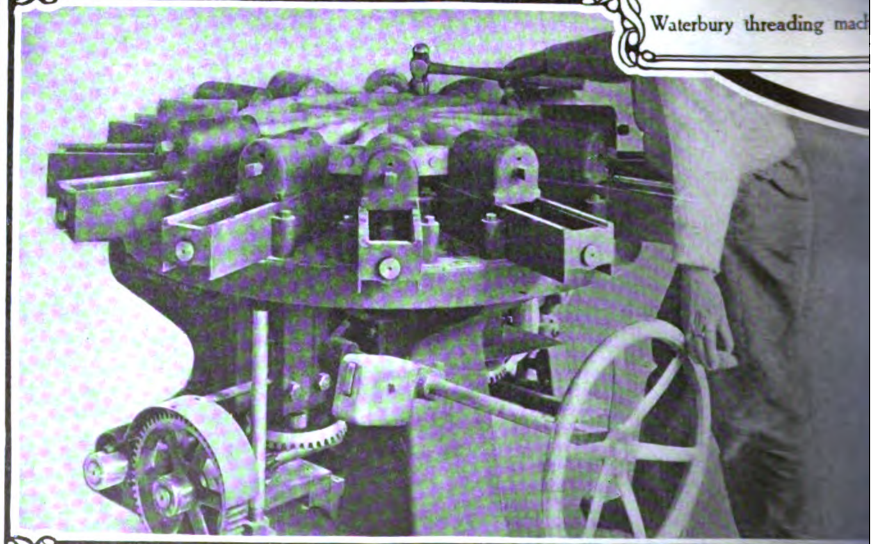


Assembling live rear axles at the Packard plant, employing three sets of men with military precision

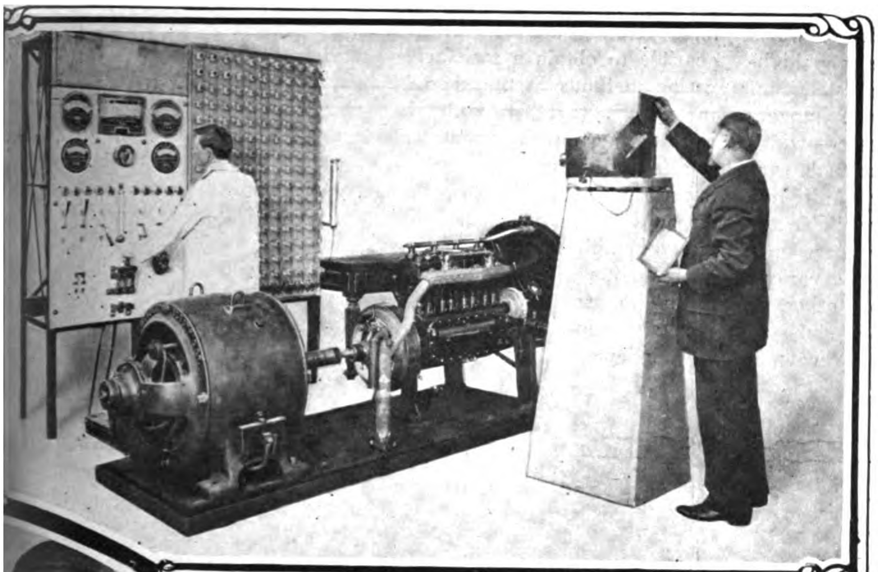


Prony brake test of live rear axle taken at the Franklin plant

Waterbury threading mach

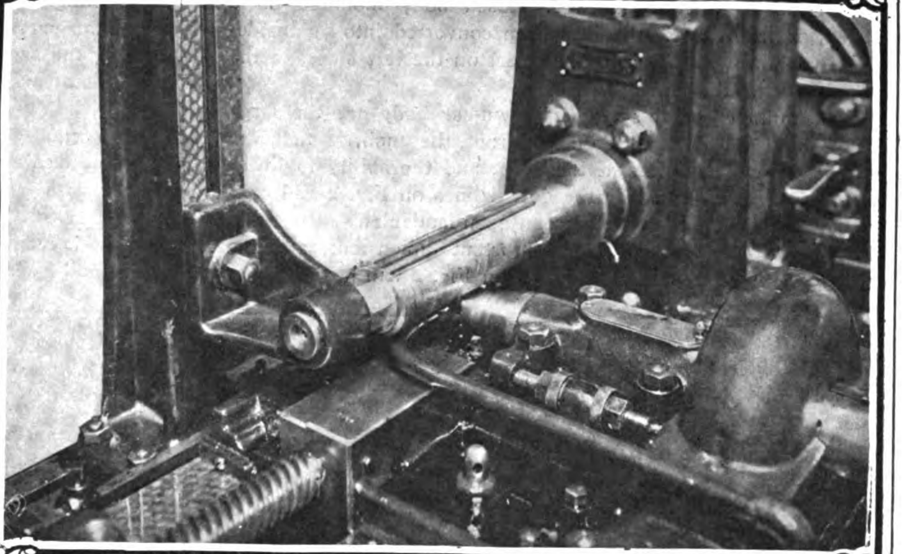


Wheel building at the Packard plant, showing the method of assembling the woodwork

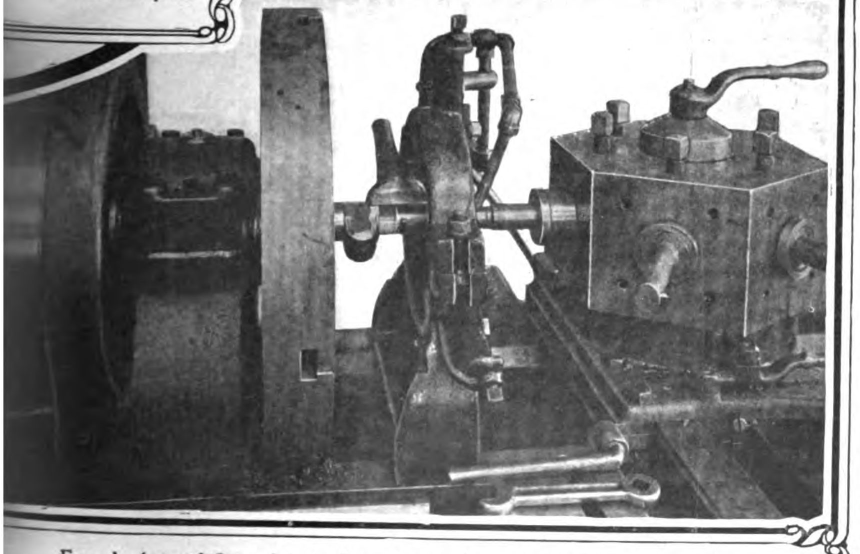


Motor testing in the Rambler plant, showing the Purdy manograph on a pedestal to the right

on at the Maxwell plant



Gould and Eberhardt gear cutter, cutting 17 blanks at one setting in the Brush plant



Example of turret lathe work in the Pierce-Arrow plant—finishing alloy steel knuckles

of maintenance was also within bounds, due to the uniform method of manufacture, but it will be a fallacy to overlook the great main consideration, *i.e.*, the cost of substituting repair for worn-out parts is nominal if the parts are made on a duplicating basis, whereas it is enormous if the parts are whittled out by hand and have to be reconstructed in the garage repair shop.

The history of the automobile, almost from its inception, due to the influence of the makes of cars that are not on a duplicating basis, is punctuated with intense dissatisfaction on account of the enormous garage expenses that have confronted automobilists. This problem has never been a serious one for the autoist who had the foresight to buy the kind of car that is made in a properly equipped plant, fitted out with machine tools of the character that cannot be used at all unless they produce parts on a duplicating basis.

In order to properly elucidate the point that is to be made here, illustrations of just a few of the leading shop processes are presented in which it will be observed that the workman is a mere spectator during the time that the operations are being performed by the machine tools. There is only one way by which a workman can be tolerated in a plant where parts are made on a duplicating basis, and that is, when he plays the part of a spectator only, excepting that he must be there in time to stop the machine when the work is done, replacing the same with new work, after which he again becomes a spectator, and is free to study algebra, if he like; lament over his past mis-deeds, figure on the world's series or build castles in Spain.

Of the unexplained difficulties involved in automobile work, experts have said very little to clear up the reasons why high-priced man-made cars wear out too soon. A broad statement of the underlying facts would, of course, have to take into account the expenditure of energy—in other words, losses—which much necessarily follow if the component parts are not made with precision and if the fits are poor. In the illustration of the live rear axle test at the Franklin plant the facilities are available for determining whether or not the live rear axles as made are on a duplicating basis, because since the parts come from the various departments *en masse,* they must be in replica of each other, or the assemblages will be faulty, and the brake test will show an excess of power taken and dissipated in the form of heat; in other words, the friction load will be too high. Without the motor testing methods at the Rambler plant it would be impossible to obtain a satisfactory result in the absence of duplicating methods in the shop because the electrical devices used in testing, together with the manograph check, would disclose the incongruities that are ever present when workmen alone are depended upon for accuracy. Other illustrations convey the impression of rigidity of the machine tools, as in the Pierce-Arrow illustration of alloy steel knuckle finishing. Other illustrations indicate multiple operations by means of which the quantity of work turned out is rendered sufficient to make it pay, as in the assembling of Packard axles, utilizing three sets of men simultaneously, they working with military precision, each gang independent of the other.

Inside-Drive Coupe Landaulet

GEORGE J. MERCER SHOWS IN DETAIL HOW THIS TYPE OF BODY MAY BE APPLIED TO A MITCHELL TAXICAB CHASSIS

IN the accompanying illustrations are shown in detail the construction of a four-passenger closed body mounted on a Mitchell taxicab chassis that has been converted into an inside-driven machine with the steering wheel on the left side and the change levers in the center.

The advantages of this type of town-car body are the large amount of light on the sides and the front, the unobstructed view from the rounded corners at the front and the ability to lower the rear part as indicated by the dotted lines on Fig. 2 and convert the body into the regulation semi-open landaulet.

Figs. 2, 3, 4 and 5 show the important dimensions, and the scale as presented along the base line on Fig. 2 will be a medium by which the other dimensions required can be quickly ascertained.

The seating is for four adults or three besides the operator. The cushion part of the operator's seat is made to tilt up as indicated by the arrow marks and the dotted lines on Fig. 2; this will permit of access from either side. The back of this seat is stationary, however, and the seat has the necessary stiffness and security to satisfy the driver.

This body can be made either with wood frame and metal panels or with wood panels, as the design is suitable for either form of construction. At the front the glass is divided and the upper half is made to swing outward to form a visor shield, and the door and back side glass frames are made to drop.

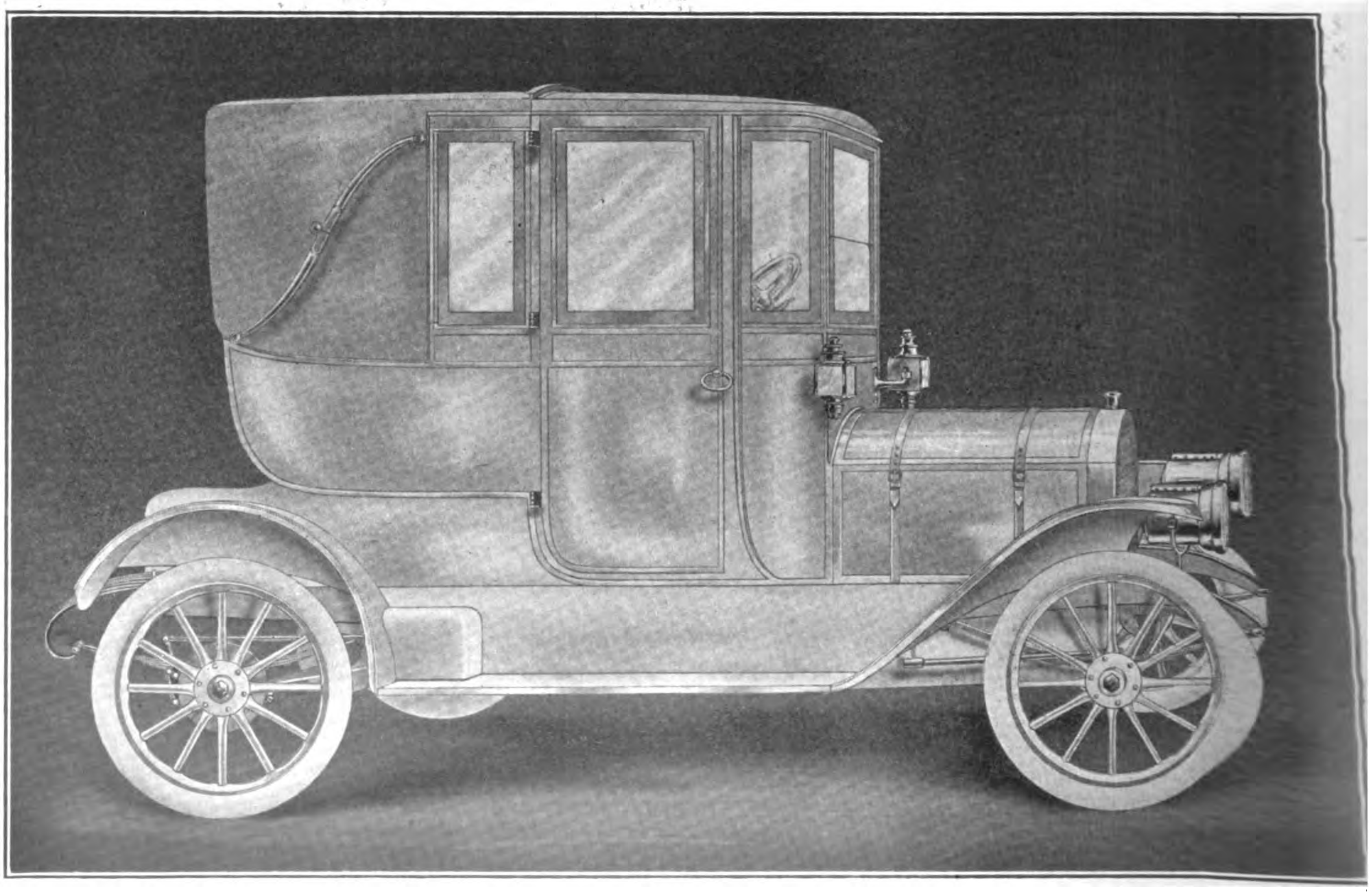


FIG. 1—SHOWING A NEW TYPE OF BODY ESPECIALLY ADAPTED TO WINTER DRIVING AND TOWN-CAR WORK

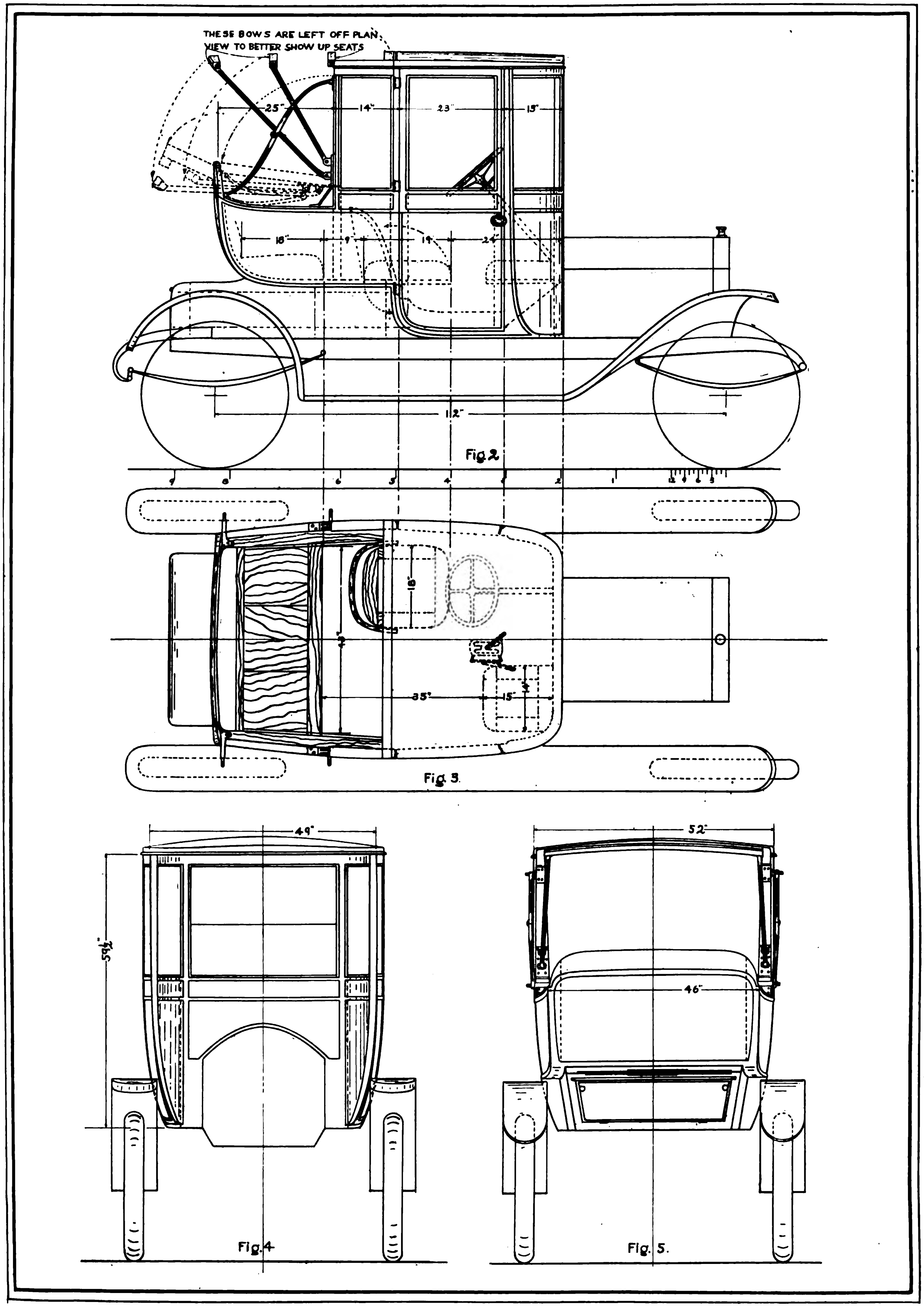
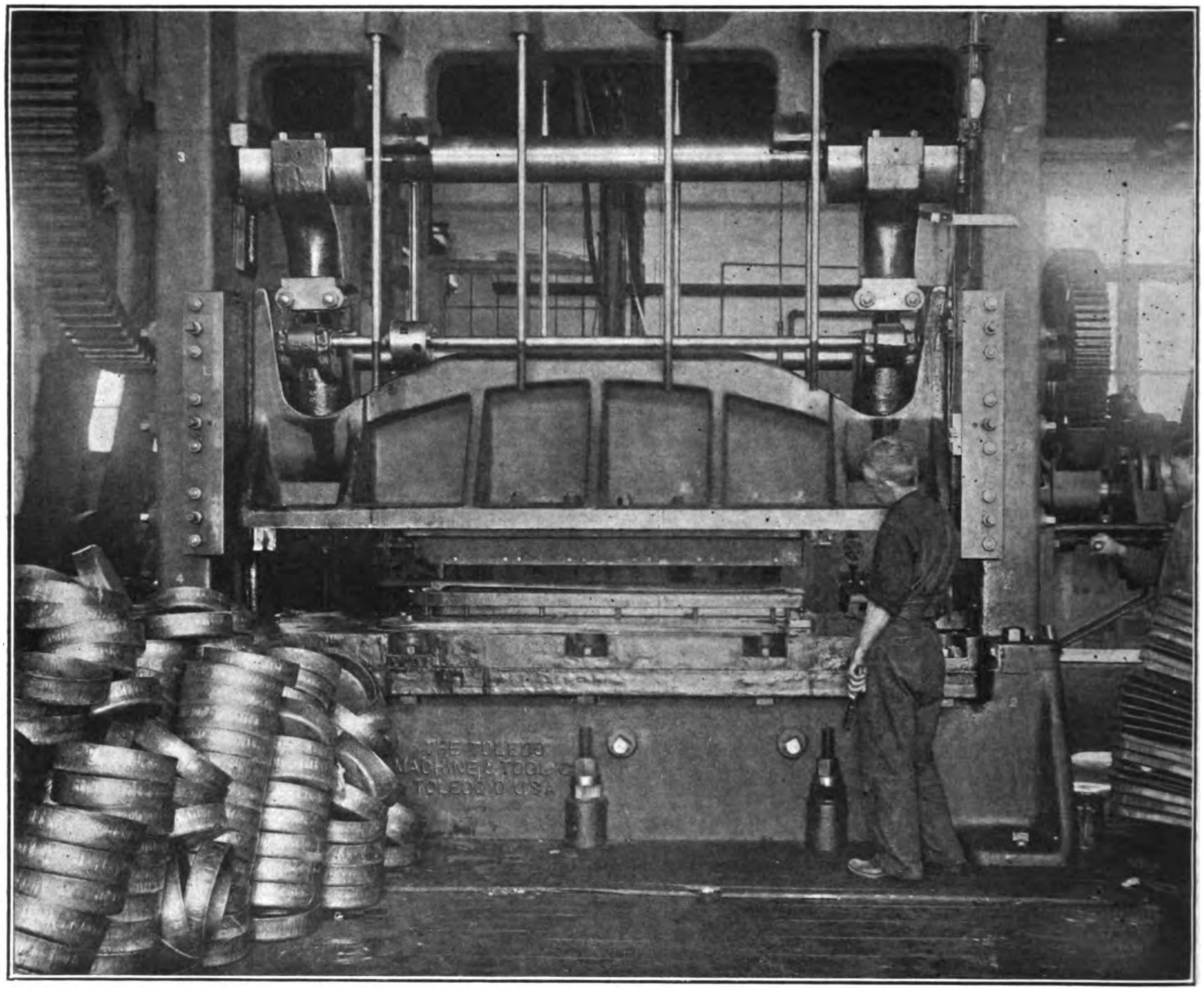


Fig. 2—Side elevation. **Fig. 3**—Plan of body. **Fig. 4**—Front elevation. **Fig. 5**—Rear elevation

Among the Makers

EXCELLENT PROSPECTS FOR WINTER AUTOMOBILING—DETAILS OF THE 1911 CHADWICK SHOW A MATERIAL ADVANCE IN EXCELLENCE —THE NEW SPEEDWELL LINE



HOW BRAKEDRUMS ARE FORMED OUT OF SHEET STEEL—TAKEN AT THE MAXWELL PLANT AT TARRYTOWN

FOR a time it looked as if the 1911 models of automobiles would be much retarded, due to bad automobile weather last Spring and the enormous number of 1910 automobiles that were then contemplated. The present spell of good automobiling weather covers substantially the whole American continent, and this year differs from any previous year from the builders' point of view, from the fact that the demand for automobiles, ostensibly for Winter use, is greater than it ever was before. While it is true that the weather and the promise of a mild Autumn have much to do by way of encouraging automobilists, the fact remains that the new fore-door types of bodies, coupled with larger diameter wheels and better motor performance, remove the last obstacle that stood in the way of winter automobiling for pleasure.

But it is not the prospect of pleasure alone that serves as the motive for spending money on automobiles to be used in the winter time. When the snow is deepest and the weather conditions discourage every other form of transit to an absolute shut-down, thus stagnating business and serving as the basis for great commercial loss, the automobile is the one remaining type of vehicle for transportation purposes that has within itself the inherent qualities to combat the elements and deliver the lucky owner to his place of business on time in the morning and back to his place of abode in fettle for dinner, and ready to admit that he may have saved the price of a good automobile in a single day.

Even if it is not possible to trace so large a saving in so short a time, the economic advantage is sufficiently definite to be well worth taking into account, and to this is added the pleasure of living in comfort and in contentment.

The cost of living in the manner that requires the use of an automobile is reduced to a low ebb when account is taken of the greater amount of work that the owner can do.

The Chadwick for 1911

ALL FOUR MODELS ARE MECHANICALLY IDENTICAL—WHEELBASE OF THE RUNABOUT SHORTENED TO FACILITATE EASY HANDLING AT HIGH SPEEDS

MECHANICALLY and in general details of engineering design the 1911 models of the Chadwick, made by the Chadwick Engineering Works, of Pottstown, Pa., are identical, the only difference between the five- and seven-passenger types being the weight of the springs and the set of the steering gear. In the Runabout, or two-passenger model, the wheelbase has been considerably shortened to facilitate handling at high speeds and in addition it is equipped with special long-distance oil and gasoline tanks.

The Touring Car model is a 133-inch wheelbase chassis fitted with 36 x 4 tires in the front and 37 x 5 in the rear. The tonneau is large and comfortable, and the auxiliary seats when folded up occupy very small space in the tonneau. The rake of the steering gear, the finish and upholstering are all that can be desired. The standard colors are Brewster green and Chadwick red, upholstering to match. The standard equipment consists of demountable rims, tire brackets, robe rail, a foot rail, full set of tools, a 10-inch searchlight, with Prest-O-Lite tank, combination electric and oil side and tail lights, and storage battery.

There will be two Tourabout models offered. The miniature tonneau Tourabout, seating four passengers comfortably or five closely, the body design being extremely low and rakish with extreme rake to the steering gear, is furnished in Royal blue and Brewster green. Tire equipment is 36 x 4 1-2 front and rear, demountable rims. The standard Tourabout, a full five-passenger car, with detachable tonneau with double side doors, will prove unusually interesting to those who do not desire the carrying capacity of a large touring car. In this model has been accomplished that which has so long been striven for, the production of a five-passenger car which will possess the easy riding qualities of the larger model.

The Runabout model is a 112-inch wheelbase chassis and has identically the same engine as the Tourabout and Touring Car models, the only difference throughout the construction being the shortening up to allow placing it in the shorter wheelbase. Possessing power, speed, flexibility, and ease of operation to the greatest possible extent, and having on the high gear the ability to throttle to six miles an hour with an ultimate speed of ninety miles, this car is equipped with a luxurious and carefully worked-out body whose lines are graceful, attractive and symmetrical. It is not only adapted for high speed work, but is equally available for park or city driving or long-distance touring. The carrying capacity of gasoline is 50 gallons and of lubricating oil 23 gallons, enabling one to be independent of the base of supplies.

The type-19 engine shows the following improvements and refinements. The carbureter has been increased in size; around the inlet manifold has been placed a heating attachment not only enclosing the manifold, but the heater pipe also passes directly through the center. This will enable the low grades of gasoline now obtainable on the market to be used satisfactorily, and when the car is throttled down very low on direct drive there will be no difficulty experienced from condensation of the gas in the inlet manifold. The heating arrangement is so designed that the temperature of the inlet manifold can be maintained at any point up to the temperature of the heating water, enabling it to be instantly adjusted to meet the conditions found in different parts of the country. A special flooding device and air shutter have been installed for the purpose of easy starting. The spiral advance on the magneto used in former models will be maintained, with a slight increase in size and the addition of an outboard bearing in order to reduce to a minimum the wear and lost motion, and tending to greater quietness. The inlet valves have been largely increased in size and placed in the head of the motor, actuated by push rods and rocker arms, their connecting valve lifts being made instantly adjustable in order to insure noiseless operation. All points and working parts are carefully ground and case-hardened to insure long life. Inlet and exhaust springs are carefully faced square and have been slightly stiffened. There has been a slight increase in the size of waterjacket, due to the changing of the valve position, and the jackets in conjunction with the radiator carry nine gallons of cooling water. The pump has been placed on the left side of the engine, inserted in the oiler drive line with an Oldham coupling, and is easily removed. The oiler has been increased in capacity and is now furnished with a large filler hole, one of the small details that tend to greater satisfaction. The Herz distributor has been removed from the rear of the engine and placed in a most accessible and well-protected position on the left side, well to the front, being mounted vertically and driven from the pump line shaft and actuated by a spiral advance similar to that of the magneto. A separate set of plugs has been installed for the auxiliary system, which furnishes a complete double system of ignition and prevents trouble. The time gears are all of hardened steel, are carefully cut, and accurately ground and fitted to insure their quiet and smooth operation. The installing of hardened-steel time gears absolutely insures long life and durability.

The clutch is of the internal expanding type, actuated by a rack and pinion, and held into engagement by a very light spring pressure. The process of engagement is very smooth, being free from jerking or gripping. The flywheel is 18 inches in diameter, with six-inch face. The expanding band of the clutch is leather-faced at point of contact with flywheel. A strong feature of this clutch is the fact that by removing three nuts the band can be slipped out and the condition of the leather face examined or treated if desired, and band reinserted without disturbing in any one particular its adjustment. The foot lever operates the usual type of yoke, actuating a sleeve which carries a small rack operating a pinion and radial shaft inside of the clutch, the outer end of this clutch carrying a small crank surrounded by a hardened-steel roller. The rotation of this crank by the change of position of the clutch pedal forces the band in or out of engagement with the flywheel. There is attached to the body of the clutch a drum, and as the pedal is actuated to throw the clutch out, the small brake passes down beside the drum and prevents the clutch expanding. This brake is so designed as not to interfere with the clutch adjustment, and in case incorrect adjustment is made, it would not prevent the clutch being entirely disengaged.

The universal joint is not in the ordinary acceptance of the term a universal joint, but a flexible joint made of chrome nickel steel with pins, ball-shaped on the end, of chrome nickel steel, heat treated, the joint being respectively keyed to the drive shaft on the transmission and the connecting drive shaft between the clutch and the transmission. This joint, after many thousands of miles' operation in high-powered cars, has shown no signs of wear.

The drive shaft is of special heat-treated steel, flanged for carrying the clutch body integral.

The transmission is the Chadwick semi-selective type, three positions being located from the neutral, namely, first, second and reverse; the gear-shifting lever being equipped with a ratchet device which positively locks each gear shift in its correct relation and prevents passing through or improperly meshing gears. The principle of the Chadwick transmission lies in the large bevel gear in the rear, the intermediate drive being directly from the

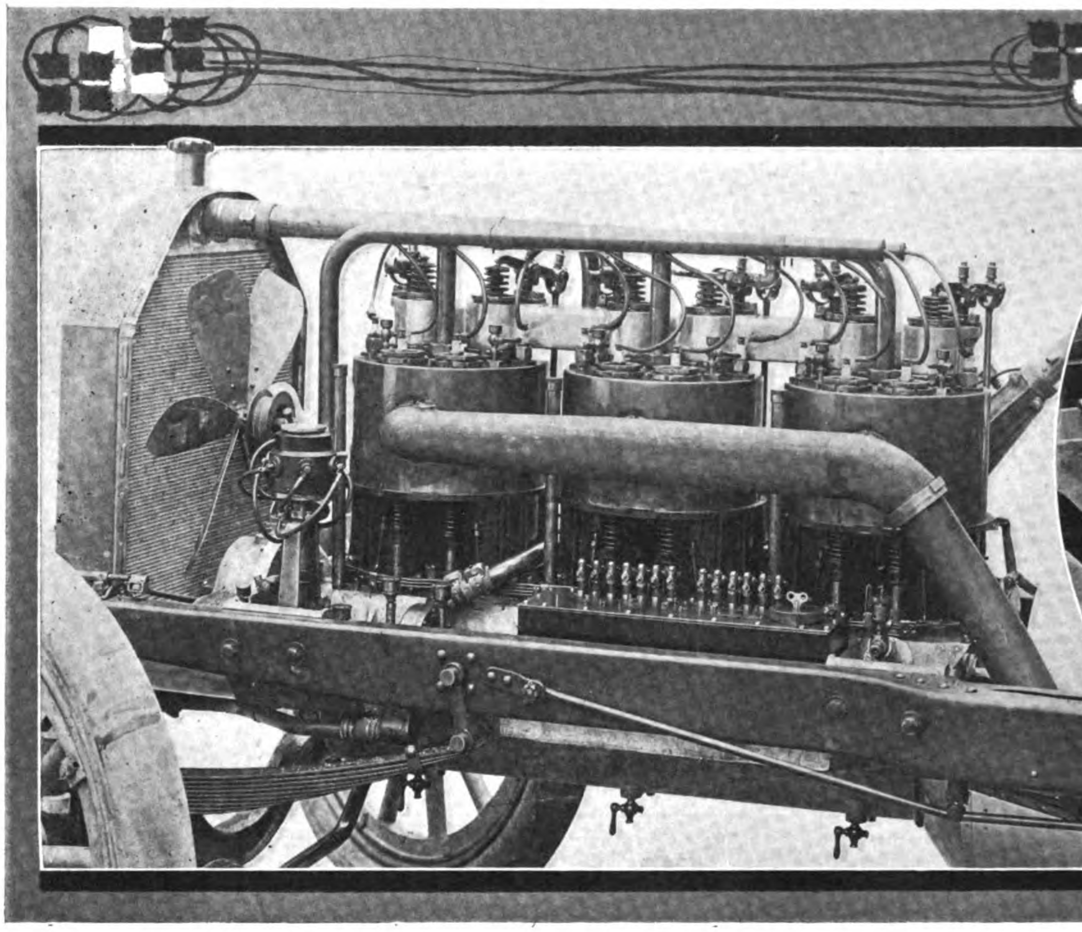


Fig. 1—Left-hand side of engine showing lubricator, timer and other details

Fig. 3—Detailed view of clutch mechanism, show

drive shaft to the counter shaft and to one set of double bevel gears, drive being through the line shaft directly to the other set of bevels, with direct drive on fourth. The gear ratio is 2.25 to 1 on the Touring Car and Tourabouts. Gears are of a special alloy, heat treated, and where possible the gears are forged integral with their shafts. The bearings are all unusually large, imported, all gears being carefully cut and accurately ground to insure their quietness of operation. A filler plate for grease is installed in top of transmission and at all points where shafts enter or leave the transmission carefully designed grease retaining devices are installed.

SPECIFICATIONS FOR CHADWI

MODELS	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION	
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radi-ator	Pump	Mag-neto	Battery
Type 19........	$5500	60	Tour'g..	7	6	5	6	Pairs..	Tubular.	Cent'f'l..	Bosch...	Storage.
Type 19........	5500	60	T'b't*..	5	6	5	6	Pairs..	Tubular.	Cent'f'l..	Bosch...	Storage..
Type 19........	5500	60	R'bout.	3	6	5	6	Pairs..	Tubular.	Cent'f'l..	Bosch...	Storage.
Type 19........	6500	60	Limous.	7	6	5	6	Pairs..	Tubular.	Cent'f'l..	Bosch...	Storage..

* "Miniature Tonneau" or "Stan

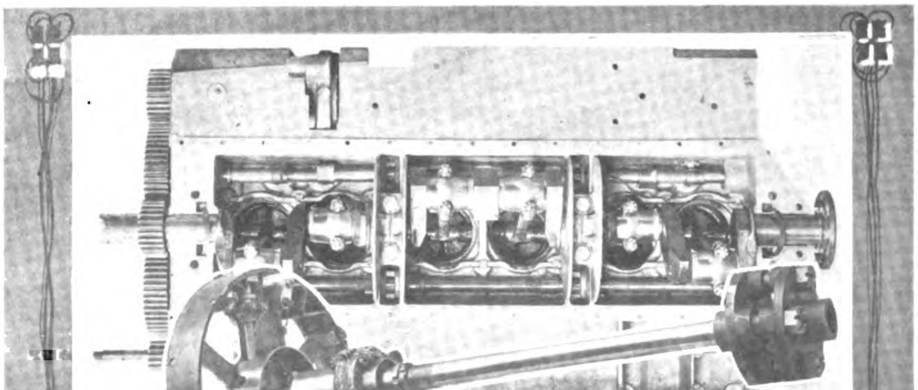
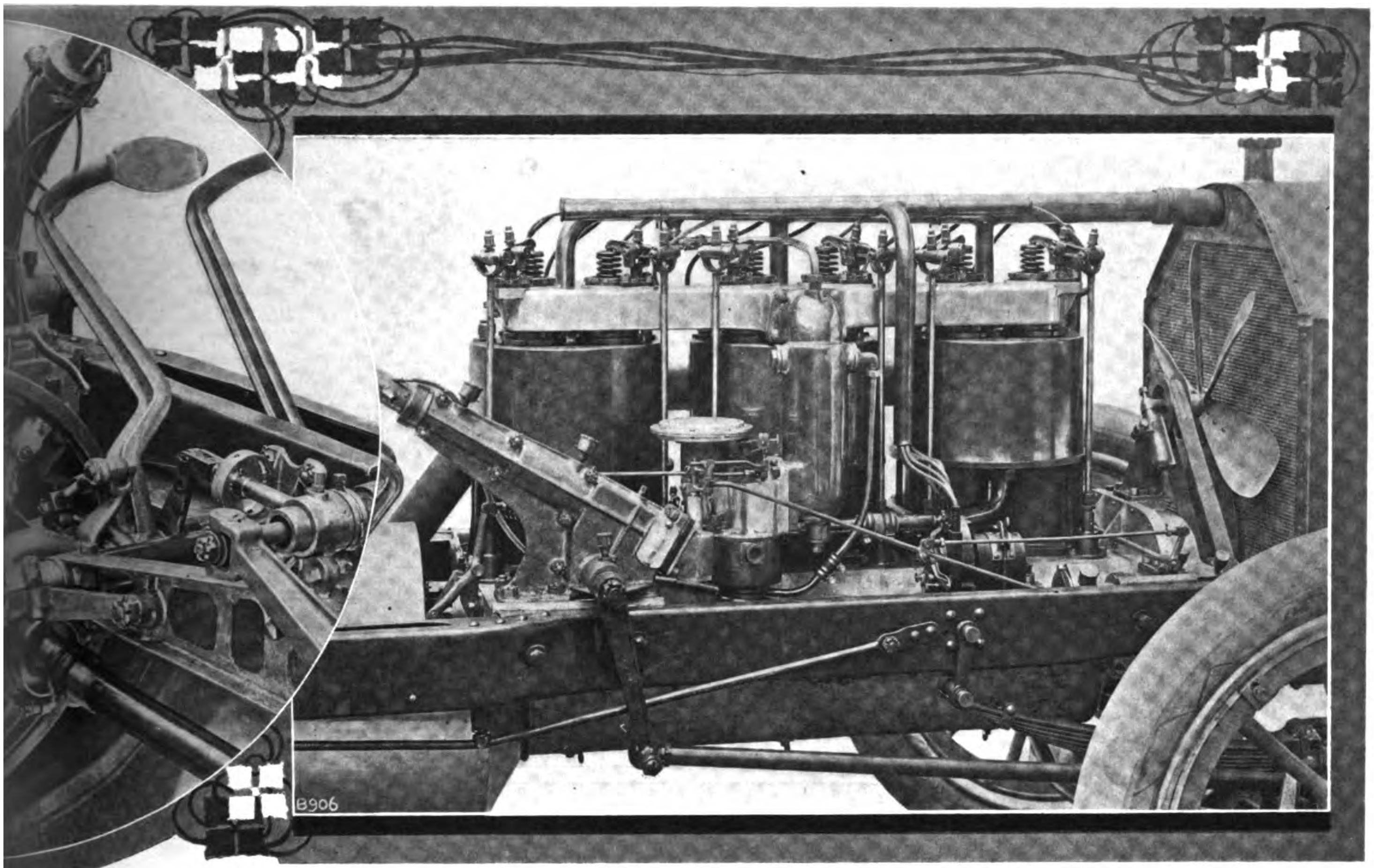


Fig. 2—Looking into the crankcase with its lower half removed

The chain drive is of the Chadwick type with enclosing chain case, whose principle lies in the employment of a radius rod forming the major portion of the chain case. This radius rod is a large, carefully designed manganese bronze casting, ribbed to obtain enormous strength with minimum weight.

The chain cases are dustproof to insure that the chain shall operate under the most favorable conditions, it being properly lubricated at all times and no opportunity allowed for dust or dirt to get on it to cut it out. This type of drive tends to work with the springs to secure greater ease of riding. The differential gear is incorporated with the transmission, and in the rear is employed an I-beam section axle of chrome nickel steel drop-forged in one piece, which possesses a wide mar-



substantial frame and part of propeller shaft

Fig. 4—Right-hand side of engine with a view of magneto, carbureter and steering mechanism

CARS AS OFFERED FOR 1911

	TRANSMISSION							BEARINGS				TIRES	
Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Trans-mis'n	Axle	Weight	Front	Rear
Int. Exp.	Selecti'e.	4	Frame.	2-Chain	133	56½	Cr. N. St.	Plain...	Ball....	Ball....	3600	36x4	37x5
Int. Exp.	Selecti'e.	4	Frame.	2-Chain	133	56½	Cr. N. St.	Plain...	Ball....	Ball....	3450	36x4½	36x4½
Int. Exp.	Selecti'e.	4	Frame.	2-Chain	112	56½	Cr. N. St.	Plain...	Ball....	Ball....	3000	36x4½	36x4½
Int Exp.	Selecti'e.	4	Frame.	2-Chain	133	56½	Cr. N. St.	Plain...	Ball....	Ball....	3900	36x4	37x5

gin of safety and is not subject to distortion from road shocks. This type of construction transmits to the rear wheels the maximum amount of power, assures greater life and durability, with a wider margin of strength than has ever before been obtained, and also assists the designers in securing a car of minimum weight and maximum strength.

The braking systems are large and powerful, the main or service brake being actuated by a foot pedal and acting directly upon a large crucible-steel drum bolted directly to the compensating case. The brake shoes are equipped with cast-iron liners, the brake drum being 14 inches in diameter with 3-inch face, with cork inserts and producing instant locking action to the rear wheels if desired.

The placing of the brake upon the compensating case insures absolute compensated braking action, for at every turn the equalizing gears operate, with consequent assurance of their being in perfect condition. At high speeds it is of the utmost importance that brakes shall apply equally and there is no engineering design whatsoever that will give absolute assurance of this except the placing of a brake on the compensating case and braking through the equalizing gears. All adjustments are by hand, automatic locking devices being provided, these being some of the small refinements which must to-day be found on the high-powered, high-priced car. The rear or emergency brakes act directly upon the rear-wheel drums and are

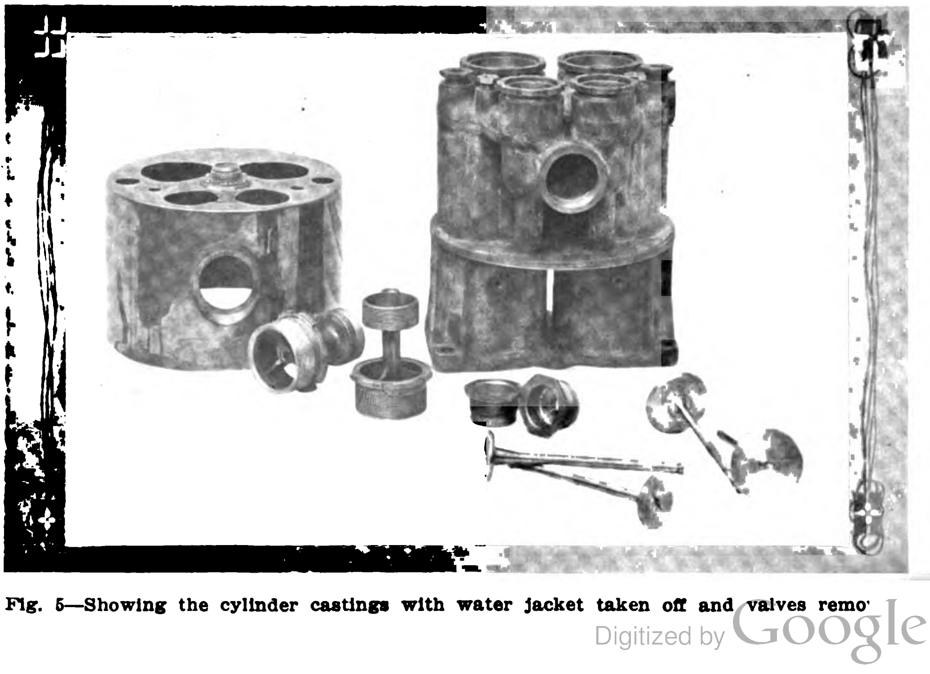


Fig. 5—Showing the cylinder castings with water jacket taken off and valves remo

operated by a hand lever. They are large in size, dustproof, manganese bronze to crucible steel, adjustments being made by hand.

In the Touring Car and Tourabout models the spring construction is semi-elliptic front and platform spring suspension rear. The front springs are equipped with a special safety link. This link is a patented Chadwick feature and absolutely provides against any danger of ditching due to loss of steering from front spring breakage. Owing to the engine being a dead load, the spring action in the front is further controlled by the equipment of Truffault-Hartford shock absorbers.

The platform spring extension in the rear has been carefully worked out, the springs are bushed, eyes being perfectly parallel and springs equipped with force-feed oilers, ample clearance being allowed for spring action. The Chadwick car has been noted for its unusual qualities of easy riding and this comes about largely from the carefully worked out and satisfactory spring suspension.

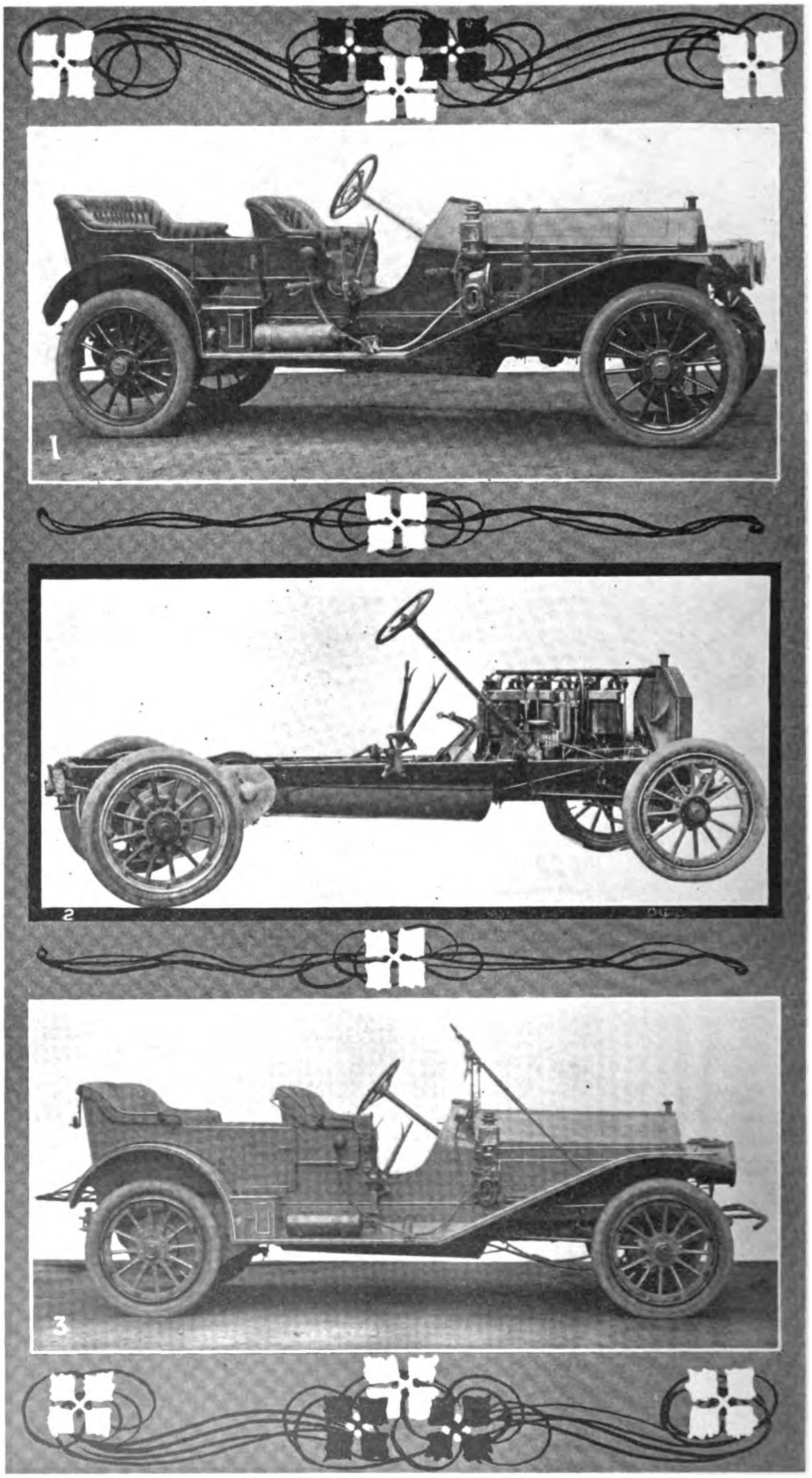
Runabout models are equipped with semi-elliptics front and rear. All springs are of vanadium steel with ample leaves, so that breakage is practically unknown.

The worm-and-screw steering gear is of the reversible type, equipped with 19-inch steering wheel, and remarkably quick in operation, giving a full sweep of the front wheel in 1 5-16 turns of the steering wheel. The steering gearcase is phosphor bronze and arched with a long supporting arm, so used that no dependence is placed on dash support to hold the steering column. To prevent road shocks being communicated to the gear, the steering axle bolts around which the front wheels revolve as a center are so inclined that shocks will be absorbed into the axles, and through the springs instead of through the steering gear connections—a most important point. Provision is made for adjustments which can be made without dissembling the gear. The side link connecting the steering knuckle arm, also the cross link which is at the rear of the front axle, are fitted with ball and socket ends so arranged that if the cap should unscrew and come out it would be impossible for the ball to come out of the socket, owing to the method of assembling.

Both front and rear axles are of I-beam section, chrome nickel steel, drop-forged in one piece. These are the type of forgings which are hammered and the constant pressure of the metal tends to make them enormously tough. They are heat-treated to give the maximum strength. The steering axles and steering axle levers are also of special alloy steel, as are the materials throughout the car.

The wheels are built of the finest grade hickory stock, having specially designed rosettes on the spokes for carrying the drums. The wheel bearings are all imported and several sizes larger than the loading would require and there are provided between the inside and outside bearings spacers so designed that if a ball should break, instead of grinding out the race the bearing will immediately change to a plain bearing and run upon the spacer. This spacer also serves the function of preventing the wheels from coming off.

The frame is of chrome nickel steel, channel section, heat



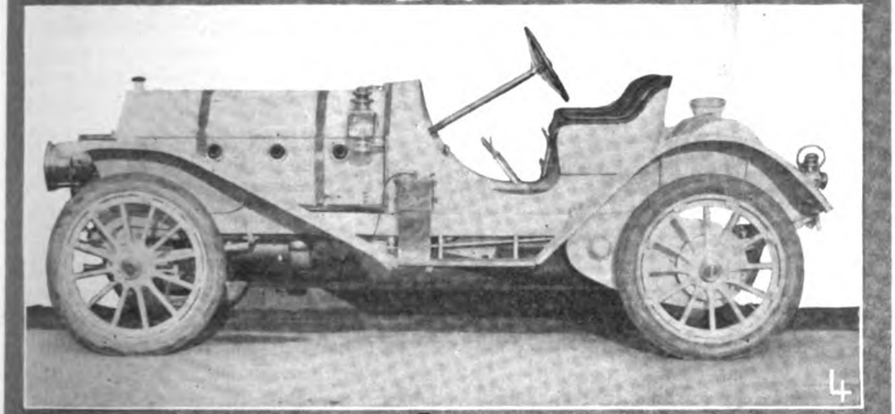
Miniature Tonneau Tourabout, seating chauffeur and four passengers
Right-hand side of 133-inch wheelbase chassis
Standard Chadwick Six Tourabout, seating capacity five

treated and bottle neck to allow short turning, and at the point where the frame is narrowed at the bottle neck there are supporting reinforcing gussets installed. All cross-members are of chrome nickel steel, heat treated.

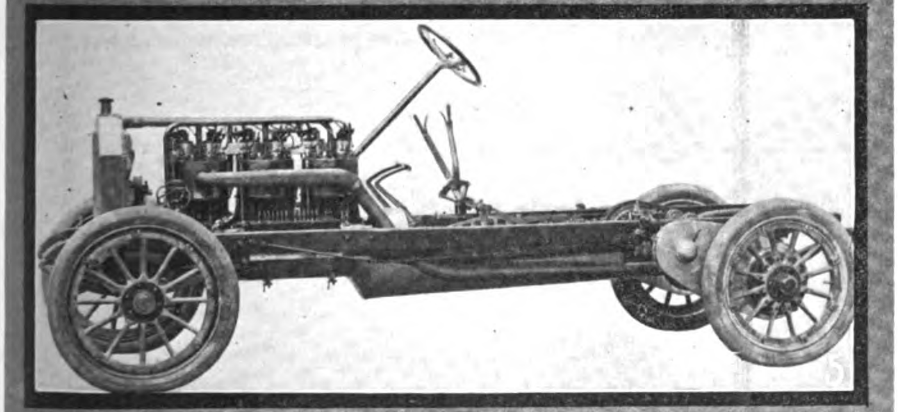
Ignition is by means of Bosch high-tension magneto positively gear driven, the advance and retard being obtained by means of a spiral advance. The circuit-breaker is fixed in a permanent position to give a maximum intensity of spark at all positions of advance or retard, a fat, hot spark being obtained which enables the car to be throttled down very low on direct drive. The auxiliary system consists of a Herz low-tension timer with high-tension distributor and a single coil box on the dash with storage battery and a separate set of plugs, so that the two systems are entirely independent of each other, the auxiliary system being used for purposes of starting only and, where necessary, in an emergency. The car can be started on one-quarter turn of the crank on the magneto alone. The usual number of spark and control levers are provided on the wheel, except that they are very substantial and in addition to this the magneto cut-out button for the purpose of grounding the magneto is placed upon the steering wheel instead of upon the dash and in descending steep hills the engine can be used as a brake if desired. The magneto is held by means of a strap and winged nut, being located by dowel pins, so that it can be quickly removed for purposes of inspection.

Lubrication is by means of a Precision oiler, 14 feeds, there being an oil lead to each of the pistons, to each of the main bearings, to each of the crankcase compartments and to the compensating case in the back, the lead to the compensating gearcase passing through a bleeder test valve on the dash, which shows whether or not there is oil in the tank. The oil leads to the pistons lubricate the cylinder walls and also pass through the hollow wrist pins, lubricating the upper ends of the connecting rods. The leads to the main bearings lubricate these bearings and the oil passes through them to the connecting rod bearings, the crankshaft being equipped with a banjo oil catcher which throws oil in to feed the connecting rods. The front and rear bearings are also ring oiled, there being sufficient oil underneath to insure the delivery of the lubricant to them in addition to the force feed of the lubricator. In addition to this there is a receptacle in the base which furnishes a separate and distinct system of splash lubrication. After a lubricating oil has passed through a bearing its physical character is changed, and to insure as near perfect lubrication as can be secured fresh oil must be supplied to each and every bearing, which cannot be obtained other than by a positive force-feed lubricator supplying fresh oil. The lubricating system of the Chadwick engine has been most carefully worked out. The oiler is so designed as to furnish instant adjustment so that any desired quantity of oil can be fed to any particular point.

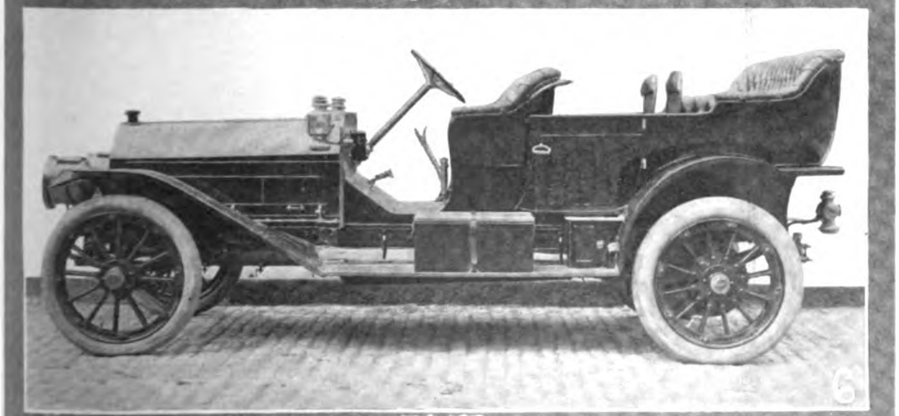
Considered from the price standpoint, the Chadwick 1911 proposition stands thus: Touring Car, Miniature Tonneau Tourabout and Standard Runabout each $5,500, f.o.b. Pottstown; Limousine, $6,500 f.o.b. Pottstown.



Standard Chadwick Runabout with seating capacity for two passengers



Left-hand side view of 133-inch wheelbase chassis



Seven-passenger Touring model of Chadwick Six

1911 Gemmer Gear Offering

THREE TYPES OF STEERING GEARS SHOWN; MODELS "O" AND "K" ARE WORM-AND-SECTOR TYPES; MODEL "G" IS THE CHARACTERISTIC GEMMER GEAR

AUTOISTS of experience now regard steering gears as entitled to the most exacting consideration, and they demand that the design, construction and material used in this part of automobiles be of the best. The requirement, from the necessity point of view, contrary to the usual way of looking at it, depends upon the conditions as follows:

(a) Considering the square of the speed of the automobile;

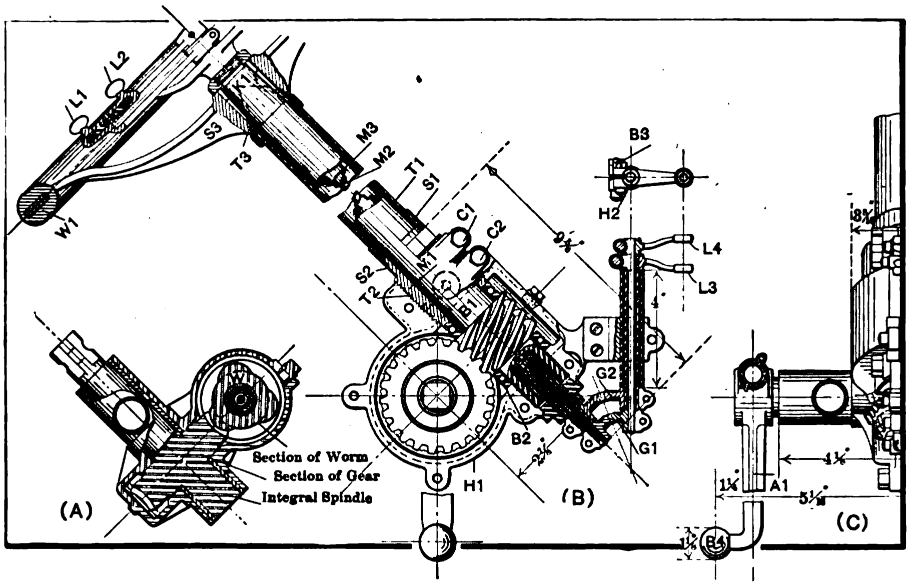


Fig. 1—Model K gear of the worm and gear type with ball thrust bearings above and below the worm and liberally proportioned plain bearings for the gear shaft

(b) Involving the weight of the car;

(c) Viewing the design of the front axle;

(d) Locating the center of gravity of the structure;

(e) Noting the fore-and-aft distribution of the weight;

(f) Influenced by the diameter of the road wheels used.

Just using what might be termed a good steering gear, not figuring upon all the influencing considerations, as will be plainly seen, is not the right way to arrive at the right conclusion, and as the Gemmer Manufacturing Co., of Detroit, Mich., has pointed out, the proper use of steering gear requires mature consideration. The company makes a specialty of this character of work, and in addition to a large and well equipped plant, it is provided with all the means for determining the best conditions to surround each of its makes of steering gear.

The illustrations here afforded of three of the Gemmer types of gear, while they do not cover the whole range, are sufficient to illustrate the points to be made, in which quality of material is the first requisite, but, as will be shown, there are other equally or more important details that must be attended to if the end is to be entirely satisfactory.

In Fig. 1 of the Model K gear reference will be made to a section of the worm and gear (A) with a view to making the point that the material used is of a fine grade of true cementing steel, and it is heat treated to render it glass hard, but the core is left in a state to resist shock. It is too frequently overlooked in this class of work that mere low-carbon steel is not sufficient for the purpose. True, it is possible to employ ordinary grades of low-carbon steel in cementing work, but when the product is finished it can not be claimed that safety is one of its properties, and when this important point is disregarded in steering gears it looks as if the greatest question is ignored. Considering (A) in Fig. 1, the worm is of the cementing steel referred to, and it is first machined to near size from bar-stock, then machined to accurate blanking size, after which the worm is hobbed, leaving "grinding finish" over the diameters of the two extremities of the integral spindle. The next step is to pack the worms in bone in a box, after which the cover is put on, and luted, to keep it tight against the introduction of any contaminating substance, also to keep the gases from the bone in long enough to cause carbon to penetrate below the surface of the metal for a suitable distance to afford the hard skin; but the fact that the metal is of true cementing stock assures that the penetration will be limited to that definite amount that is known to suffice for the purpose, leaving the core soft and dynamic.

Passing on to the remaining things to be noted, B1 is a thrust ball bearing above the worm, and B2 is a similar bearing below the worm, as shown in the section (B). The housing H1 is a close fit, made in the shape that affords the requisite strength, and is so designed that it goes readily into place in substantially every make of car; in other words, it is approximately universal. The steering post tube T1 is accurately fitted to the housing by means of a sleeve S1, butting up against the shoulder S2 of the member M1, and the housing H1 is split at this point so that, by means of the clamping bolts C1 and C2, a secure relation is realized, but this relation is aug-

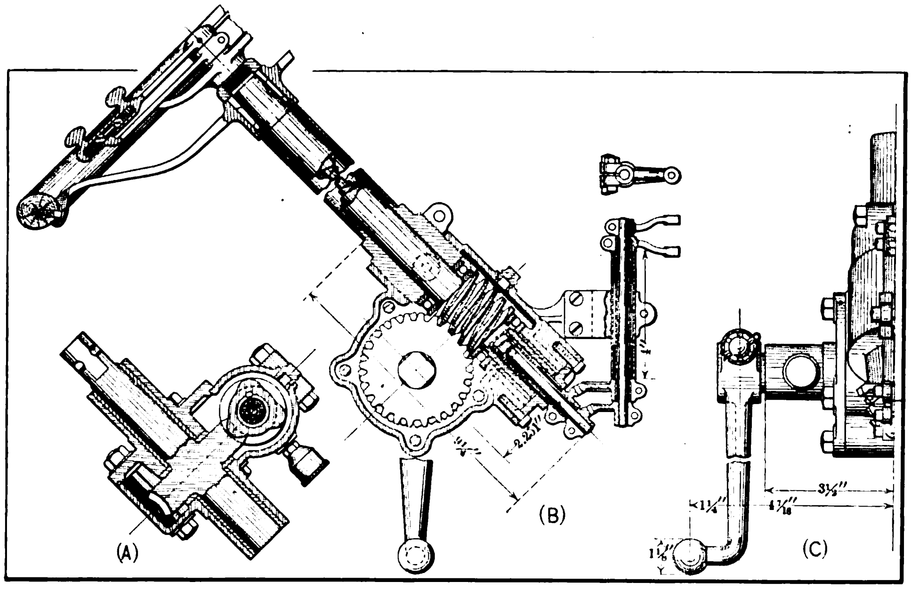


Fig. 2—Model O gear of the worm and sector type, differing from Model K system in detail

mented due to the use of threads T2 which are chased in the housing H1 and mated on the member M1. The spider S3 of the steering wheel W1 is fitted over a taper T3 and Woodruff keys K1 are employed to prevent the spider from rotating excepting with the tube. The spark and throttle levers L1 and L2 shown in part section are above the steering wheel and they impart motion to the torsion members M2 and M3, thence to the bevel sets G1 and G2, from where motion is directed to the mechanisms on the carbureter and magneto. Either the system G1 or G2 may be used for the magneto, the remaining system being for the carbureter control. An examination of the plan will show the nice designing of the small levers, which are made with split hubs H2 rendered secure by means of clamping bolts B3. Referring to Fig. C and to the steering gear arm A1 with its large diameter ball B4, the extension of the arm is square, and the hole in the arm is broached square.

For a certain class of work, notably on cars of lower power and speed than when the gear as above described is used, the gear as shown in Fig. 2, known as type O, is used. Fig. 3 is an illustration of the characteristic Gemmer gear.

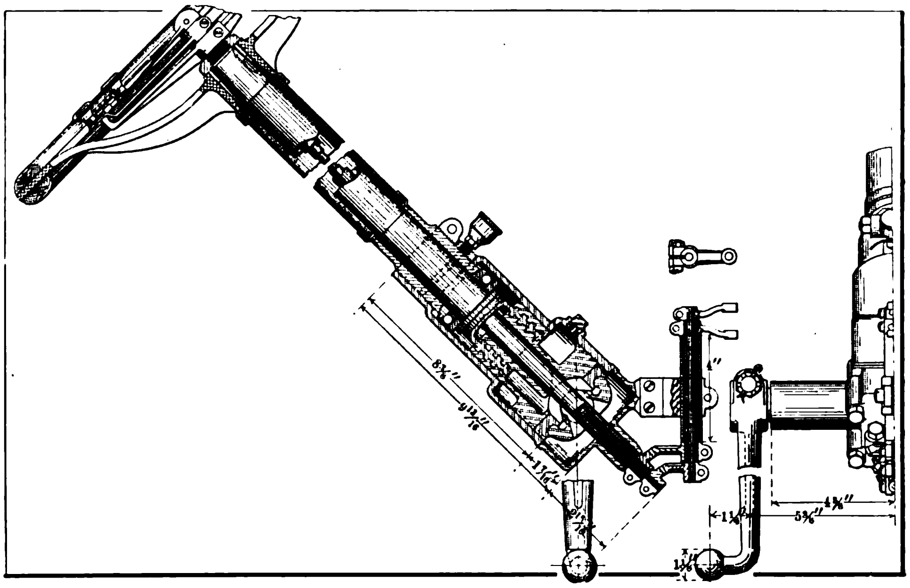
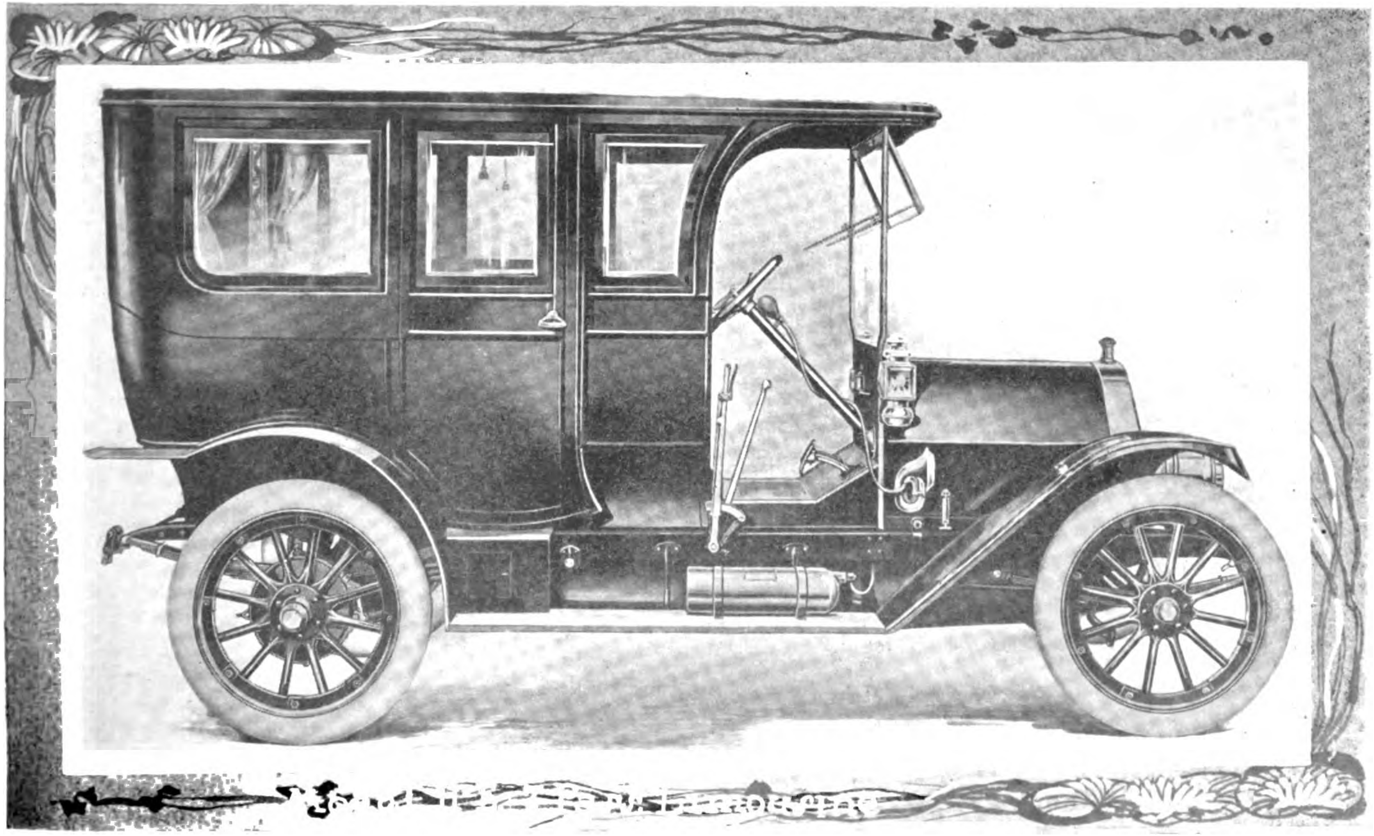


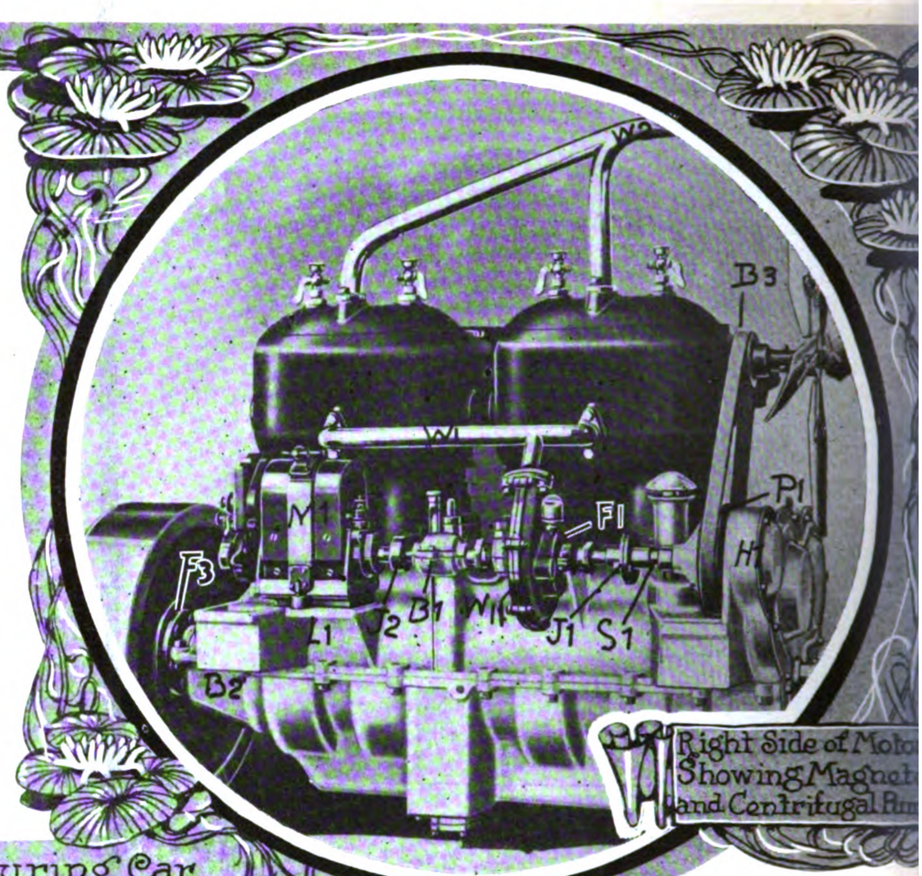
Fig. 3—Characteristic Gemmer gear as used under the most exacting conditions of service

1911 Speedwell Automobiles

ELEVEN OPTIONS TO THE PURCHASER; POWER PLANT COMMON TO ALL; REFINEMENTS RATHER THAN CHANGES PREVAIL

TAKING a single power plant and fixed conditions of the chassis with a wheelbase of 121 inches and standard tread the Speedwell Motor Car Co., of Dayton, Ohio, provides eleven types of cars for the various classes of its clientèle, the lowest of which sells at $2,500 in the form of a fore-door roadster, and the highest priced car sells at $3,850 with a limousine body. The tabulation as here afforded gives the necessary information in relation to the several options. The tire equipment is 36 x 4 on all four wheels of the respective models, and referring to the view of the stripped chassis, the general arrangement of the



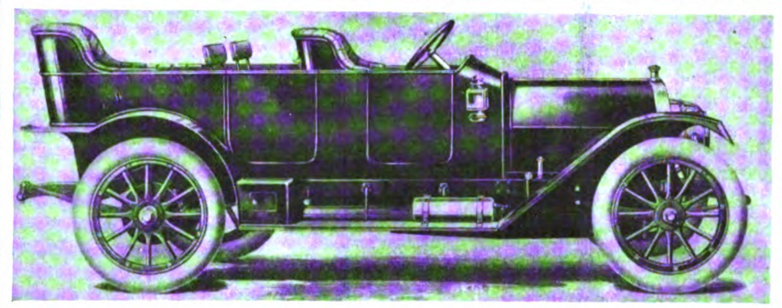


Right Side of Moto
Showing Magnet
and Centrifugal Pu

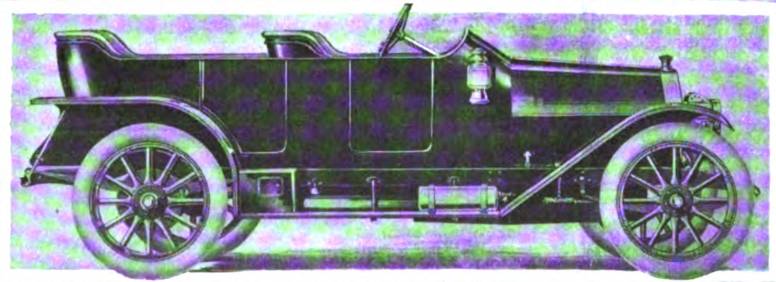
units is clearly indicated, with the radiator R1 on the center line of the front axle, and the motor M1 far enough back to make room for the fan F1. The clutch C1 is housed in the flywheel; it is of the cone type, and a universal joint U1 is placed between the clutch and the three-speed and reverse selective sliding gear system G1. A second universal joint U2 connects the clutch G1 with the propeller shaft S1, and a third universal joint U3 makes connections with the live rear axle A1. The service and emergency brakes B1 and B2 are in drums on the rear wheels. The chassis rides on semi-elliptic springs S2 and S3 at the rear and somewhat shorter semi-elliptic springs S4 and S5 at the front. The scheme of design throughout is straight line, and provision is made for the equalization of the braking pressure by means of equalizers E1 and E2. In the steering mechanism it will be observed that the drag rod D1 is straight, and the tie rod T2 is not only straight, but it is in a protected position to the rear of the front axle, the latter being a drop forging of the I-section in one piece. The chassis frame is of the channel section, with crossbars at points of greatest necessity, and the power plant is supported on a subframe which terminates at a crossbar to the rear of the transmission gear.

The live rear axle of the Timken type, with a shell-like one-piece housing H1 with the differential unit D1 removed, shows the jackshafts J1 and J2 with square ends to engage the differential set through the broached holes B1. Gear ratios are 2 10-19 to 1, 3 to 1 and 3 3-7 to 1. The spring perches P1 and P2 are free to rotate, thus relieving the axle of spring contortions, and the brake drums B2 and B3 are of large diameter with wide-faced brake bands, B1, B2 and B3 of the constricting type actuated by the level L1. The internal expanding brake shoes are actuated by the lever L2. The shell-like axle housing H1 is of great strength, but in order to guard against any possibility of sagging the bobstay S1 is also provided. Timken roller bearings B4 are placed on the spindles, and the drive is made from the jackshafts J1 and J2 through dog clutches C1 to the road wheels. This type of axle affords immunity from the class of trouble that comes from axle sagging and disalignment. The Timken roller bearings provide against thrust as well as caring for the radial load, and they may be adjusted at will to compensate for wear. In the differential unit the bevel drive is incorporated, and the entire outfit is mounted complete in its housing, after which it is inserted into place in the enlargement of

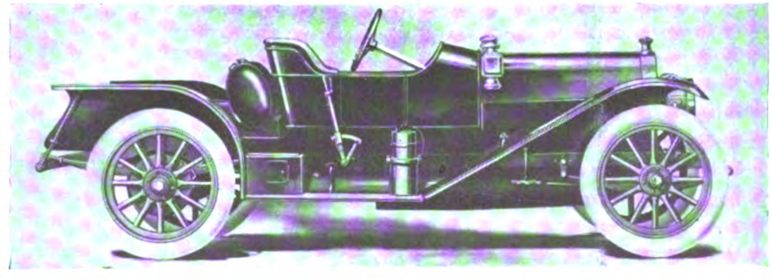
Model 11-F, 7-Pass. Special Touring Car

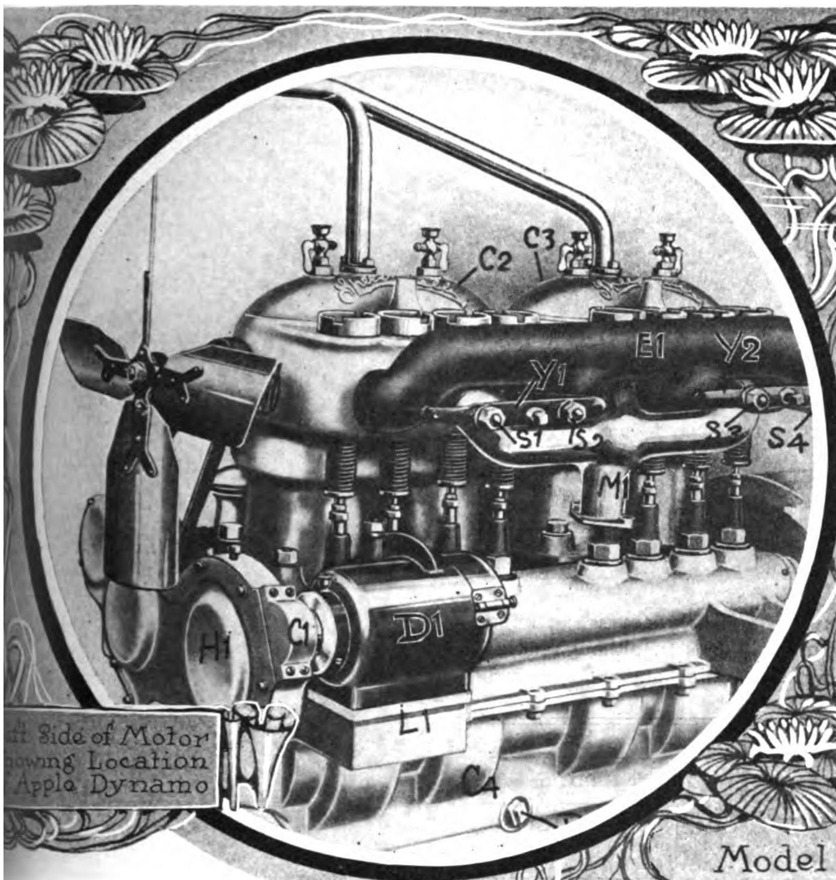


Model-11-G, 4 Pass. Torpedo



Model 11-H, Semi-racing Roadster





ft Side of Motor
owing Location
Apple Dynamo

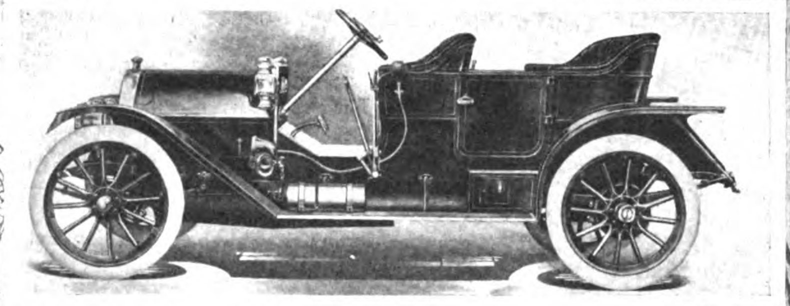
the shell, and noiseless performance is assured as well as ease of disassembling.

The 40-horsepower, four-cylinder, water-cooled motor has the cylinders cast in pairs with a 5-inch bore and stroke respectively; valves are on the left-hand side and are operated by a single camshaft. Referring to the illustration showing the left side of the motor, provision is made for an Apple lighting dynamo D1, resting on a ledge L1, driven by a pinion within the half-time housing H1, taking power from the half-time train, and the pinion is accessible through the cover C1. The carbureter is also placed on this side and is flanged to the manifold M1. The exhaust manifold E1 and the intake manifold M1 are held against flanged surfaces of the cylinders C2 and C3 by means of yokes Y1 and Y2, utilizing four studs S1, S2, S3 and S4, which are in a get-at-able position so that the time required to remove and replace the carbureter and the manifolds is reduced to a minimum. The lower half of the crankcase C4 is provided with an oil sump, and a plug P1 is so placed as to drain the sump and afford a means by which it may be flushed out. Referring to the view of the right-hand side of the motor, the magneto M1 is placed on a ledge L1 near the flywheel, and the water pump W11 is flanged to a face F1, it being the case that the magneto and the pump are driven by a shaft S1 taking power from the half-time gear case H1, and a flexible joint J1 is placed in front of the pump with a second joint J2 back of the bearing B1, but in front of the magneto M1. A flywheel F2 is flanged to the crankshaft at F3, and the rear end bearing B2 has a large projected area in order to support the weight and gyrations of the flywheel in addition to the torque of the motor. The water piping W1 is symmetrical and well made, and the water leading from the motor to the radiator is through a well-contrived water manifold W2 with a flexible hose coupling intervening. The fan F4 is substantially made, has a good propelling ability and is actuated by a flat belt B3, driven by a flanged pulley P1. The workmanship throughout is on a high plane and the general appearance of the motor accords with accepted practice along conservative lines.

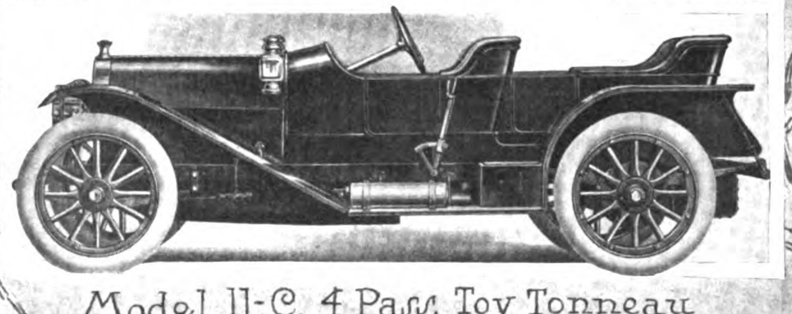
Ample cooling effect is given by an efficient cellular radiator, the water being circulated by a large centrifugal pump. Air is drawn through the radiator by a carefully-balanced fan, driven by an endless belt, any stretch in which may be taken up by an eccentric adjustment.

An 18-inch steering wheel with an aluminum web and Circassian walnut rim is used on all models. A worm and complete gear of vanadium

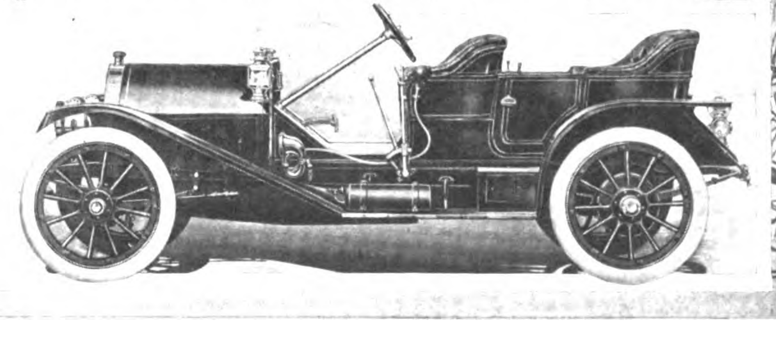
Model 11-K, Close Coupled 5 Pass. Car

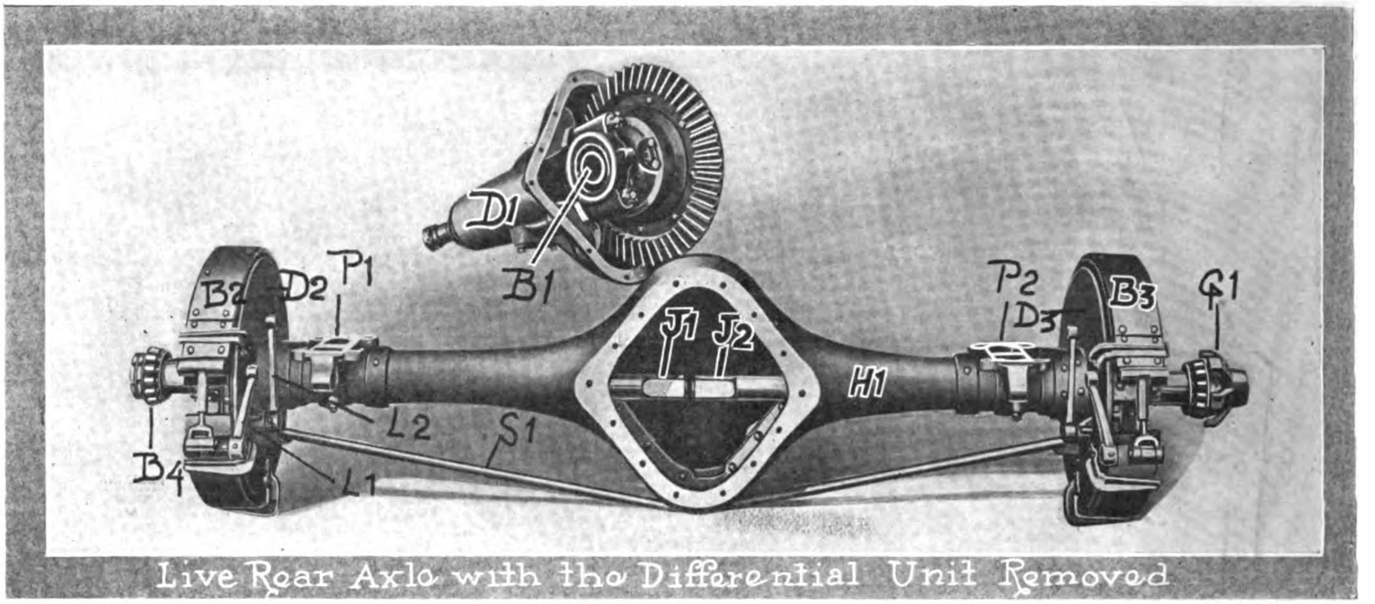


Model 11-H, With Toy Tonneau



Model 11-C, 4 Pass. Toy Tonneau





Live Rear Axle with the Differential Unit Removed

steel, carefully hardened and ground, are enclosed in a heavy housing with simple means of taking up wear in the bearings and between the worm and gear. A large force-feed grease-cup lubricates all frictional surfaces. The worm and complete gear type allows four changes of teeth, which is in strong contrast to all other types, which allow no change.

The semi-elliptic springs are made from the finest spring steel of special analysis, and are rigidly tested and inspected before being placed under the car. The springs are 2¼ inches wide and almost flat, very flexible, but of such toughness that breakage is almost impossible. The springs being flatter than in former models, the frame is 1½ inches closer to the ground. The front springs are 40 inches, the rear 56 inches long. Perfect alignment is maintained by small lips on each leaf. All spring eyes are provided with hardened steel bushings.

Unusually great braking power is provided—approximately one inch of braking surface to each seven pounds of car. The four brakes, of simple and heavy construction, act on rear wheel brake drums, an improved provision being made for all adjustments, although adjustments are seldom necessary. Both running and emergency brakes are provided with equalizers.

SPECIFICATIONS FOR SPEEDWELL

MODELS	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		Lubrication
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	
11-H	$2500	40	R'st.*	2	4	5	5	Pairs	H'comb	Cent'fl	Bosch	Battery	Pum
11-C	2625	40	T. Ton.	4	4	5	5	Pairs	H'comb	Cent'fl	Bosch	Battery	Pum
11-D	2650	40	Tour'g.	5	4	5	5	Pairs	H'comb	Cent'fl	Bosch	Battery	Pum
11-K	2650	40	Cl. Coup	5	4	5	5	Pairs	H'comb	Cent'fl	Bosch	Battery	Pum
11-G	2700	40	Torp	4	4	5	5	Pairs	H'comb	Cent'fl	Bosch	Battery	Pum
11-H Special	2700	40	S-Racr†	4	4	5	5	Pairs	H.comb	Cent'fl	Bosch	Battery	Pum
11-D	2750	40	F.d.Tg.	5	4	5	5	Pairs	H'comb	Cent'fl	Bosch	Battery	Pum
11-F	2800	40	Tour'g.	7	4	5	5	Pairs	H'comb	Cent'fl	Bosch	Battery	Pum
11-F Special	2900	40	F.d.Tg.	7	4	5	5	Pairs	H'comb	Cent'fl	Bosch	Battery	Pum
11-E	3850	40	Limous.	7	4	5	5	Pairs	H'comb	Cent'fl	Bosch	Battery	Pum
Cruiser	3500	40	Cruiser.	4	4	5	5	Pairs	H'comb	Cent'fl	Bosch	Battery	Pum

*Fore-door body. †Fore-d

Diamond tires are standard equipment, 36 x 4 front and rear on all models but the seven-passenger touring cars and limousine, which have 36 x 4½ front and rear. Firestone demount-

The Co-operator Favors Himself a Little

Methodic co-operation for industrial progress is fashionable among theorists only. The American citizen, native or naturalized, who fights for his country in times of peace fights a little more for himself than for the rest of us combined. But whatever he accomplishes, by making automobiles, for example, better suited for the needs of the masses or the classes, he has to share with all. He has to give value. Only his defeats are his own and remain so. They probably number ten, to one success, among the soldiers of peaceful progress. Yet only he who does not shoot is without honor—if he has gun and ammunition Methodic co-operation would save some of the misses, but, oh human nature unregenerated, the crown of reward for a bull's eye would descend upon the foxiest head in the combine, whose genus and whose genius no one wishes to have propagated or promoted to the seat of prestige. Gunning is as common as grass and prevails in co-operation, as in politics. It is gunning that is wanted, and a breed of gunners, fellows who can set their sights with little direction from the lieutenant and who can "go it" alone, having confidence in their own ability for discerning a target among the values of civilization. The journal of special purpose stands for all the co-operation the lone gunner wants, and he does not want it unless it shoots, too.

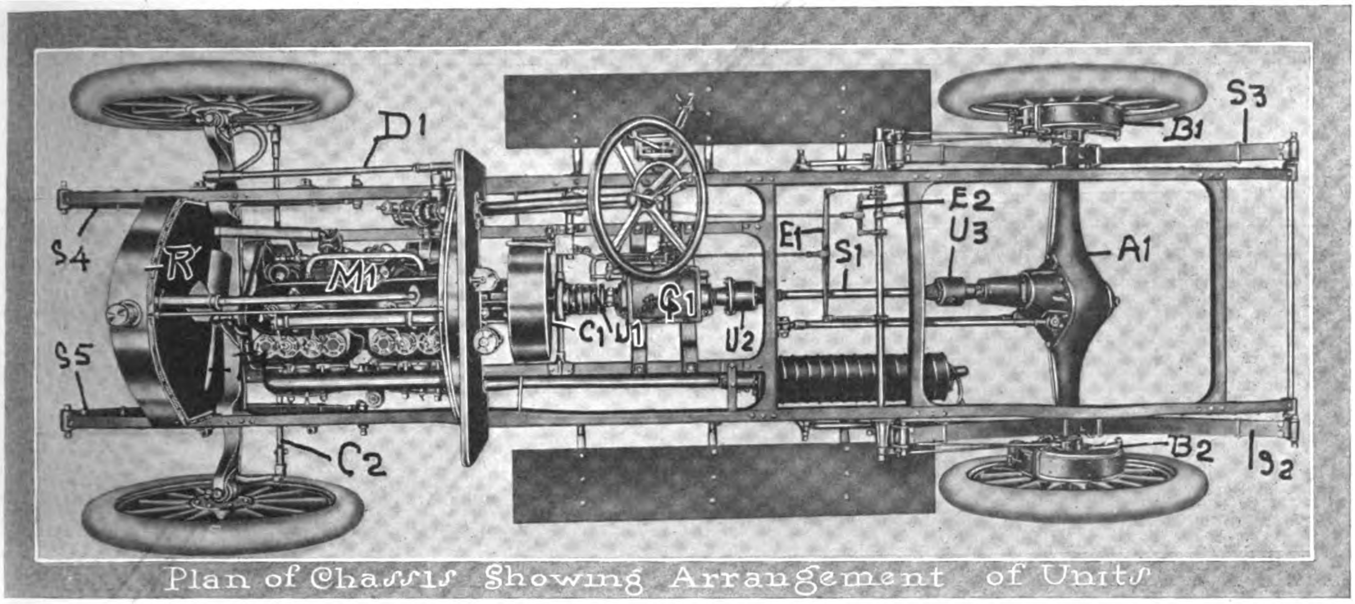
Will Coke Replace Benzine for Fuel ?

In the mechanical transportation of men and material on ordinary streets and roads the victory will be to that system, or those systems, where the cost of service and the duration of full efficiency without undue outlay for repairs are the lowest, and the degree of reliability the greatest.

The advocates of steam figure that a five-ton vehicle, running on streets and roads with over 10 per cent. grades, should be able to tow a 2-1-2 ton tender without trouble. A benzine motor to effect this would be of about 40 horsepower, and take 0.4 kilogram equals 4.88 pounds average of benzine per horsepower and per hour, which, at marks 30 per 100 kilograms equals $3.24 per 100 pounds average, would cost marks 4.88 or $1.14 per hour.

The steam-driven vehicle would, it is claimed, do the same thing all day with 400 liters equal 14.12 cubic feet of gas coke at mark 0.80 per 100 liters equals $5.39 per 100 cubic feet, costing only marks 3.20 = $0.76; that is, mark 0.32 = $.076 per hour.

The cylinders for the steam engine must withstand only 14 atmospheres pressure and a temperature of 190 deg. Cent. equal 384 deg. Fahr.; whereas those of the benzine motor need withstand a temperature of 800 deg. to 1,200 deg. Cent. equals 1,372 deg. to 2,192 deg. Fahr.



Plan of Chassis Showing Arrangement of Units

able rims are on all models but the 11-H, which has Goodrich quick detachable.

In the matter of price the Speedwell line offers an exceptionally wide range of choice. Commencing with Model 11-H, fore-door body roadster, at $2,500, there follow the 11-C toy tonneau, $2,625; 11-D touring car, $2,650; 11-K close-coupled, $2,650; 11-G "Torpedo," $2,700; 11-H Special, semi-racer, $2,700; 11-D special, $2,750; 11-F touring, $2,800; 11-F special, $2,900; 11-E Limousine, $3,850, and the "Cruiser," $3,500. The latter, a special 1911 effort, with a wheel-base of 132 inches, is a particularly rangy-looking car, and in addition to the regular equipment there are included a pigskin trunk and cover, cape top and shock absorbers.

CARS AS OFFERED FOR 1911

Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
	Type	Speeds	Location	Drive				Crankshaft	Trans-mis'n	Axle		Front	Rear
....	Selecti'e.	3	Amid'p.	Shaft...	121	56	P. Steel.	Plain...	Roller...	Roller...	....	36x4	36x4
....	Selecti'e.	3	Amid'p.	Shaft...	121	56	P. Steel.	Plain...	Roller...	Roller...	....	36x4	36x4
....	Selecti'e.	3	Amid'p.	Shaft...	121	56	P. Steel.	Plain...	Roller...	Roller...	....	36x4	36x4
....	Selecti'e.	3	Amid'p.	Shaft...	121	56	P' Steel.	Plain...	Roller...	Roller...	....	63x4	36x4
....	Selecti'e.	3	Amid'p.	Shaft...	121	56	P. Steel.	Plain...	Roller...	Roller...	....	36x4	36x4
....	Selecti'e.	3	Amid'p.	Shaft...	121	56	P. Steel.	Plain...	Roller...	Roller...	....	36x4	36x4
....	Selecti'e.	3	Amid'p.	Shaft...	121	56	P. Steel.	Plain...	Roller...	Roller...	....	36x4	36x4
....	Selecti'e.	3	Amid'p.	Shaft...	121	56	P' Steel.	Plain...	Roller...	Roller...	....	36x4½	36x4½
....	Selecti'e.	3	Amid'p.	Shaft...	121	56	P. Steel.	Plain...	Roller...	Roller...	....	36x4½	36x4½
....	Selecti'e.	3	Amid'p.	Shaft...	121	56	P. Steel.	Plain...	Roller...	Roller...	....	36x4½	36x4½
....	Selecti'e.	3	Amid'p.	Shaft...	132	56	P. Steel.	Plain...	Roller...	Roller...	....	36x4½	36x4½

pe with toy tonneau rear.

Standard equipment includes a Prest-O-Lite tank with all models (except 11-H, which has a generator), two acetylene gas headlights, two side lamps, one tail lamp, horn, jack, tool kit, tire repair kit, pump, battery box, tool box, robe rail and Bosch magneto. Model 11-H Special has rear seats, same pitch as front, and pressure gasoline tank in rear.

Although it has never been the custom of the Speedwell concern to enter cars in road and track competitions, many individual owners have done so, and with marked success in some instances. In the Good Roads tour from Atlanta to New York a privately owned Speedwell was among the absolutely clean-score cars.

Losses in Economy with Alcohol Motors

The losses in economy with alcohol motors come under five heads: Those due to the work of drawing in and exhausting the gases of the charge; (2) those of friction of moving parts; (3) those caused by late and slow combustion, as shown by bad indicator diagrams; (4) loss of heat given out to the cooling water, and (5) passage of unconsumed alcohol through the machine. This latter, which is about the only loss in which the motors of various makes differ greatly, accounts for the enormous consumption of fuel of some motors under certain loads and conditions.

It must be noted in this connection that to insure complete combustion no more alcohol must be introduced into the ignition chamber than the air can properly supply with oxygen for combustion; and that the intermixture shall be so complete that even with exactly theoretically perfect proportions of alcohol and air, no uncombined air or alcohol shall be exhausted. A good instance of the truth of this is given by Meyer as the result of tests of two motors of equal size, and of the same builder, but in which the compression was in one case 5.91 times, and in the other 8.90. The first-named motor consumed 436 grams of 86.1 per cent. alcohol per horsepower per hour; the other, 364 per horsepower per hour under same conditions.

First Russian Touring Competition

The first Russian touring competition, from St. Petersburg to Witebsk, Gomel, Kiev, Moscow, Wischni Wolotschok and St. Petersburg, a distance of 1,900 miles, has been recently won by Willie Poege on a Mercedes, with Fritsch, also on a Mercedes, second; Valenski third on a Gaggenau, and Heine and Erle respectively fifth and sixth on Benz cars.

The five Mercedes cars taking part in the competition are similar to those which took part in the Prince Henry tour in Germany, their four-cylinder motors having a bore and stroke of 3 7-10 inches by 6 inches, with four valves in each cylinder. As the Gaggenau firm is practically a newcomer the winning of third place by it came as a surprise. Having come so successfully through the Prince Henry tour it was expected that the Benz would do better than fifth and sixth positions. A streak of ill-luck in the form of slight accidents, however, kept them back. At the start there were 43 cars; Germany supplied 26, France 8, England 3, Russia 3, Belgium 2 and Italy 1. Considering the state of the roads the rather high number of 35 cars which finished the tour is very satisfactory. Owing to the lack of hotel accommodations in the towns and villages passed through, a special train with dining and sleeping cars followed the competitors, carrying all their baggage.

Digest

EXTRACTS FROM CONTINENTAL JOURNALS ON SUBJECTS ALLIED TO AUTOMOBILE ENGINEERING: TWO CARBURETERS OF SPECIAL PURPOSE—AMERICAN KEROSENE NOT SUITABLE FOR MOTOR FUEL

Special adjustment of a carbureter for very low driving or for keeping the motor going while the automobile is at a standstill is provided by the German Daimler Company by means of the construction shown in the accompanying illustration, Fig. 1 A and B, with especial view to avoiding that fouling of spark plugs and combustion chamber which is likely to be the result of poor combustion when the motor, as ordinarily throttled, draws in a too-rich mixture. The jet *f*, fed from the float chamber *d*, terminates in the tube *b*, which is surrounded by the air chamber *a* and connected with the induction tube of the motor by the conduit *c*. In the cylindrical extension *g* is placed the sliding tube *h* which at its inner end carries a thin and bent tube *i*, open at both ends. In Fig. 1A, *h* is shown in the position for normal driving. The air channels are all open. In Fig. 1B, *h* is shown in the position which closes the connection between *b* and *c* and establishes instead the tiny tube *i*, one end of which is very close to the jet, as the only channel for the gas mixture.—*La France Automobile*, No. 35.

An improved constant-mixture carbureter, Fig. 2, has been designed by the French engineer Rebourg and has been tested with benzol as well as gasoline, in both cases resulting in greater flexibility of the motor. The jet *B* is surrounded with an air conduit shaped as a double cone and composed of a number of flexible brass strips which are twisted helically and overlap. These strips are secured at the bottom to a fixed ring *N* and at the top to the ring *D*, which is capable of a rotary as well as an up-and-down movement and provided with gear teeth. Centrally in the ring *D* there is secured a tube *E* whose lower portion telescopes around jet *B* when the ring *D* moves up or down and thereby covers or uncovers some of the apertures in *B* through which the fuel is discharged. When ring *D* is turned in the direction of the twisting of the brass strips, the central diameter of the air conduit *A*, is contracted, and at the same time its height is reduced and the ring *D* is lowered and a number of the apertures in *B* are closed by tube *E*. Turning of ring *D* in the opposite direction naturally has the opposite effect. The changes are worked automatically by the motor. To this end the diaphragm *G* operates ring *D* by means of the rack *C* meshing with the spur teeth of the latter. On the outer side of the diaphragm the atmosphere exerts its pressure through openings in *H*, and on the inner side the suction of the motor and the constant pressure of spring *R* take effect, the spring pressure being kept constant by means of the compensating device *LT*.—*La France Automobile*, No. 36.

Many persons believe that our constructors should develop a motor for automobiles adapted for burning the same kind of kerosene that we burn in our lamps. But in France we generally use the burner called Cosmos for our kerosene lamps and it gives a very good illumination, a flame which is quite white and of suitable height and which does not smoke, but it has these qualities only if the wick is fed with kerosene of American origin. This kerosene, so nearly perfect for our lamps, is very easily decomposed under the influence of heat and then deposits carbon and releases lighter hydrocarbons. For this reason its use in motors produces fouling by deposits of lampblack. The kerosenes of Russian, Roumanian or Austrian origin, on the other hand, are not easily decomposed by heat, and if their richness in carbon does not admit of using them unmixed for lighting purposes, they make up for this deficiency by being very suitable for motors, in which they cause little or no carbon deposit. The kerosene to be used for motors should not be the same as that used for lighting. It should not be very homogeneous, either. The grade which produces best results contains a certain percentage of volatile products serving to facilitate the ignition of the explosive mixture.—Georges Girou in *Technique Moderne*, June.

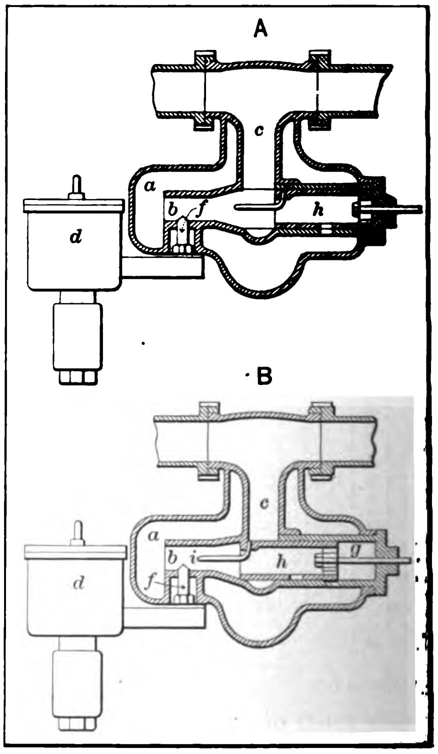


Fig. 1A and B—Carbureter device for minimum motor speed

In a recent article in *La Technique Automobil et Arienne* Mons. Claudel, the designer of the automatic carbureter of the same name, says that, theoretically. the best mixture develops a heat of 2,788 deg. Cent., 1,957 deg. with one and a half times more air, 1,488 deg. with twice and 1,010 deg. with thrice more air.—*Motor Trader.*

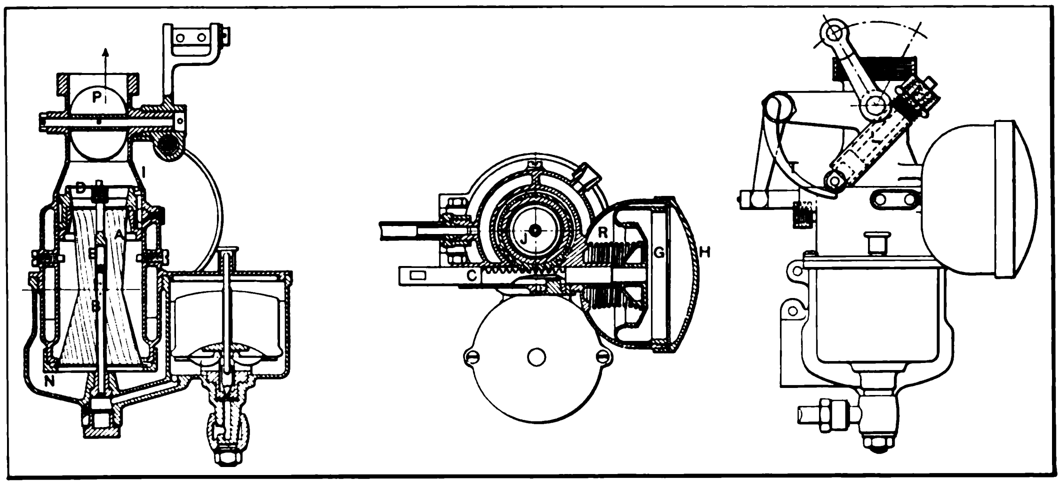
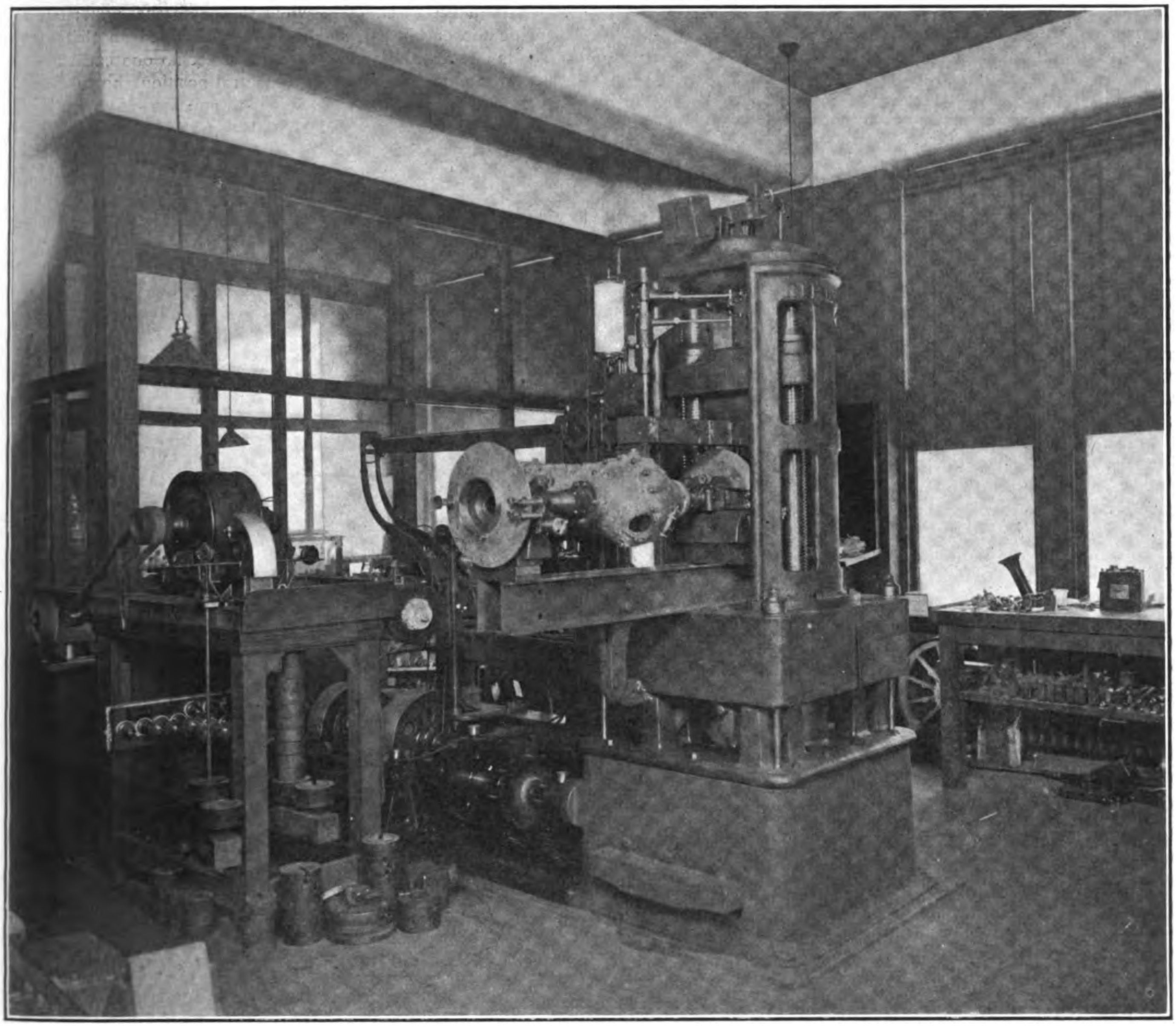


Fig. 2—Rebourg constant-mixture carbureter

Engineering Section

DEVOTED TO THE DISCUSSION OF ENGINEERING PHASES OF AUTOMOBILING, INCLUDING DESIGNING AND CONSTRUCTION FEATURES OF PRODUCTS, AND INFORMATION TO AUTOISTS



THE LABORATORY IS A BUSY PLACE IN THE PLANT—EXAMPLE OF PACKARD PRACTICE

THE great problem from the point of view of the makers of automobiles, and from an economic point of view as well, thus interesting users of cars, comes in the consideration of what to do with more or less worn-out machines. The second-hand car gets in the way of the maker, to whatever extent it prevents the sale of a new automobile, and it stands in the light of the aspiring automobilist if it prevents him from buying a new car and fails to come up to his requirement, if he elects to invest in a second-hand automobile instead. The maker should have no good ground for complaint, provided the second-hand car is capable of doing useful work, but some method will have to be contrived in the long run by means of which it will be possible to determine when a second-hand car ceases to be of real value.

Every purchaser of a second-hand automobile, whether or not he has had the benefit of prolonged experience, realizes that the major portion of all offerings is far from what he wants. He goes forth contemplating the sweet-running qualities of a new automobile, and he hopes to enjoy these sweet-running qualities in a second-hand car. Admitting that perhaps 90 per cent. of all the second-hand cars to be had are strangers to sweet-running qualities, it remains for the intending purchaser to find what he wants in a grab-bag, as it were. This would be a serious matter for a veteran automobilist to undertake, but when a man who has never had anything to do with a problem such as this figures on coming out whole, he shows evidence of much bravery, with a chance of being called "foolhardy."

When the Owner Drives

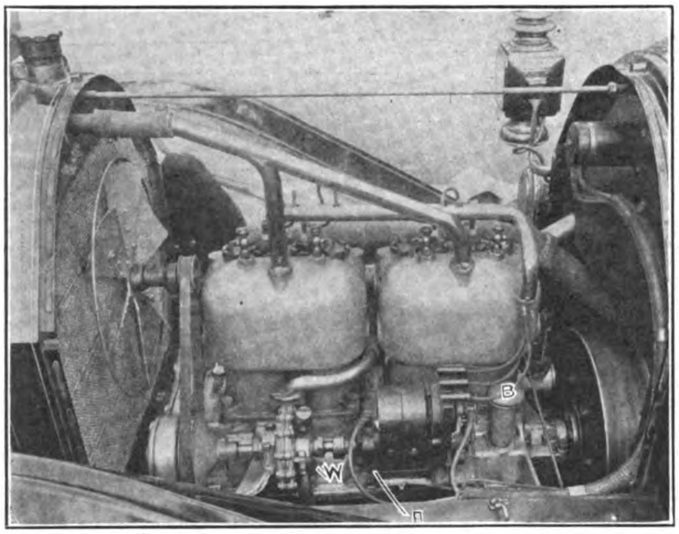


Fig. 1—Left-hand side of the motor, showing pump, magneto, oil level and oil filler cap

AFTER the first principles of the automobile have been mastered—and it is essential that this should be done before the owner thinks of taking the car in hand—he should familiarize himself with the different operations of the car. It is difficult at first to make the hands and feet work simultaneously. Before an attempt is made to start the car the different ingredients, viz., water, oil and gasoline, must be verified. The level of the oil is shown in a glass gauge placed beneath the magneto and marked A in Fig. 1.

The gasoline tank is situated under the front seats and the filler will be found under the passenger seat. To turn on the gasoline lift the floor board and turn on the tap above the gasoline feed pipe. There is also a tap to empty all the gas in the tank, and this should be drained off every 2,000 miles to rid the tank of any impurities that may find their way in.

The tension of the fan belt should always be such that there is no slack. To take up slackness, undo nut C in Fig. 5, lift fan bracket and tighten nut C again.

After these details have been attended to, which does not take more time than it does to read these few words, the needle valve of the carbureter should be raised to flood the carbureter marked D in Fig. 5 and the switch turned to the right; this is placed on the dashboard and has a key, G, fitted so that when the car is left in the garage or in the street no one can start it.

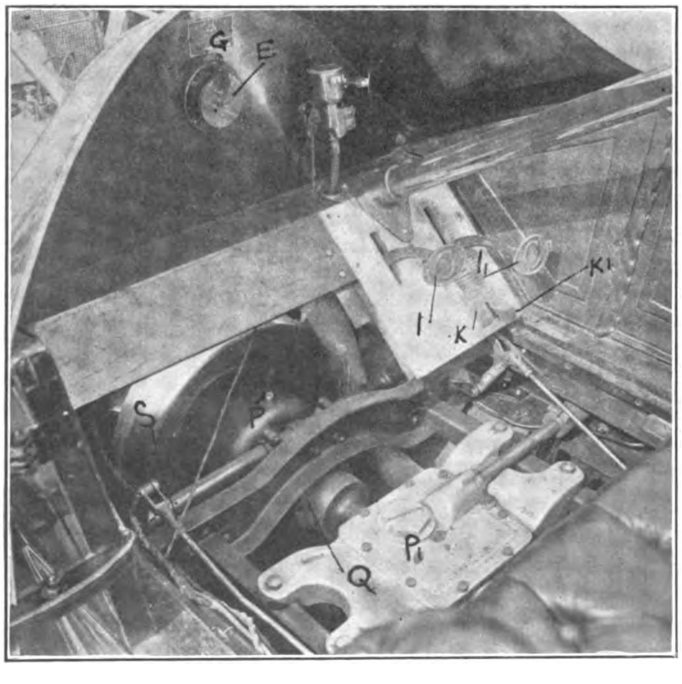


Fig. 2—Showing clutch mechanism, filler plug, switch and locking key, control pedals, gear box suspension and brake adjustment

See that the gear lever is in the neutral position shown in Fig. 6. This can be verified by moving it to and fro sideways. The levers on the steering wheel should then be set for starting. The top lever marked H in Fig. 6 is the ignition lever. This should be set about halfway between the bottom and its position as shown in the illustration. The throttle lever, the lower one marked H_1, should be set about two inches from the bottom.

After the engine has once been started, turn switch over to M, which means magneto; it should be possible to restart it again during the day by turning the switch to the right and pressing button E in the center of the switch marked G.

Fig. 3—Correct position for sitting while driving and method of holding this particular change speed lever

Now take your seat at the wheel, depress the clutch I (Fig. 2) to the full extent of its travel, which is not much, and wait for the primary gear shaft to slow down to engage the first speed, which is done by pressing the lever T sideways toward you and drawing same backwards to position marked L on quadrant—in Fig. 6. The ignition lever H should now be placed as in the position in Fig. 6. By depressing the accelerator pedal K slightly to speed the motor and letting the clutch pedal I up gently the car will move forward. Wait for the clutch to take proper hold before pressing the pedal K down again to increase the speed; to change to second speed release the pressure from the pedal K and declutch; take the gear lever T and push it forward with a slight outward pressure so that when it arrives at the gate it will lay over to the right and the continuation of the forward pressure will make it drop into the second speed, the position on the quadrant being marked M for medium. This operation of changing should be done deliberately and without waiting in the gate; otherwise the engine shaft will have time to slow down and may cause the gears to engage badly. The same operation is to be followed as from first to second speed until a momentum

HOW TO MANAGE A CARHARTT CAR, WITH INSTRUCTIONS AS TO LUBRICATION, TIMING, CARBURETION, AND COOLING

of ten to twelve miles per hour has been attained. To change to third or high gear, take the gear lever in the hand, ready to pull back to its full extent, but do not press the clutch more than half its travel; otherwise the dogs of the high gear will not mesh easily. If the lever does not move easily through quadrant and across the gate oil at O, Fig. 6. This requires frequent oiling, as dust gets into it.

After the car has attained a speed of, say, twenty miles per hour move the spark lever H three parts the way up the quadrant and then it requires very little touching.

To change from high to second speed care should be taken that the speed of the engine shaft is not allowed to drop too low, and after the clutch is released the lever should be pushed forward as far as it will go, to M, quickly. The same applies to changing from second to low.

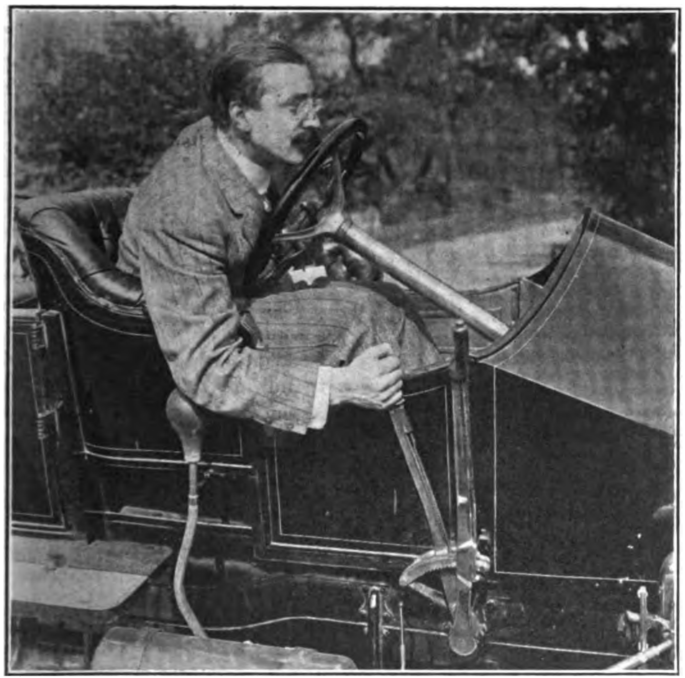


Fig. 4—This position may look racy, but is very tiring and perfect control over the pedals and wheel is lost. Note wrong way of holding knob type lever

The brake, which is operated by the pedal I, in Fig. 2, is powerful and if properly adjusted is sufficient to hold the car under any conditions. The handbrake is conveniently situated (T, Fig. 6) and should be used on hills and in gently slowing up, so as not to give the footbrake too much work and to accustom one's self to using it when an emergency necessitates a quick stop.

The throttle lever H_1 should be left in such a position that the engine just turns over when the clutch pedal is depressed.

To drain the water undo the plug under the radiator; also the tap W (Fig. 1.) If this is not done some water will remain in the pump, and if it freezes a broken pump spindle will be the result. The greaser on the pump should be given a turn every day. To remove the magneto undo four holding-down bolts under the bed plate, but first mark the dog-clutch coupling.

The air valve A_1, Fig. 5, needs cleaning from time to time. Do this by pouring a little gasoline on it and turn it round on its seat by the adjusting nut. Slackness in the steering can be taken up by giving a slight turn to nut X. Undo nut Z to lubricate the steering box. To release the inlet manifold undo nuts B_1.

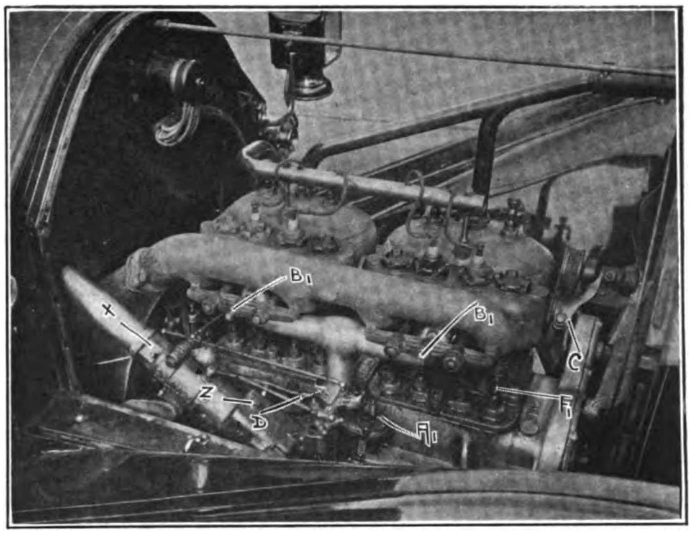


Fig. 5—Intake side of motor, showing carbureter, steering adjustment, fan belt, tightening nut and adjusters for valves

When the valves are worn the distance between the lifters and valve stems can be regulated by adjusting nuts F_1, so that a visiting card will just slide between the two surfaces.

Fig. 3 shows how to sit at the wheel and change speed and Fig. 4 how not to do it. There is no necessity to move from the comfortable position shown in Fig. 3. The gear lever should be taken in the hand as indicated so that when you want to use the reverse the index finger is ready to press the knob T_2. If the position in Fig. 4 is followed command of the steering is lost.

The clutch fork Q, Fig. 2, under curved chassis member needs lubricating every day. P is a plug on the plate clutch boss. Undo this every week and insert a mixture of one-third kerosene and two-thirds lubricating oil.

K_1 is the exhaust cut-out pedal, to operate which press down till it catches in a notch; to release, press it upward with the toe of the right shoe.

To fill gear box with oil the cap P_1 should be undone. Behind the gear box a ring with a milled edge will be found to lubricate the universal joint and this requires frequent filling with grease; unscrew the ring and the special cap will slide back.

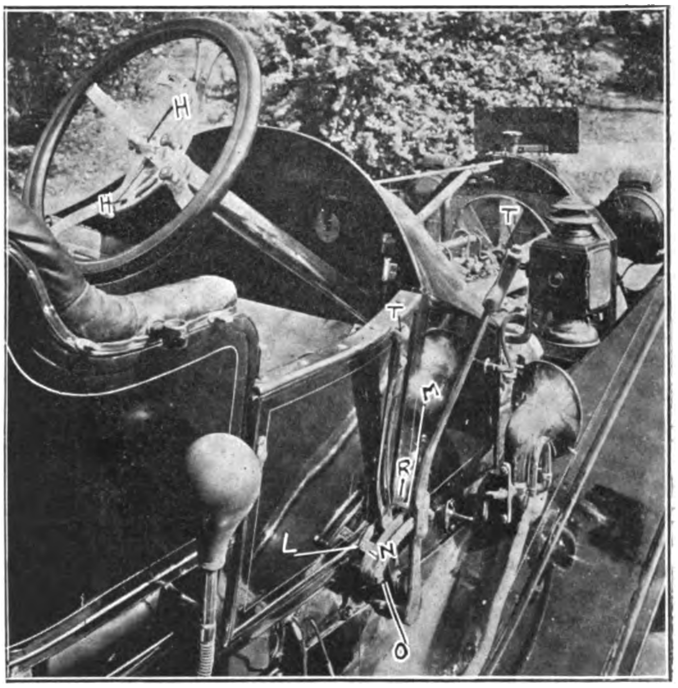


Fig. 6—Control levers on steering for ignition and throttle gear and brake

Injunctions.

Don't decide before you see the car whether or not you will like it; the wish should not be father to the thought.

Don't look with a prejudiced eye; you might as well not look at all if you refuse to see.

Don't let some other pair of eyes do the looking for you; what is the matter with your own? Moreover, the other eyes might be near-sighted.

Don't look at the paint on the body while you are thinking of the carbureter.

Don't examine the striping on the wheels while you are wondering whether or not a magneto is used in the ignition system.

Don't become fascinated with the brightness of the lamps and forget to observe the method of lubricating.

Don't spend all your time admiring the straight lines of the body; the cooling system remains to be looked at.

Don't go hunting around for a place to put your baggage until you find the place where the tools are stored.

Don't just glance at the place where the tools are supposed to be; count them; give a thought to the character of them; a bundle of wire is worth about a nickel; credit the "kit" with all that it has in its make-up, but no more.

Don't try to figure out where the spare tire is to be stored on the car; let the maker of the car dispose of such details for you.

Don't assume that the lubricating oil can be carried in your hand; let the maker of the car provide a place for it.

Don't usurp the position of designer of the automobile that attracts your notice; buy a car that has been designed.

Don't assume that a car that looks bad is good. True, beauty is as beauty does; equally true, beauty is an outward sign of an orderly interior.

Don't fool with the carbureter and after you put it out of joint assume that it is no good; the chances are that it is as bad as you make it; the equal chances are that any other carbureter will be in the same fix after you get through tinkering with it.

Don't expect to go too far on a gallon of gasoline; some of the distances covered (theoretically) on this amount of fuel are past practical mention.

Don't start out with a little lubricating oil; have as much as there is storage room for; it is marvelous how much damage that can result from the absence of lubricant for just five minutes.

Don't fall in love with the magneto to the extent of neglecting the battery ignition; an old friend comes handy in a pinch.

Don't expect a battery to be in good working order after it has stood in idleness for a year and a day; it may be a wizened old man incapable of active service when you get to it.

Don't neglect the wiring; it should be examined at regular intervals; poor joints offer a high electrical resistance and defeat service.

Don't assume that the wiring is perfect simply because the joints are in good order; there may be a fault in the wire under the insulation at some point; feel along the insulation until you come to a spot that indicates lack of continuity, just as a doctor examines for a fractured bone in the arm.

Don't neglect the contacts in the magneto and timer; they have to stand a large amount of rubbing and in time the effect is to wear them out; replace them at the right time.

Don't allow grease to remain on the surfaces of the insulation of the wiring; grease and rubber, of which the insulation is made, are far from good friends; unfortunately, grease gets the better of the argument.

Don't, under any circumstances, fail to grease all the little joints around the chassis; grease is the keeper of the bearings.

Don't allow mud to dispossess the grease that is placed to lubricate and protect the bearings; if the grease is present in quantity sufficient to fill the space mud cannot get in.

Hints on Care of Tires

After four years' experience I am confident that the solution of the automobile tire problem will not be found in discarding the pneumatic tire for some other kind, but in selecting the best pneumatic on the market and giving it proper use and care.

When an owner finds that two sets of tires do not give the same amount of wear, he frequently concludes there is defective material or workmanship in that make of tires, forgetting that conditions of service vary so widely, and that drivers are often heedless about starting suddenly, and careless about the many little things that seem insignificant to them, but which affect tremendously the life of his tires. The service received depends as much on the proper care as on the quality of the rubber and workmanship.

Observe carefully the different automobiles you pass and you will notice that a large percentage of tires are used without being properly inflated. Ask the driver, whose tires disintegrate rapidly, and who is constantly complaining about blow-outs, if he keeps his tires as highly inflated as the manufacturers request and invariably he replies, "No." Usually he has no knowledge as to the amount of air his tires contain.

Often the driver never thinks of his tires until he observes they are nearly flat; or else he is ignorant of the fact that when a tire is imperfectly inflated the walls bend back and forth, with the same result as when you bend a piece of wire back and forth in your hands; it weakens and breaks. Few tires are strong enough to stand the heat engendered in the threads, the weight of the car, combined with the air pressure and gross carelessness. The most remarkable thing about the pneumatic tires is that they last so long in view of the ill-use and improper care they so often receive.

If drivers would be sure that their tires are properly inflated before starting they would find that rim cutting, which is caused by the play between the rubber and metal of the wheel, would seldom occur before they are fully satisfied with the mileage received. Remember you cannot always tell from appearances whether or not your tires are perfectly inflated. A good gauge should be secured, and then it will be the exception when a good tire will not travel five thousand miles.

Another improper use to which pneumatic tires are put is constant overloading. Every car should be carefully weighed and the equipment and load carefully considered, in order that the driver may have a margin of safety and not carry more than the tires were made to stand.

You do not expect your boy to do as much work as you do because he does not possess your strength; neither should you be so unfair as to insist that your tires shall do more work than their strength warrants.

Again, owners are careless about tire shoes when the car is in the garage. Often the car will not be used for long periods of time. Instead of jacking up the car and taking the weight off the tires and partially deflating them, they stand just as the car was placed when the last trip ended. This exerts a continual and unnecessary strain on the walls of the shoe.

But if time is taken to jack up the car and partially deflate the tires the life of the shoes will be materially lengthened; as then they will be called upon to bear only the pressure of the air with which they are inflated. This is slight compared to the strain they must bear when they support the weight of the car. And if one will follow this course the life of the tires will be increased by about one-half the time the car stands idle.

Care should be taken that the car does not stand with deflated tires without being jacked up. Watch carefully that the tires

REV. PERCY R. FERRIS SAYS: "SOLUTION OF THE PROBLEM DOES NOT LIE IN DISCARDING OF PNEUMATICS; SELECT THE BEST AND GIVE THEM CARE"

do not stand in oil or grease and wipe off any oil that may drop on the tires. Oil greatly softens rubber and takes away its resistance and elasticity.

In cold weather, if it is desired to lay up the car, the tires should be removed from the wheels and after carefully wiping off all oil or water wrap them up in a soft cotton cloth to keep out the light; then put them where the temperature will be moderate. If you leave your tires in the direct rays of the sun, or in a very warm place, the rubber will quickly lose its elasticity and become hard and cracked. A few months of such treatment will destroy the life of the best tires.

Be careful in driving your car for the sake of your tires if for no other reason! Careless driving causes more harm to tires than we dream of. Start your car gently and with your mind on what you are doing. Take every corner at a moderate pace and do not stop suddenly unless unavoidable. When curves are taken at high speed the strain on the sides of the tires is detrimental. Carry tire chains for wet roads to prevent skidding, which is a very dangerous experience to tire, car and driver.

In driving up to a curb never let your wheels rub against the curbing as you come to a stop, for it will wear out the rubber at the thin point of contact and is liable to bend the rim and pinch the shoulder of the shoe. If possible to prevent it, do not permit your car to run in a rut, as it is liable to greatly injure the tires; and never apply your brakes suddenly unless forced to do so by some emergency, because when the wheels cease rotating before the car stops the tires drag and wear tremendously.

Examine your tires at frequent intervals for cuts, which as soon as found should be washed out with gasoline and rubber cement or plastic put in the gash. Then bind with tape and leave it wrapped with the tape until the car is to be used again. At the first opportunity the cut should be vulcanized to prevent mud-boils and sand-blisters. The maker is the proper one to repair the tires, as it is to his interest to see that the work is well done.

Just as soon as the fabric is exposed the shoe should be sent to the factory, if the owner desires to preserve the fabric, and present permanent injury. When proper care is given, and the tires are not weakened by bending or by extra strains, the fabric should retain its strength indefinitely. But let the moisture penetrate the tire and at once the fabric begins to disintegrate and lose its power of resistance. As long as the fabric can be preserved blow-outs will not occur, though it tears comparatively easy once it is cut or injured. Kept in proper condition it will resist severe strains for a long time.

Remember the wheels of every car should be examined occasionally to see that they run parallel to each other in order that the tires may not be subjected to a grinding action which wears out the tread rapidly. Look over the rims at frequent intervals to detect dents or rust. It is quite easy to dent some rims and often the edges wear down to such a sharp edge that rim cuts result.

Just a word about the care of extra casings. It is so much easier to change tires in case of trouble than to repair old ones that few owners drive without carrying the extra shoe.

It is the part of wisdom to change your tires from left to right and vice versa at least once a year to distribute the wear as evenly as possible. Place good covers over your casings and secure them on the car so that there is no danger of chafing. Put the cover over them so carefully that no water can enter.

And when you place your tubes in the shoes sprinkle plenty of soapstone within, so that friction may be reduced between the casing and the tube, and the heat which is so often generated by this friction prevented.

Instructions.

When the carbureter becomes unruly the difficulty may be:

(a) Nozzle too large.
(b) Nozzle too restricted.
(c) Needle in nozzle not properly set.
(d) Depression too low.
(e) Depression too high.
(f) Too little initial air.
(g) Too much initial air.
(h) Too much auxiliary air.
(i) Too little auxiliary air.
(j) Float too high.
(k) Float too low.
(l) Passageways stopped up.
(m) Air locked.
(n) Pocket of water.
(o) Float punctured.
(p) Mechanical interferences.
(q) Leak around manifold flanging.
(r) Adjustment awry.
(s) Filter stopped up.
(t) Low pressure.
(u) Control system awry.
(v) Carbureter too small.
(w) Carbureter too large.
(x) Manifold not right.
(y) Poor gasoline.
(z) Gasoline not turned on.

Remedies for A to Z Carbureter Troubles—

(a) Fit smaller jet or solder up orifice and redrill.
(b) Use taper reamer.
(c) Adjust till correct position is found.
(d) Fit lead washer beneath jet base.
(e) File top of jet or better reset needle valve.
(f) Drill a few additional holes at convenient places.
(g) Fit shutter, locked by a set screw.
(h) Increase tension on spring or block up ports.
(i) Decrease tension of spring, enlarge slot and ports.
(j) Unsolder balance weight holder ring, lower same on needle and solder or weight down float equally with a little solder.
(k) Unsolder balance weight holder ring and raise same.
(l) Unscrew same and clean them, using air pressure (tire pump); don't use pins in the jet.
(m) Unscrew gasoline pipe from carbureter and allow gas to flow through, look to stoppage in hole of filler cap in gravity-fed cars.
(n) Same as (l).
(o) Drill another small hole, blow or boil gasoline out and solder.
(p) Disconnect carbureter entirely, thoroughly clean out, verify everything, and if it does not then work have some one put it in order that understands how to.
(q) Replace old joint by a new one; if you haven't a new one make one from stout brown paper and boiled oil or white lead.
(r) Readjust but leave jet alone; if it ran all right once it will do so again unless the motor is worn badly.
(s) Disconnect and clean out; should be cleaned once a month.
(t) Clean pressure valve and go over all connections, copper pipes sometimes split at the seam.
(u) Readjust and tighten up, or if worn take up play.
(v) Fit larger carbureter.
(w) Try adjusting jet and closing ordinary air intake; if it will not work, fit smaller carbureter.
(x) Consult makers of car or engine and have a new one made, patched induction pipes do not work well.
(y) Empty out every drain of old gasoline anl pay more money and get better quality, or if the dealer has only one quality go to another dealer, or better still, buy direct and store it yourself if you have the convenience.
(z) Turn it on.

Letters

COMMUNICATIONS FROM READERS MAINLY ALONG TECHNICAL LINES; MOST EFFICIENT ORDER OF FIRING FOR SIX-CYLINDER CARS; STARTING WITHOUT A CRANK; FAST- AND SLOW-MOVING VEHICLES ON CROWDED STREETS; INSTALLATION OF PYROMETERS.

Order of Six-Cylinder Firing

Editor The Automobile:

[2,398]—I am a subscriber for years. Please inform me how a six-cylinder motor should fire. I have one that fires 1-3-5-6-4-2.

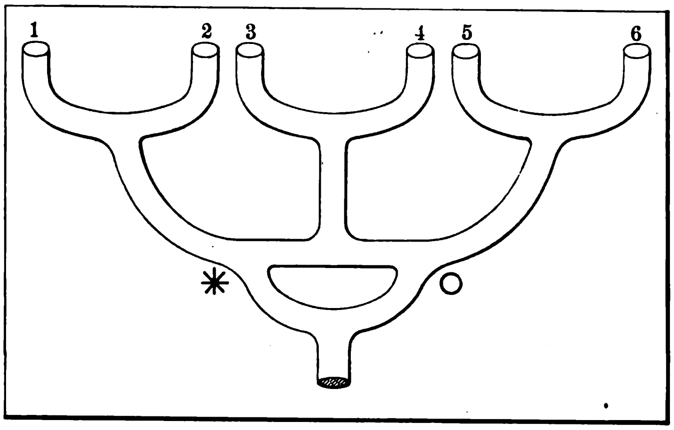


Fig. 1—Showing one type of six-cylinder induction pipe

A mechanic claims it should fire 1-4-2-6-3-5, as the gas can be gotten to the cylinders with more uniformity. The intake is designed so as to have 1 and 2 draw together, 3 and 4 together and 5 and 6 together. When this auto is on a State road going 25 to 30 miles, it runs smooth and good, but when on rough roads going slow the cylinders fire irregular and bother. Another claims faulty construction of intake manifold (Fig. 1).

Is it best and of proper design? If not please give me information to have a better one made. I do not mention maker's name. If you can assist me please inform me. The auto is very satisfactory, but engine, six-cylinder 4½ x 5 geared 3½:1, does not give good results; weight 2,800 pounds. It does not do near as well as my four-cylinder, 4½ x 5¼; weight 2,950 pounds.

Forgot to state that a duplicate of this six-cylinder. in a boat, was helped by closing the pipe marked O and drawing supply through place marked * (Fig. 1).

Can you assist me?

Syracuse, N. Y. **Edwards.**

Without knowing the make of car it is impossible to tell you the firing order, as the following table will show that different makes of six-cylinder engines fire differently. Perhaps you will find your engine in the list:

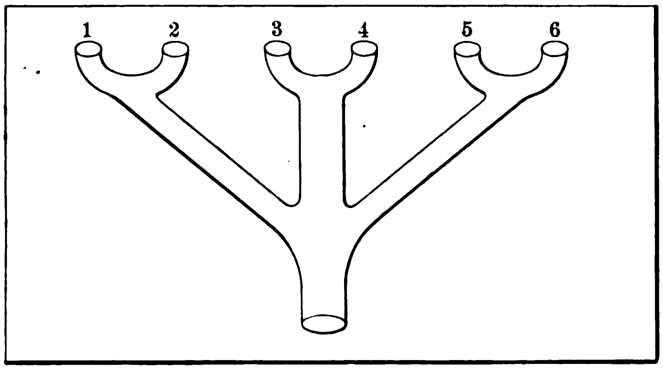


Fig. 2—Suggested alteration in shape of induction pipe

Pierce-Arrow	fires	1-5-3-6-2-4
Winton	"	1-5-3-6-2-4
Lozier	"	1-2-3-6-5-4
Peerless	"	1-3-2-6-4-5
Matheson	"	1-4-2-6-3-5
Stevens-Duryea	"	1-4-2-6-3-5
Knox	"	1-5-3-6-2-4
Alco	"	1-4-2-6-3-5
Thomas (K)	"	1-4-2-6-3-5
" (L)	"	1-3-5-6-4-2
Franklin	"	1-4-2-6-3-5

It will be seen that there is only one engine that fires in the sequence that you give.

With regard to the induction pipe this appears too complicated, besides having too many elbows against which the rush of gas has a chance of condensing before reaching the cylinders.

The shape of induction pipes is dependent on the sequence of firing, and is more a matter of trial and error than actual theory. The majority of six-cylinder motors have their cylinders cast in pairs with only three ports to feed, and it is then a very simple matter. The method shown in Fig. 2 is a suggestion that might suit your engine, but without more data we cannot recommend it as being a sure cure for your troubles.

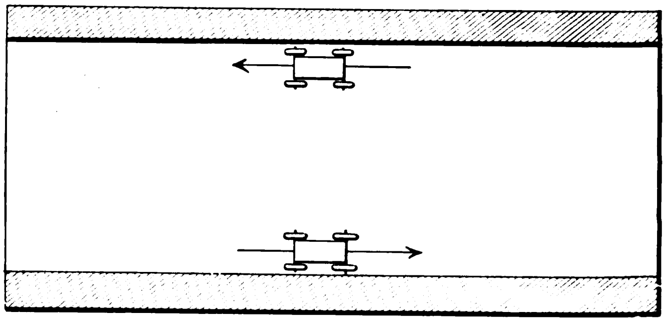


Fig. 3—Slow moving freight automobiles passing each other, both keeping to the right in order not to obstruct the positions that belong to quick moving automobiles

Wanted: A Disinterested Party

Editor The Automobile:

[2,399]—Am now trying to decide which car (Roadster type) to buy and was very much interested in your "dont's" of last week. They really do not help an inexperienced buyer very much in selecting the best car for the money. Could you refer me to some disinterested person to whom I can apply for advice and have him answer a couple of questions like these: "What car costing under $1,000 or $1,200 in your judgment would give me best service (Roadster)?" Also: "What car costing less than $1,500, etc.?" and have him tell me why. Whether this scheme would work I do not know, but would like your opinion. Would be willing to pay a reasonable price for the advice, of course. Thanking you in advance, I am, yours very respectfully,

Wm. Ryan.

Muskogee, Okla.

With reference to your esteemed favor of the 5th inst., we think that you will have a difficulty in finding a disinterested party to advise you. We are glad you are interested in the "Don'ts" that appear in The Automobile, but the choice of the car is dependent upon certain local conditions and the work that you intend to put the car to.

You can find several people who will give you advice upon a second-hand car as to its wear and value, but with a new car the case is not the same.

Personal demonstrations and opinions of users of the car are the best criterion.

Starting a Car Without a Crank

Editor The Automobile:

[2,400]—Is it possible to start a car if the starting handle has been damaged or lost?

Endeavoring to turn the motor by the flywheel is a very dangerous operation and should not be resorted to. If there is any one else in the car put the car in the high gear, inject a small quantity of gasoline in the cylinders and let the car be pushed with the clutch out. After a little momentum has been attained let the clutch in softly and the engine should start even on magneto. If alone, however, jack up the rear wheel, put in the high gear and turn in the forward direction.

H. W. M.

Trenton, N. J.

Slow Moving Automobiles to the Side of the Road

Editor The Automobile:

[2,401]—Is there any law that makes it mandatory for slow-moving automobiles to get out of the way of speeding cars?

H. L. S.

New York City.

Questions such as this are handled under the head of "police regulations," and the police power of the respective States is sufficient for the purpose. If the police are instructed in accordance with the spirit of city ordinances, and have among their instructions those which require them to so regulate traffic that freight automobiles are directed to keep to the sides of the street, for the purpose of making way for the faster passenger automobiles, it may be regarded as well within the law. Figs. 3 and 4 show the right positions for freight and passenger automobiles under such conditions, it being assumed that the freight automobiles will be slow moving, relative to the speed of passenger automobiles, but it will be understood, however, that passenger automobiles are not given the right to violate the fundamental speed laws simply because they are given the right of way.

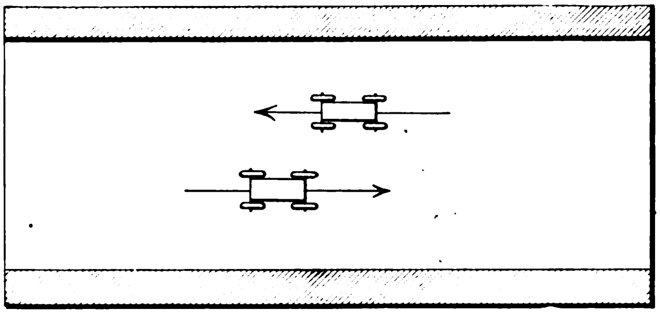


Fig. 4—Quick moving passenger automobiles passing each other, occupying a center position in the street, leaving room for slow moving automobiles at the sides of the street

Moving Wire Not Necessary

Editor The Automobile:

[2,402]—I am much interested in magneto ignition work, and would like to have you state whether or not it is necessary to employ armatures with moving wire, provided some means is utilized for varying the magnetism.

Erie, Pa. C. R. S.

An electromotive force will be induced into the wire whether or not the same is placed upon the rotor, provided the magnetic fluxes vary. Flux variations may be brought about by making and breaking the magnetic circuit. This is a mere matter of utilizing the rotor, one form of which is shown in Fig. 5. In this example, the coils of wire are placed on cores formed out of the polar horns. The cores are in the path of the magnetic flux, and the magnetic circuit is interrupted by the rotor, due to its shape. This form of magneto will be highly efficient if the general design is properly looked after, provided the permanent magnets of the magneto are made of a proper grade of tungsten steel, and are suitably magnetized for the purpose.

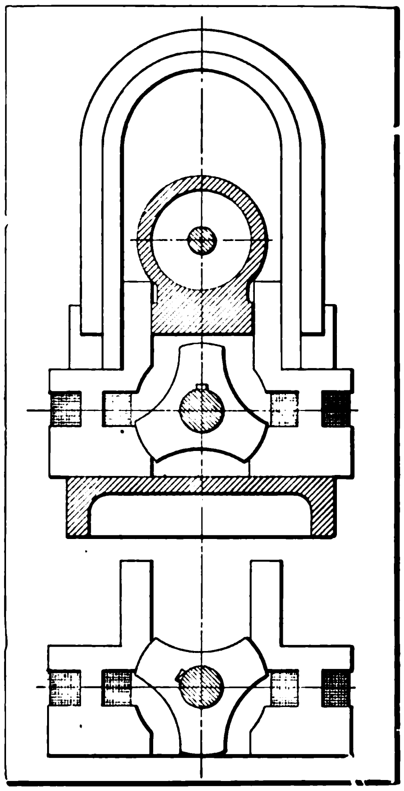


Fig. 5—Cross-section of a rotor type of magneto with fixed coils embedded in the soft pole pieces, eliminating the use of wire on the moving parts

As to the Use of the Pyrometer

Editor The Automobile:

[2,403]—What is the best way to use the pyrometer in connection with furnaces? O. J. M.

White Plains, N. Y.

The illustration Fig. 6 as here given will be sufficiently clear to require no further explanation, unless to point out that the measuring instrument is very delicate, and should be placed in a well lighted room so that the observer will be able to note the readings with precision. Attention should be given to the means at hand for maintaining the proper temperature of the cold end.

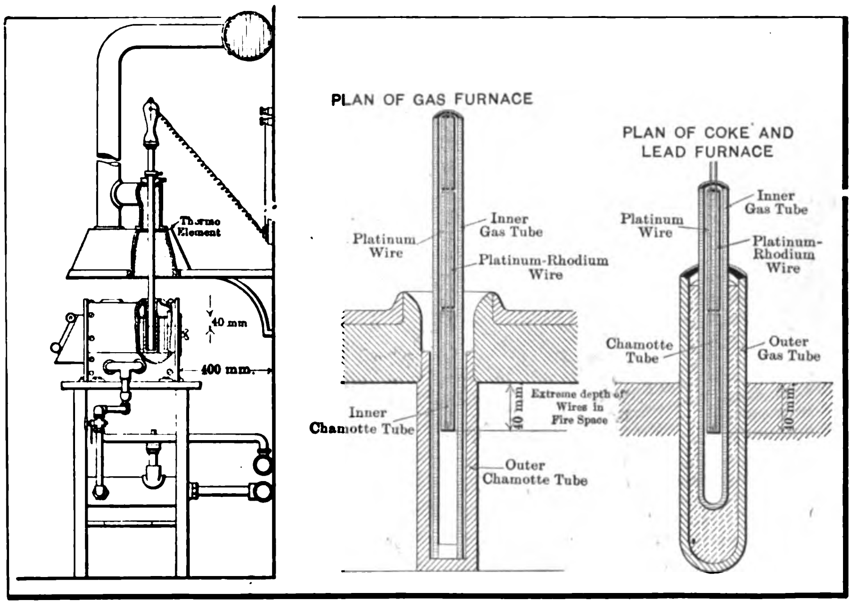


Fig. 6—Illustrating the installation of pyrometers in gas furnaces for heat treatment work

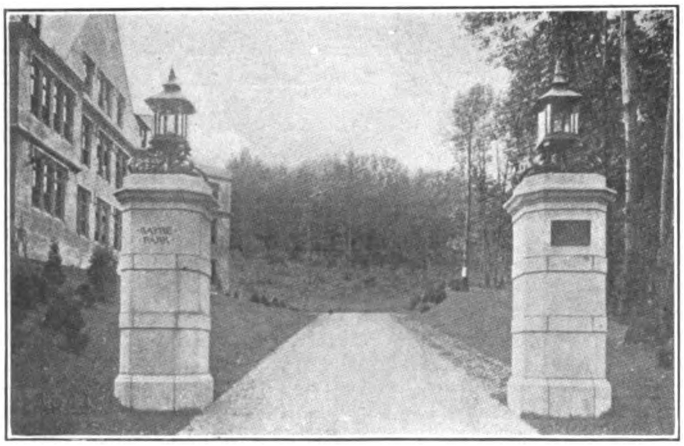
Touring in a Runabout

JAMES S. MADISON RELATES SOME EXPERIENCES WHILE TOURING IN A RUNABOUT THAT ARE PLEASANT TO READ AND INSTRUCTIVE AS WELL

THE average runabout of small wheels and light weight is not intended for touring purposes and is poorly adapted to such use. No matter how ambitious the owner of such a car may be or how much confidence he may have in his car he should be rather wary about attempting a tour unless he is entirely willing to take chances and meet his trouble philosophically when it comes. The most serious objections to all the popular runabouts are their short wheelbase, light weight, small wheels and consequently small tires. Each of these factors helps to render them unsuited for long trips over all conditions—good, bad and indifferent—of roadbed. The total combined effect is to transmit a very large proportion of all road shocks, from whatever cause, to the power-plant, transmission, body of the car and to the passengers. Under these conditions touring more nearly approaches a torture than a pleasure. The storage space on a runabout is also limited to a very small amount so that one cannot take with him the necessary spare parts for emergencies, or suitable wearing apparel.

It should always be remembered that the runabout, as its name implies, is intended for town use, and for such portions of the country as have advanced to the point of good roads. I have in mind a popular 20-horsepower, four-cylinder runabout that on the splendid, level, oiled roads of eastern New Jersey would give most excellent satisfaction as a touring car. But if this same car were used for the same purpose in the western part of the State or on the average roads of Maryland or Pennsylvania the result would be disastrous. There are, however, runabouts that may be used with great satisfaction for long tours. In the writer's judgment the necessary requirements are these: The wheels should be at least 30 inches in diameter, the tires should be large, not less than 3½ inches in diameter—a 4-inch tire would be better—the car should be provided with excellent springs—springs that are merely "good springs" will not answer—and it must be sturdily built throughout. It ought to weigh not less than 1,400-1,600 pounds, and have an engine capable of developing 15 to 18 horsepower at the wheels. There must also be plenty of storage space. With a car of this type one may take tours of any desired length with but very little trouble.

Following is an account of one of many trips the writer has taken. The car is equipped with unusually large tires, 31 x 4 in.; for this reason partly and also partly because the car is usually not driven faster than 16 miles an hour there has been remarkably little tire trouble—two punctures and one blow-out in 7,500 miles. On this account it has not seemed necessary to be bothered with carrying a spare casing. A blow-out sleeve and two extra inner tubes have answered perfectly all demands up to the present.



Entrance to Sayre Park, Lehigh University, South Bethlehem, Pa.

A June Trip from the Delaware to Gettysburg

The party consisting of one and one other started from Easton, Pa., in a two-cylinder, air-cooled, fifteen (manufacturer's rating twenty, by A. L. A. M.) horsepower runabout, provided with a commodious rear box, in which were stored chains, curtains, spare parts and our personal belongings. Instead of placing these in the usual suit case, they were wrapped in a linen folder about five feet long by three feet wide, containing a number of pockets of different sizes for various articles, combs, brushes, cuffs, etc. We expected to be gone three or four days and our requirements were strictly limited to the articles absolutely necessary for that length of time. One of the indispensables was an eye-cup and bottle of eye-wash. The writer always finds after a day's run in the sunlight, over dusty roads, with the constantly changing focus of the eyes on the road, that they become inflamed and uncomfortable. The eye-cup and wash bring much relief.

The day was June 29; the sky was clear, the temperature 68 degrees. The first stop was made at Bethlehem after an exhilarating run of seventeen miles over a fine State road oiled all the way. At the corner of Broad and New streets, Bethlehem, we turned to the left (south) on New street, followed it across the Lehigh River (excellent view of the enormous plant of the Bethlehem Steel Co. from the bridge) into South Bethlehem. Continuing straight ahead for about one-third mile we entered the beautiful campus of Lehigh University. The roads inside the grounds are of the most approved macadam construction. All of them lead to Sayre Park, a vast tract of wild, but most beautiful mountain land that the university has cared for so successfully that it is one of the show places of eastern Pennsylvania. A perfect macadam road of about a mile and half in length goes right through the heart of it, affording at many places a view of a magnificent panorama extending for thirty miles or more. The tourist going through Bethlehem who fails to take in this side trip of about five miles in all is missing a rare opportunity.

Spectators congregate to see the trouble

From Bethlehem we ran on to Allentown over five miles of oiled macadam. The next stop was Reading, thirty-seven miles from Allentown, over a road that was fair dirt for much of the way, and good pike the remainder; the last five miles of it was of the same quality as the glistening white sand roads of New Jersey. On approaching the city we saw the now famous sign painted on a large white square board surface: "Automobilists Speak Well of Reading. May We Speak Well of You?" We drove to the square in the center of the town, where we had a light luncheon in a department store—a plan we followed wherever possible. We found the food satisfactory and the expense lower than at the usual restaurant.

During the afternoon we ran on to Lancaster, thirty-six miles, good road most of the way, and then on to Columbia, ten miles farther. Here I made the first mistake in deciding to spend the night. The town is not attractive and the accommodations poor. It would be much better to go on to York—fourteen miles farther.

At Adamstown, a small village between Lancaster and Columbia, it was necessary to take on gasoline. After fifteen minutes' diligent search, a man was found who had some. He filled a four-gallon can by means of a quart measure; the can, measure and funnel were originally tinned, but long use and exposure had obliterated every sign of tin and left only a coating of iron rust. Since the oval funnel with gauze screen which had been purchased especially for such occasions had been forgotten, a handkerchief was used for a filter and the gasoline poured through that—a wise precaution, for there was about a quarter teaspoonful of sediment caught.

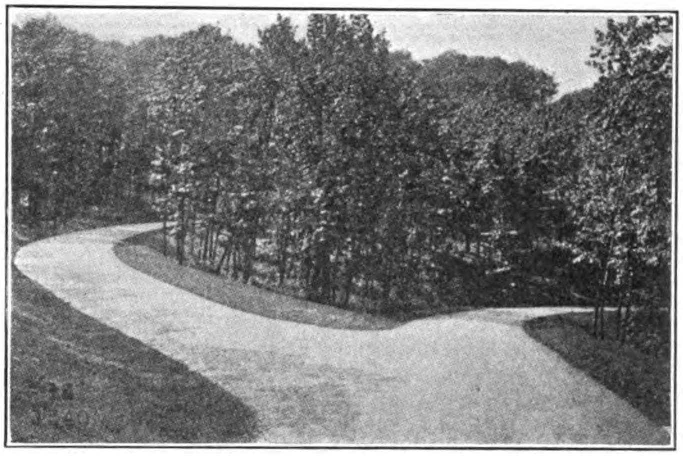

A little oil to keep things going

On the morning of June 30 we left Columbia, passing through York and arriving at Gettysburg about noon, a run of fifty-two miles. The road up to the last ten miles was good, but that is the worst road in eastern Pennsylvania. The average driver's remarks about that particular piece of deviltry are unprintable. I must content myself by saying that it is a disgrace to any civilized community. The fact that it is a toll road and one is obliged to pay for the privilege of going over it makes the imposition all the more shameful.

We spent the afternoon in Gettysburg seeing as much of the battlefield and of the National Cemetery as possible. In spite of the magnet that draws over a hundred thousand visitors there every season, Gettysburg is not a pleasant place to visit. It is a provincial community whose principal industry is taking care indifferently of the strangers who want to know about the battle fought there forty-seven years ago.

The hotel at which we stopped was so burdened with flies that each guest in the dining room was supplied with a fan to keep them off the food and out of his mouth. The waiters, when not busy, stood back of one's chair and aided in keeping the pests at a safe distance.

We left early next morning (having been awakened by squealing pigs and crowing chickens) with great enthusiasm for the thirty-eight mile run to Harrisburg. For twenty-eight miles this road out of Gettysburg was also very bad. Water bars, deep ruts, rough surface, loose stones, etc., tell the unpleasant tale. When within ten miles of Harrisburg the signs became encouraging—we knew we were getting out of the backwoods into civilization. The last lap to Harrisburg was delightful. The city itself is most attractive, with many miles of modern streets and many beautiful parks. From this point we ran on to Warnersville, where we spent the night, forty-four miles over what was at one time a fine pike. At present it is badly worn in spots. The method of repairing the roads is a senseless one, although it seems to be general in Pennsylvania towns and counties. When a soft spot appears in the surface, it is allowed to go until it becomes a hole or rut and it is then closed up by dumping broken limestone in it; the passing vehicles are expected to crush it—and they do, except what they scatter to the side and ahead. This sort of repairing is primitive and and stupid, and also exasperating to the man who is trying to make a set of tires guaranteed for 3,500 miles give him that mileage. The next morning we ran to Reading, ten miles; from there we followed the same route by which we came back to Easton. The total mileage for the entire trip was 311; the gasoline consumed, 24 gallons; the total expense was $35. Of this amount $2.65 was paid for toll, most of it in small sums. The toll gates in Pennsylvania are a relic of the dark ages. They are a great nuisance to the motorist; not the matter of the expense, but the frequent stopping. Many times one has to wait for a woman to leave her washtub or other household duties to come for the toll. As a general principle I should say it would be decidedly more economical and certainly more satisfactory for the average tourist to avoid Pennsylvania, and take out a yearly license in New Jersey. The cost of the toll will almost pay the annual fee, and I calculate that the damage to tires will be about ten times greater in Pennsylvania than in New Jersey. Upon examining the tires after returning, the tread of each casing was found to be hopelessly cut up by the loose stones, and while all the casings were old, having been driven 4,400 miles, it was evident that nothing would save them except a retread for each at a cost of $14 apiece.


The Junction, Sayre Park, South Bethlehem, Pa.

A Word of Advice as to Tires

Concerning tires, have the best that money can buy, and by this it does not necessarily mean the dearest; but a tire that has given good results to others should give the same to you if you treat them properly. It is better in the long run to have a larger size tire fitted to the car even at an extra cost than to run on tires that are overburdened, and in this particular communicate with several tire companies and find out what they consider the correct size should be for a given weight, and while speaking about weight insist upon a specific weight being given you by the maker of a car and not "Oh! about so and so many pounds." Sometimes through lack of knowledge and sometimes through desire to make the weight appear as small as possible the question is evaded in this manner. You can get anything in the way of information if you insist.

Salesman Made a Grave Mistake

Purchaser: "Say, man, there is a mistake in this bill."

Salesman: "Oh, no! You are quite mistaken, the bill is right."

Purchaser: "I tell you there is a mistake in this bill."

Salesman: "I tell you there ain't! The bill is right."

Purchaser: "I tell you there is. I've got more money than that!"

Questions That Arise

CONCERNING THE BEST PROCESS IN MAKING A NOISELESS MOTOR; USE OF PRUSSIAN BLUE IN SCRAPING CRANKSHAFT BEARINGS; INFLATING TIRES WITH CARBONIC ACID GAS

[251]—What are the choices in the process of making a noiseless motor?

The first choice would be in favor of a design that does not utilize gears of any kind. The second choice would be in favor of a design that utilizes the least number of gears, and advancing this reasoning further, it would be proper to point out that selecting the types of gears that are most noiseless in their performance would be rational. Fig. 1 will help in the reasoning process; it shows two schemes of gearing considering a motor with two camshafts. The scheme at the top presents the pinion on the crankshaft, and the two halftime gears on the respective camshafts with center distances *a a*. Should there be but one camshaft, as in the L-cylinder designs, the halftime gear system and one large gear only would suffice. The lower diagram of Fig. 1 shows the pinion on the crankshaft, a lay gear above, and the two halftime gears in mesh with the lay gear. This is probably the most extravagant use of square cut gears that can be found in practice. The question of noise as it relates to these plans is very much involved in the center distances *a* between the meshing gears. If these distances are exactly right, and the gears are accurately cut, noise is reduced to the point where the muffling effect of the enclosing case renders the performance quite saisfactory. If the distance *a* is not right, no one of these plans would be worth considering, and so it would appear that noiseless performance does not depend so much upon the scheme employed, as it does upon accuracy of workmanship. If jigs are used in each case, it is no more difficult to use the plan with the two camshafts and the lay gear than it would be with one camshaft and one halftime gear meshing directly with the pinion.

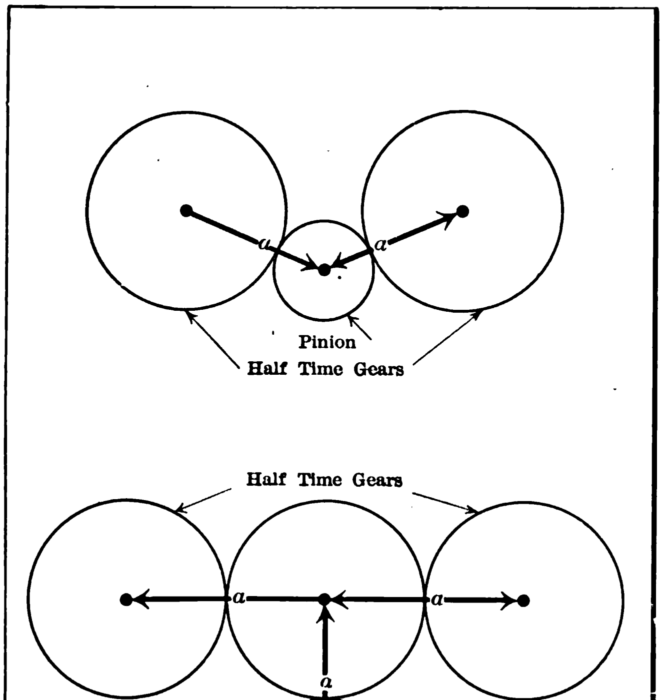


Fig. 1—Diagrams of the schemes of halftime gearing as used in automobile motors

Fig. 2 shows a plan that was used on the Moore motor, employing spiral gears, they being quite noiseless. The spiral pinion on the end of the crankshaft drives a laterally disposed shaft and the two camshafts are driven through pairs of spiral gears, one of which on the lateral shaft and the other on the end of the camshaft in each case. This lateral shaft also affords the driving means for the magnetos, of which there are two shown, and while this is an example of the profuse use of gearing, the fact remains that the performance was noiseless and satisfactory.

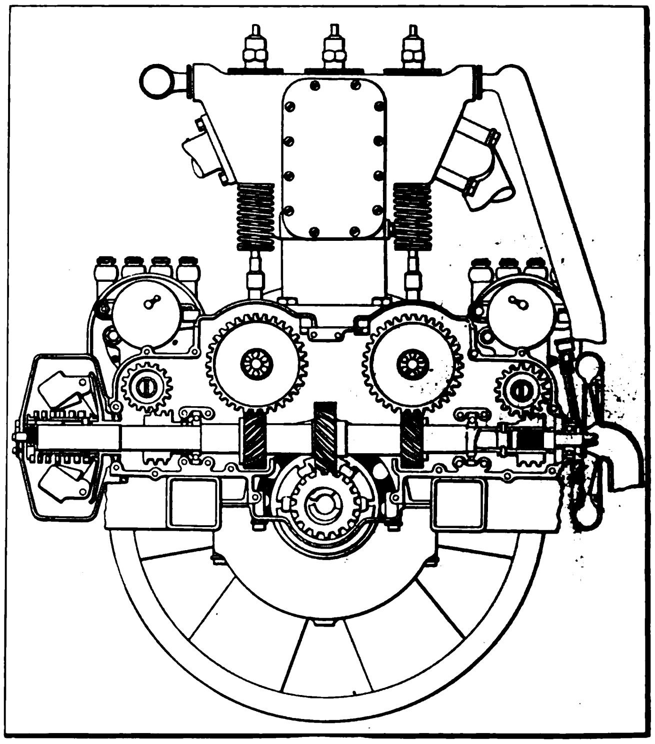


Fig. 2—Spiral gear system used on the Moore motor for driving the camshafts and magnetos

[252]—What is the character of the blue pigment which is used by machinists when they are scraping in crankshaft bearings?

Text books give for "Prussian blue" the name ferric ferrocyanide. Commercially, no such material is known. The blue that comes in tubes is made of Williamson's blue with perhaps other iron-alkali or cyanides, and perhaps aluminum-iron. The best way is to purchase this blue in these small tubes, very little being required in the scraping in of the motor. The mistake that the average workman makes lies in the profuse application of Prussian blue during the scraping operation; a perfectly even perceptible smear is all that is required.

[253]—Does inflating tires with carbonic acid gas have a detrimental effect on the rubber of the tires?

This method has been employed a good deal and no harm seems to come from the use of CO_2, but with heat generated by the friction with the road surface the gas expands and in Summer allowance must be made for this. What must be guarded against in pumping up tires is the use of exhaust gases from the engine; these have a detrimental effect.

A Tenement House Quarrel

MOTOR DRINKS TOO MUCH GASOLINE; MAGNETO COMPLAINS ABOUT OVERWORK; SPARK PLUG IS MISSING

"DRINKING gasoline cocktails," said Mrs. Magneto to Mr. Motor, "will bring you to an early grave; it takes all my time, no matter how much of a cat I become, spitting fire continuously, to keep you from having your system all clogged up with the carbon that gasoline tracks on its nasty feet; I told that fellow, Carbureter, who lives on the other side of you, to close the door which leads from his gasoline cellar, but he seems to be a most unaccommodating neighbor at best."

"Come now, Mrs. Magneto, please don't scold," said Mr. Motor. "You know very well that Dr. Quack prescribes gasoline cocktails as a regular diet for me."

"True," said Mrs. Magneto, "but you forget that Dr. Quack did not tell you to drink so hard; don't you know that you always have stomach trouble every time you take too much?"

"Aye, it is just as you say," said Mr. Motor. "I must get after that tenant of mine, Carbureter, and give him to understand that it is against the law to keep open after hours. Even if I am his most persistent customer; the best way to reform myself is to compel Old Carbureter to obey the excise law."

Now, little Miss Timer was listening to all this talk; she lives in a most inaccessible flat just back of Mr. Motor, facing Squire Flywheel's place. When conversation died out, little Miss Timer made bold to have a say: "Oh, Mr. Motor, aren't you afraid to put the law on Old Carbureter? Just suppose, for a moment, that you were to be cut off from your regular diet of gasoline cocktails, then what?"

Mr. Motor, never thinking that little Miss Timer was anything but a most giddy little child of poor parentage, awakened from his lethargy (having indulged in too much gasoline for over a week) and, touched by the solicitude of the girl, said, "Good for you; who would have thought it? I feared that you were so busy flirting with Willy Contact that you didn't know beans."

"Just to think of it, me flirting with Willy Contact? Never; I gave him his marching orders last week," said Miss Time. "Willy was limping around for several hours, kind a sour like; he seemed to be afraid of me, and the result was that I was all covered with the black dust that he kicked up every time he fell over something. I made up my mind that his spring was not working properly, and seeing Dr. Quack down there talking to Judge Battery, I called and he sauntered up to see me. Well, I told him of my suspicions and he agreed with me. He grabbed Willy Contact, took off his coat, and after looking him over carefully said: 'Willy, you certainly are in need of a bath; for the present I will be content to give you a new spring, but if I come around here again and find you with a dirty face, I will give you the bath of your life.' Willy said, 'Dr. Quack, Ounce-of-Prevention knows more about it than you do: had he been around I would not have had to eat my spring when I got hungry; he would have fed me some vaseline.' "

Just then a great commotion was heard up in Magneto alley; Willy Contact and the rest rushed away to see what was the matter, and just as they rounded the curve leading by Centrifugal Pump's house, they heard Fauntleroy Startingcrank say, "What do you think? Them Sparkplug boys have been sparking so long that every one concluded that they would marry and settle down, and now one of them is missing."

Helping a Novice Start His Engine

The other day I ran across Carrington on the train. Carrington lives near me and owns a Hurriup runabout and a touring car. Naturally we talked automobiles.

"It is a funny thing," said Carrington, reflectively, "how much a greenhorn can do to make trouble for himself. Yesterday I went to call on Gray, who lately bought a runabout like mine and is learning to run it. I got to Gray's house a quarter after three and was welcomed with more enthusiasm than if I had risen from the dead. I soon learned why. Since ten o'clock that morning Gray's man, aided by a chauffeur and helper in the garage nearby, had been trying fruitlessly to start the engine of Gray's runabout. Glad to see me? I should say they were!

"As Gray's runabout was of the same make as my own, I had a good idea of how to begin. For the fun of the thing I turned the crank two or three times, but of course without result. I noticed, however, that there was no compression whatever, absolutely not the faintest suspicion of it. On asking what they had done, I learned that in their efforts to prime the cylinders they had squirted gasoline by the cupful through the spark plug holes, and the gasoline naturally had cut every vestige of oil from the pistons. I took out the spark plugs to inject oil on top of the pistons, and found that the points of the plugs had been spread apart, I am positive, a quarter of an inch. Who did it, or why, I failed to learn; but of course no spark would jump that gap under compression. With oil supplied, the chauffeurs who had been cranking all day made themselves useful by cranking a little more, till the piston rings were properly oiled and would hold compression. Meanwhile I had set the points of the spark plugs a thirty-second of an inch apart, as they should be. I then tested the batteries and found them O. K.

"With the surplus gasoline worked out of the cylinders, and with proper compression and good sparks, I expected to see the engine start. I primed the carbureter and the crank was turned. The engine gave two or three spits and stopped. I turned the crank again. Two or three spits followed, and again the engine stopped. The third attempt resulted likewise."

"'Sounds as if the gasoline pipe was partly stopped,' said I. "Stopped? The gasoline was running a stream every time the float was depressed! The trouble was just the other way—too much gasoline. I asked Gray if he had changed the adjustment of the needle valve. He said he did not know, but he guessed he had, as he had done about everything else. I took a screwdriver and turned the needle valve down. It should have touched bottom in half a turn or less. It did not touch in a full turn, and I began to open my eyes. Fearing I might be turning in the wrong direction, I turned the needle back to its first position and marked it so I could return to the same position. Then I turned it again—one turn—two turns—and still no bottom. Three turns—still no bottom. 'Ye gods,' I thought, 'am I crazy?' Half a turn more, and it touched. I turned it back a scant half turn, cranked the engine a few minutes with the switch opened to expel the rich mixture, and it started and kept going. A slight adjustment, and the carbureter was O. K.

"The engine was running on the battery. I switched it over to magneto and the explosions stopped instantly. I looked at Gray. 'What have you been doing with the magneto?' I asked.

" 'I don't know,' said Gray, 'but the engine has been running on the battery for the past three days.'

"Well, I myself cannot imagine what that fellow had been doing, but when I looked at the magneto contacts I found pieces of his brake band mixed up with the contact points. I picked them out and cleaned the points, and the engine ran on the magneto as if nothing had happened.

"Before leaving Gray I warned him to dump out every bit of oil from his crankcase and replenish with fresh oil, as there was no way of telling how far the oil in the crankcase had been thinned by the gasoline squirted in to prime the cylinders."

Louisville Automobile Club

Exterior

Secretary's Office

Assembly Room of Executive Com.

Eugene Straus
Pres.

Hewett Brown
V. Pres.

W Staniar
Treas.

W. H. Argabrite
Sec.

LOUISVILLE, KY., Oct. 10—The history of the Louisville Automobile Club is a record of ups and downs; of hopes and disappointments; of shadowy enterprises dimly outlined; a ray of light; a step forward in the march of progress; increasing confidence; added powers; notable achievements—success.

With a handful of charter members, the club was formed at the Galt House on February 27, 1903. This was in the early days of the automobile. In fact scarcely a year before, the first car ever brought to Louisville had been unloaded from a river packet.

At that time the automobile was an uncertain quantity and its quality was hardly comparable with modern types. It was a question whether or not it could be perfected to the point of general utility, or whether it would remain a toy. But these men who gathered around the big table in the blue room at the Galt House nearly eight years ago saw the light and prepared the way. They realized that the motor car had come to stay and that the influence of the automobile was destined to grow.

The rapidity of the growth of the club is shown by the fact that at the first meeting there were fifteen motorists present. At the second meeting, two weeks later, there were twenty-four and the constitution and by-laws were adopted. The organization was formally launched under the direction of the following officers: Ira S. Barnett, president; Biscoe Hindman, vice-president; and G. Wilbur Hubley, secretary.

There were in the early days of the automobile in Louisville few successes and many disappointments. Everybody was against the motor car to about the same degree that every one is now in favor of it. There was one bill introduced into the Legislature which had for its purpose the complete destruction of the motor car so far as Kentucky was concerned. It required that a man be sent in advance of the automobile to herald its approach.

Following its organization, the club immediately got busy with the pleasure end of its usefulness and a run to Shelbyville was made on May 30 of that year. That was the first run and a forerunner of the present day reliability run. The forty-five entries made the trip without serious inconvenience.

On St. John's Day, in 1903, the first auto races ever run in Louisville were conducted at Fontaine Ferry Park. The meet was successful, but, of course, none of the exciting trimmings—such as accidents and the like—marked the occasion, because the "speed god" had not risen to his present state of power.

In the early part of 1904, the club approved an ordinance for the regulation of automobiles on the streets of the city, fixing a speed limit in the central section of eight miles an hour and of twelve miles in the less thickly populated districts. This ordinance was passed by the General Council and is in effect today, but not frequently enforced.

Members of the club entertained the poor and sick of the city with an auto ride through the public parks of the city on July 4 of the same year. This was the origin of the annual orphans' day outing, which has been taken up by automobile clubs in practically every large city in the country.

About this time the question of a clubhouse was considered, but lack of funds made the project impracticable, and with much regret the matter was dropped. A few weeks later the organization adopted a club emblem, consisting of a wheel with an auto horn in the center. On the wheel was inscribed "Louisville Auto Club," but afterwards this design was changed so as to include the national emblem, including two wheels interlocked, with the name of the Louisville Club on the wheels.

The club in 1904 first turned its attention to keeping the streets free of glass and a stop was put to the nuisance. The organization also threw its weight against the Moral bill, then pending before Congress, which sought to tax motor cars $50. A committee was then appointed to secure better streets, and its labors resulted in great improvement.

The first automobile parade was held during the Summer of 1905, and it is chronicled as a success. Every year saw remarkable improvement and on June 13, 1906, during the presidency of George H. Wilson, who served as such from 1904 to 1908, the club gave a floral parade. There were thirty-five cars bedecked with flowers and the affair reflected much credit on those who had charge of arrangements.

A run to Shelbyville enlivened the program of the club the same year. However, there had been a waning interest in club affairs, the membership having fallen from 91 to 75 and things were going badly.

On June 7, 1906, the Kentucky Automobile Club was formed at the instance of the local club, and in the following year the club aided in the defeat of the Thompson bill.

The bill was aimed for the practical extinction of the automobile, following the lines of the Traction bill, requiring that a man be sent ahead of the machine on the public roads.

Early in 1908, the following officers were elected: Pike Campbell, president; J. F. Ross, vice-president; Eugene Straus, secretary, and Walter Kohn, treasurer. "Toots," the official organ of the club, came into existence during the year and at the close of the fiscal year, April, 1909, the organization had a membership of 111.

During the last year the activities of the club were more pronounced than ever before, and just now the Louisville Automobile Club is in a state of prosperity never before thought possible. The organization arranged several good road meetings and a standing reward was posted for information leading to the arrest and conviction of any person stealing or tampering with a machine. Radiator emblems were adopted and any car carrying the insignia of the organization receives the protection of the club.

A successful race meet was held during the Shriners' convention, under the auspices of the club. The activities of the year wound up with the first annual reliability and economy contest. The tour covered about 250 miles through the fairest section of the State and was run October 8 and 9.

For six years the club paid no salaries and the work was done by the officers, but since the elevation of Eugene Straus to the presidency, the organization has had a paid secretary. The rooms of the club were recently moved from the Louisville Hotel to the Commercial building.

The usual orphans' day outing was held on June 4. When the Glidden tourists passed through Louisville the same month they were right royally entertained by members of the club. Recently a chauffeurs' register was arranged at the club for the benefit of the motorists. It contains the names of all professional chauffeurs in the city and information concerning them.

The membership of the organization is now 412 and before the close of the year it is the aim of W. H. Argabrite, secretary of the club, to increase the number to 500.

Taxicab Furnishes the Requisite Speed

It is not too much to expect that caddies, at least the most apt of them, ultimately become adepts at golf. In bold relief with this acquired skill is the lack of it as it is portrayed by the amateur. It is not uncommon to note that the caddie is the better at the game, nor would it cause surprise were one of the rascals to put it over some of the talent whose clubs they carry.

This rather natural situation leads to strained relations at times; the player of little experience feels that the caddie holds him in a certain contempt.

As the story goes (with which some liberty is being taken here) a swell young beginner, in a swaggering makeup, accompanied by a stunning girl, no less made up, was sporting a caddie of the sort that knew the game.

They played a while (in a manner to arouse the ire of the caddie) and, making but little progress, turned to the caddie and said: "Do you think we will be able to get around the course before dark?" "If you hire a taxicab, sir," said the youngster.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL-CLIMBS, ETC.

Oct. 18	New York City, Madison Square Garden, Electric Car Day at the Electric Show.
Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 15-21, 1911	Detroit, Wayne Gardens, Detroit Automobile Dealers' Association.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4,'11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11,'11	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Mch. 4-11, 1911	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.

Races, Hill-Climbs, Etc.

Oct. 21-22	Commercial Vehicle Test of Boston "American."
Oct. 21-25	Washington-Richmond Reliability Run of Washington "Post."
Oct. 22-30	Belmont Park, New York, International Aviation Tournament and Show of Licensed Automobile Dealers of New York City.
Oct. 27-29	Dallas, Tex., Track Meet.
Oct. 28-29	New York City, New York "American's" Motor Truck Contest.
Oct	Exhibition Auto vs. Aeroplane, Dutchess County Fair, Poughkeepsie, N. Y.
Nov. 3-5	Atlanta, Ga., Speedway Meet, Atlanta A. A.
Nov. 5-6	New Orleans, La., Track Meet.
Nov. 5-7	Los Angeles-Phœnix Road Race, Maricopa Automobile Club.
Nov. 7-11	Five-day Reliability Run of Chicago Motor Club, 200 Miles a Day.
Nov. 10-12-13	San Antonio, Tex., Track Meet.
Nov. 11-12	Savannah, Ga., Road Race, Savannah Automobile Club, and Grand Prix, Automobile Club of America.
Nov. 24	Santa Monica Road Race, Los Angeles, Cal.

THE AUTOMOBILE

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The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

SOME confusion seems to have been brought about by the rather good performance of the long-stroke, single-cylinder motors as they are now being designed abroad. These motors perform extremely well and they are economical of fuel, which is the important point in France in particular, and in Germany to some extent.

* * *

IT is not believed that the long-stroke, single-cylinder motor is much in demand in this country; the question of fuel economy is not as yet a serious factor here, nor is there any likelihood of a fuel shortage for some time to come. The American automobilist, take him as a general proposition, abhors a "one-lunger."

* * *

THERE is a certain demand for relatively low-priced, single-cylinder automobiles, and this need is being adequately cared for by builders who appreciate the fact that the American automobilist who selects a one-cylinder car wants it for a more or less utility purpose, nor would he thank any maker or person for information which would permit him to speed the car up beyond its normal capability.

* * *

THE fact that the long-stroke, single-cylinder cars, as they are made in France and Germany, are so designed that they will travel at a high speed and accomplish other road stunts puts them beyond the pale of use under the conditions as they have to be met in America.

* * *

THERE is one other foreign situation that is being commented upon, involving the use of wire wheels, and it is not uncommon to hear automobilists say that the wire wheel is likely to come to America and be a factor in automobile work. The probabilities are that the wire wheel, as it obtains in England, will gain favor in America when the hickory forests of Missouri are depleted, and not before.

* * *

PROPERLY made wood wheels are so eminently satisfactory that they have been used in vehicles from 4000 B. C. down to the present time, and the only countries that do not prefer them are those which are without a native supply of hickory. This wire-wheel question is in the same category as the single-cylinder, long-stroke motor. Local economic situations favor the special line of products that will best accomplish the purposes, compensating for a famine of material of the right kind in the respective cases. In France they are short of gasoline, and in England hickory is scarce.

* * *

COMFORT and convenience are ruling considerations in body work at the present time, and in a new design as presented in THE AUTOMOBILE this week the convenience of the owner is consulted.

* * *

THIS particular body is of the enclosed type with inside control, and if the owner elects to drive, the seating capacity from his point of view is for three persons, but if a chauffeur is employed the seating capacity is then limited to the occupants of the commodious rear seat. The space alongside of the driver's seat is reserved for the entrance, making the same unusually inviting, the idea being to afford the absolute limit of comfort and agreeableness of the surroundings in town car work.

* * *

THERE seems to be an unusual degree of complication in connection with the A. A. A. sanction, which was finally given for the Bay State racing event involving the presence of outlawed drivers. Whether or not the reviewing committee will be able to get at the bottom facts remains to be seen; in the meantime, it looks like a blow at clean sport, coming rather too soon behind the late Brighton Beach affair, which, from the point of view of the spectators who paid the bill, reflected discredit upon the sanction, and should have discouraged "rubber stamp" methods of issuing sanctions. If it can be shown that unruly outlaws are out of control for the moment, nothing remains but to suppress them; but if it is a clean case of "the means for the end" there is work for an honest investigating committee to do.

* * *

PERHAPS there is nothing of such vital importance to the owner of an automobile as the condition that will induce longevity in the tires, and in an article that appears elsewhere in the paper this week this problem is handled fittingly; instead of taking up space in complaining about the deterioration in tire quality, the entire article is devoted to a clear and lucid statement of the facts as they confront the man who must pay the bill.

News of the Shows

PLANNING FOR THE IMPORTERS' DISPLAY—EXHIBITION OF CARS AT AVIATION TOURNAMENT—ELECTRIC SHOW CLOSES—DECORATIVE FEATURES AT THE GARDEN

THE importers of foreign automobiles have planned the most comprehensive show of their wares that has ever been held on this side of the ocean. The show will be held in the ballroom of the Hotel Astor from January 2 to 7, 1911.

Nine concerns have signed up for space to date and similar action on the part of six other companies is looked for in the immediate future. Space allotments will be made October 24.

Arrangements for the show are in the hands of the following committee: Paul La Croix, chairman, and Messrs. Demorest and Lascaris.

The big ballroom of the Astor will be divided into fifteen spaces for exhibition purposes, if a full representation is secured. The following cars have signed up: Darracq, S. P. O., Renault, De Dion, Itala, English Daimler, Benz, Panhard and C. G. V. Like action is expected of the following: Hotchkiss, Fiat, De Deitrich, Mercedes, Isotta and Zust.

In the list are eight French cars, four Italian, two German and one British automobile.

Classic Fountain at Garden Show

One of the strikingly attractive features of the coming Eleventh National Automobile Show, which is to be conducted at Madison Square Garden from January 7 to 21 by the A. L. A. M., will be the pergola fountain, in the shape of an arc at the entrance to the amphitheater.

The fountain is in the form of a low abutment of gray stone, in the front of which is carved a long settee. It will have a trough-like basin and at each end water will spray from the mouths of griffins and gargoyles. The falling water will be electrically radiant, made so by iridescent and cunningly hidden lights. Artificial water plants from which will radiate vari-colored lights will be in the pool and natural water lilies and gold fish will be mingled with them.

The fountain is overhung with wistaria, which clings to a netting of lattice work and gracefully entwines itself about the eight marble-white Doric columns which support the pergola. Four bay trees adorn the front of the fountain.

Auto Show at Aviation Tournament

With a prize list totaling $72,300 and including $10,000 for the swiftest flight from the starting line at Belmont Park, around the Statue of Liberty and return, six other prizes averaging $5,000 each and a dozen others ranging from $1,000 to $4,000, the first International Aviation Tournament to be held in the United States will open Saturday and continue for nine days.

Many world-famous aviators with their machines will take part in the various events carded.

In connection with the tournament there will be an exhibition of automobiles and accessories. This part of the show will be held in the betting ring, which affords ample space for such an undertaking.

Among the cars that will be shown are the following. Cadillac, Peerless, Mitchell, Chalmers, Stevens-Duryea and Cole "30." The list of accessory makers includes the following: Livingston radiator; Henry Ducasse, motors; Simms magneto; Peter A. Frazee and Company; Bosch Magneto Company; Hartford Rubber Tire Works; Marburg Brothers; Mea magneto; Bliven & Carrington, greases; John A. Roebling Sons & Company, wire and tubes; Metz Aeroplane Company; Aerial Navigation Company, propellers; American Propeller Company, propellers.

Electrical Show Ends in Blaze of Glory

Literally in a blaze of glory the Fourth Annual New York Electrical Show came to a finish at Madison Square Garden Thursday evening. The great hall was packed at almost every session. Among the exhibitors were: The Anderson Carriage Company, Detroit Electrics; Babcock Electric Carriage Company; S. R. Bailey & Company; the Baker Motor-Vehicle Company; General Vehicle Company; the Lansden Company; Studebaker Brothers' Company, of New York; Edison Storage Battery Company; Electric Storage Battery Company; Gould Storage Battery Company; the New York Edison Company; Philadelphia Storage Battery Company; United States Light & Heating Company and the Westinghouse Electric & Manufacturing Company.

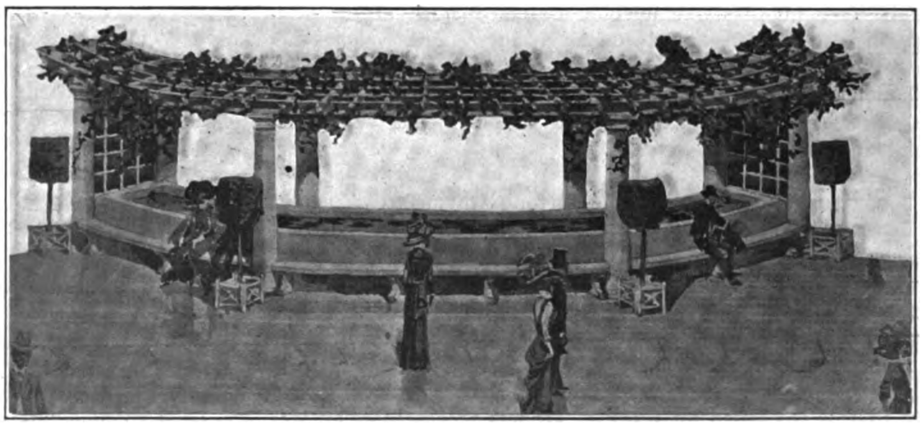
On Tuesday the First Annual Convention of the Electric Vehicle Association of America, a conference between the vehicle men and those identified with the installation and operation of central charging stations, was held in connection with the show. W. H. Blood, Jr., president of the association, presided.

Other addresses were by the president, W. P. Kennedy, L. A. Ferguson, S. C. Harris, Day Baker, F. M. Tait, J. T. Hutchins, G. M. Graham, Duncan Curry, Bruce Ford and Charles L. Eidlitz.

Oldfield, His Car and Partners Barred

Barney Oldfield, who was suspended by the Contest Board recently for advertising his participation in an unsanctioned automobile race meet, was formally disqualified by that board, Wednesday, in special session. This action was taken as the result of the race meeting at the Readville track last Friday, when he pushed his way through the officials and made two circuits of the track.

His car, a Benz, is also officially banned and barred indefinitely, and William H. Pickens and J. Alex. Sloane, manager and advance man for Oldfield, are disqualified from participation in any sanctioned meet either as owner, entrant, driver, manager or in any other capacity.


Design of fountain that will be a decorative feature of the A. L. A. M. show

The Week in Detroit

NEWS NOTES FROM MICHIGAN'S MOTORING CAPITAL—OWEN COMPANY TO TRANSFER ITS ACTIVITIES TO LANSING—CANADIAN COMMERCIAL COMPANY ORGANIZED

DETROIT, Oct. 17—The Owen Motor Car Co., of Detroit, has been absorbed by the Reo Motor Car Co., of Lansing, and it is announced that the high-class cars build in Detroit by the company since its formation a year or more ago will hereafter be turned out in Lansing. R. E. Olds states that the Owen company will be greatly strengthened financially, and that the output will be materially increased. From the outset the Owen Motor Car Co., invading the high-priced field, had been successful, and the Detroit plant had been run to capacity turning out cars.

The past week witnessed the organization of the first Canadian commercial motor car company. All the parties interested in the new enterprise, with one or two exceptions, are business men of Windsor, just across the river from this city. The company will be known as the Canadian Commercial Motor Car Co., and will manufacture the "Canadian Car," with a capacity of 1,800 pounds. The capital stock is $40,000. Celestine Thibault is the principal backer and president of the concern. The other officers are: Vice-president, J. G. Gagnier; secretary-treasurer, Charles R. Tuson; general manager, Charles F. Howse. Ernest D. Craig will be sales and advertising manager.

News comes from Hamilton, Ont., that a deal has been practically closed there for the merger of the Baynes Carriage Co., of that city; the American Road Machine Co., of Canada, located at Goderich, and two Detroit motor car companies under the name of the Acme Motor Carriage & Machinery Co., with a capital of $1,000,000.

Some 70 sales managers of the General Motors Co. met in Flint last Wednesday and Thursday to discuss plans for the selling campaign of 1911.

The Day Automobile Co. has been organized in Detroit, with a capital stock of $300,000, of which $200,000 is paid in, and will engage in the manufacture of the Day utility car, an automobile designed especially for the use of farmers, and which has a convertible body that makes it either a pleasure or commercial car. The present plans call for an output of 1,000 cars in 1911. Officers of the company are: President, Thomas W. Day; vice-president, Hugh Jennings; secretary, Cameron F. Roberts; treasurer, Wallace E. Brown.

How United States Motor Co. Will Share Profits

Benjamin Briscoe, president of the United States Motor Company, has announced the details of the co-operative plan by which the employes of the company are to be given an opportunity to share in the ownership of the company. The company offers its 7 per cent. cumulative preferred stock at the market price to be determined August 1, 1911. These shares are to be paid for in installments within two years. An amount of common stock equal to 1-4 of the preferred shares disposed of to employees will be trusteed and the dividends set off to the holders of the preferred shares and applied to the purchase. In cases of default through dismissal or resignation pending full payment for the shares, the forfeited dividends or annual bonuses will be placed in a fund to be known as the "Employees' Honor Fund," which will be divided *pro rata* among the employees whose showing during the year is satisfactory to the company. Subscription to the issue is limited arbitrarily to a scale based upon the pay of the various employees.

For the purpose of establishing an English motor car company, which will be affiliated with the United States Motor Company, Mr. Briscoe has sailed for Europe. He was accompanied by Mrs. Briscoe and will be in Europe five weeks.

It is likely that the English concern will be known as the United Kingdom Motor Company and will be located near London.

It is the intention of the United States Motor Company to transfer its designs and duplicate tools to England, but to purchase its machinery in that country.

The efforts of the United Kingdom Motor Company will at first be devoted to the United Kingdom, Germany, Russia. After branch houses have been established in these territories it is likely that the products of the organization will later be sent to all important European countries.

Automobile Activities in Pittsburg

PITTSBURG, PA., Oct. 17—The Automobile Dealers' Association of Pittsburg has named the following committee to arrange for the 1911 show at Duquesne Garden: Robert P. McCurdy, chairman; A. X. Phelan and F. D. Saupp. W. N. Murray, president of the Association, will be the ex-officio member.

The W. W. Bennett Motor Car Co. has been admitted to membership in the Automobile Dealers' Association of Pittsburg. It represents the following cars: Jackson, Buick, Waverly Electric, Franklin, Peerless, Belden, Woods Electric, Stoddard-Dayton, Overland, Maxwell, Cadillac, Pierce, B. & L. Electric, Marion, Hudson, Locomobile, Lozier, Packard, Pope-Hartford, Stevens-Duryea, White steam and gasoline, Elmore and Winton.

Big Jersey Home for Hudson and Peerless

NEWARK, N. J., Oct. 17—Work toward the construction of what will be the largest structure in this State devoted to automobiling interests has been started at 37-39 William street, this city. The building will be occupied by A. Elliott Ranney & Co., New York and New Jersey agents for the Hudson line, and the Peerless Motor Car Co., of New York. They will occupy the structure jointly. Both firms are at present located nearby.

Another Suit Filed by the A.L.A.M.

Announcement has been made that suit for infringement of the Selden patent had been filed against the W. A. Wood Automobile Manufacturing Company, of Kingston, N. Y., which is in the southern district of New York.

The bill of complaint states that the Wood company is manufacturing gasoline cars that infringe the patent.

Dexter Heads the Grout Company

At the annual meeting of the Grout Automobile Company, Orange, Mass., last week the following officers were elected: President and secretary, G. E. Dexter; treasurer, E. S. Hall; directors, E. S. Hall, G. E. Dexter, H. F. Misener; general manager, E. S. Hall; selling agent, Reginald Wade; superintendent of factory, H. F. Misener.

Cameron to Visit Olympia Show, London

W. H. Cameron, chief engineer of the Willys-Overland Automobile Company, sailed for Europe yesterday on the "Lusitania." Mr. Cameron will visit the Olympia show in London and will inspect the automobile situation generally on the continent. Mrs. Cameron accompanies him.

Aerial Events

BY MARIUS C. KRARUP. A CURRENT RECORD OF ESSENTIALS IN THE PERFORMANCES OF AVIATORS AND AERONAUTS. A WEEK FULL OF MOMENTOUS DOINGS

THE second stage of ballooning and the first stage of aviation are rapidly drawing to a finish. Almost every hour is historic. These days witness practical trials which must go far to settle convictions as to the actual state of progress in air craft. All theories withdraw to the background and await results, no less sure of themselves perhaps but less confident of a hearing. Last Saturday morning the motor balloon "America" was released from its shelter at Atlantic City, after many delays and popular disappointments, and Walter Wellman with Melvin Vaniman, his engineer, and four helpers finally set their course for somewhere in or at the Atlantic Ocean, preferably Europe. They landed 400 miles south of the starting point and 100 miles off Cape Hatteras. The event did little save to make the performance a notable event in financiering, sport and newspaper enterprise, sufficiently remarkable to excite wonderment and even enthusiasm from the standpoint of all who love modern adventure, and sufficiently complicated scientifically and mechanically to confuse conclusions and bolster new and treacherous hopes for the future of the elongated gas bag, nine-tenths drifting, one-tenth driven. Only 24 hours later, while the coast of Nantucket was busily conversing with the Marconi apparatus of the "America" somewhere in the offing, the Clément-Bayard motor balloon was started from Compiègne, northeast of Paris—it was 7.15 Sunday morning—and headed for London. A favorable wind sped the apparatus at the rate of 40 miles per hour in almost the right direction. The motors had easy work, and six hours later the daring deed was done and the pilot, Mr. Clément, Jr., deposited his crew of five and his delighed passenger, Arthur Du Cros, of the well-known British family identified with the history of automobile tires, among the gasping denizens of the largest city in the world. Almost at the same time—reckoning with the long minutes of history—and more precisely beginning Saturday, Oct. 22, some thirty noted aviators will demonstrate their art at Belmont Park on Long Island, and the interested public, comprising the entire civilized world, holds its breath in expectation. What new stunts will be done in this new loop-the-loop game in which the daring entertainers know not in advance when or where or how the loop comes? Who shall win the tempting prizes, aggregating at the present moment $72,000 and likely to be swelled further through the persuasive force of things doing? And—passing thought—whose shall be the names to be stricken with sad nonchalance from the roster of active conquerors of the atmosphere, that heroic list which keeps so remarkably constant in length of late, losing by cautious desertions, by disablement and by the final cross almost as many devotees as it gains from a sportsmanlike craving for new sensations or from lust for glory and its emoluments?

And from abroad comes the report that Henry Wynmaelen with the latest model of Henry Farman biplane, after a few days ago making a new altitude record of 9,185 feet with the same machine, succeeded in capturing a $35,000 prize by flying with a passenger from Paris to Brussels and return, a total by the air route of about 350 miles. Wynmaelen covered 234 miles on the first day and the rest on the second, Oct. 16. Legagneux, also with a Farman biplane, tried the same feat, but suffered a slight accident when descending 116 miles from the finish. Wynmaelen's time was 27 hours 50 minutes and 27 seconds, more than 12 hours being used for rest and care of the motor.

At St. Louis, Mo., ten spherical balloons set out for a longer international prize race on Oct. 17

The Wellman expedition, at the present moment, bids for comment rather than description.

The motor balloon can reach greater heights than the aeroplane, perhaps, and its motor troubles may be remedied en route. But it owes its reputation in this respect to the spherical balloon. No dirigible has carried power to great height. Constructed in enormous dimensions it can carry higher propulsive power than the aeroplane, but each additional horsepower is discounted in advance by the additional volume and areas to be forced against the air currents. It can stay in the air a long time, but not necessarily where wanted. All confidence in its possibilities should be measured in comparison with those of the aeroplane. As a destroyer in war and a maker of peace—and it is as a peacemaker that Wellman proposes to demonstrate its superiority, he says—its capacity for controlled operation at high altitudes is indispensable, and it seems unfortunate that the attachment of the so-called equilibrator to the "America," for the avowed purpose of holding the airship down to within 200 feet from the surface of the sea, has been considered necessary, since the employment of this device renders the whole demonstration null and void for its declared purposes.

Undertaken gaily and carried out with the dash which, for example, Moissant put into his flight from Paris to London, the crossing of the Atlantic in a dirigible would have been glorious sport, worth its price and its reward, in case of success, but as the last squeeze in a frantic search for conspicuous achievement and coupled with the profession of lofty purposes on one side and keen pecuniary arrangements on the other, it challenges a close examination of the pretensions with which it is heralded. Unfit to travel over land, as the preparations proved it to be; unfit to cross the ocean unless the winds favor it exceptionally, as proved by its coastwise course; unfit to reach the altitudes where lies the only perceivable utility of the motor balloon in competition with aeroplanes, the "America" outfit—so skillfully named to enlist a favorable sentiment—offers apparently no guarantee that anything which may be accomplished with it once may be accomplished again when wanted, or within a month after it is wanted, or that anything which can be done with it at any time will serve any useful purpose.

As between the aeroplane promised by Lilienthal, Chanute and others, which stays in the atmosphere for days by virtue of large areas, small weight and perfected devices for utilizing air currents for its support, and the motor balloon rendered capable of similar service though at much lower speed by enormous size and scientific equipment, the choice, with regard to the probability of seeing either of these creations of hope and imagination materialized, seems to favor the former among those who reason for engineering purposes rather than for publicity.

How to Make a New Altitude Record.

Start from Leadville. This city has a recorded altitude of about 11,000 feet. The country is fairly level for several miles both southerly in the direction of Malta and westerly toward Tennessee Pass on the "great divide." A recorded rise from the ground would be a world record. The gradual rise of the ground from the Missouri River to this plateau of the Rockies gives opportunities for trying out the carbureter adjustment required for best results; also for trying out the proportions between aeroplane area and motor power and the most favorable relation between speed and angle of incidence, and the angle of incidence or tilt which gives the best fore-and-aft balance of the machine, and therefore the smallest loss of efficiency from the use of an elevating rudder must also, other things equal, give the highest altitude.

At Quitman, Ga., on "Round-the-State" Run

Preparing for Grand Prize and Smaller Events

Savannah, Ga., Oct. 17—Entry blanks for the Grand Prize race and its auxiliary light-car races have been issued by the Savannah Automobile Club. Save for the substitution of the names of Harvey Granger, Frank C. Batty, Arthur W. Solomon and William B. Stillwell for those of the officials of the Motor Cups Holding Company, and of Savannah for the Motor Parkway, the blanks for the Grand Prize entrants are identical with those that had been prepared for the original Long Island contest.

Entries close November 5 and so far the indications are that the list will be considerably larger than had been expected. No limits are placed on the power and construction of the cars save that they are limited in width to 68.89 inches; must have their exhausts directed away from the ground; must have a motor-driven reverse gear and must be certified as safe by the Technical Committee of the Automobile Club of America.

The course as approved by the club is 18.50 miles long and the Grand Prize racers will circle it 22 times, making the total about 407 miles. The race will be held November 12.

On the preceding day two road races for light cars will be given. The route will be the same as that to be taken by the big racers, but the number of circuits will be cut down to 15 in one case and 10 in the other.

The cars eligible to entry in these classes correspond in a general way to Divisions 2 and 3 of Class B, according to the rules of the Contest Board, but there are a number of exceptions and options not included in the terms of the "stripped stock chassis" class.

The longer race scheduled for November 11 is for the Savannah Challenge Trophy, a cash prize of $1,000 and various minor awards. The cars eligible must have piston displacements ranging between 231 and 300 cubic inches, and conform with the requirements of the Automobile Club of America's rules. The distance for this race is approximately 277.5 miles.

The Tiedeman Trophy race is for cars of from 161 to 230 cubic inches displacement and the mileage of the course is 185. The entrance fee in either of these contests is $250 a car; two for $400 or three for $500.

Considerable work has been done to put the course in proper condition for racing and 100 loads of gravel have been used in repairing bad spots. The contract for oiling the entire 18.5 miles of the course has been let and this phase of the work will commence immediately.

The stands this year will be located on either side of the course, the grandstand on the outer side at Fifty-second street and Waters road and the press and official stand on the inside, connected by an elevated passage-way over the track. South of the main stands, the general admission stand will be built on the inside of the course. Each of the stands for the public will be 1,000 feet long and it is estimated that they will hold 40,000 persons.

"Round-the-State" Tour

Atlanta, Ga., Oct. 18—Unique in its conditions is the "Round-the-State" automobile run of nine days that started Monday morning. There were about 75 starters but the cars were not required to begin at a definite line, and the noon and night controls have been divided up so that it will be possible to entertain the big caravan.

In a general way the run is following this course: Atlanta to Macon; to Albany; to Bainbridge; to Valdosta; to Waycross; to Savannah; to Augusta; to Athens, and back to Atlanta. Sunday will be spent in Savannah. Road conditions during the first three days were excellent. The entered cars include: Two Halladays, one Ohio, three Maxwells, three Columbias, eight Buicks, two Primos, one McFarlan 6, two Thomas Flyers, one Lozier, one Franklin, three Knoxes, two Nationals, four Whites, two Coles, four Overlands, one Speedwell, two Cartercars, one Selden, one Hudson, one Everitt, two Chalmers, two Ramblers, three Haynes, five E-M-F's, one Abbott-Detroit, one Firestone, two Mitchells, one Olds Special, one Brush, one Pullman, two Hupmobiles, one Case, Oakland and Velie.

Mount Vernon Club to Stage Races

The second automobile race meet under the auspices of the Mount Vernon Automobile Club will be held Saturday afternoon, October 22, at the Empire City motor speedway. Seven events are carded and entries for each are said to have been received in satisfactory volume. The races include two 10-mile events under Class B; one 10-mile event under Class C; a 5-mile free-for-all handicap; an owners' race at 5 miles, limited to members of the Mount Vernon Automobile Club, to be driven by the owners; a club handicap at 10 miles and an hour race, limited to cars with piston displacements of from 231 to 300 cubic inches. This race, which will be the feature event, will bring to the winner the possession of the Splitdorf trophy.

Otto F. Rost, who successfully managed the former meeting of the club, is general manager of this meeting and is chairman of the contest committee.

The affair is fully sanctioned and recognized.

Big Entry List in American Truck Test

The commercial vehicle endurance and economy test scheduled for October 28-29 on the streets of New York City, under the auspices of the New York *American*, has attracted an unusually large and representative field. A. H. Whiting is to be referee;

Savannah, Ga., on "Round-the-State" Run

SEVENTY-FIVE STARTERS IN THE NINE-DAY RUN THAT LEFT THE GEORGIA METROPOLIS LAST MONDAY

E. L. Ferguson, manager, and the chairman of the Technical Committee is A. L. McMurtry.

Electrics entered in the contest shall be known as Class A, while the gasoline trucks are Class B. There are five divisions under each class, according to capacity. A running schedule of 5 1-2 hours for each day has been arranged for the group designated as the Distributing Group, which will travel with half loads and will stop frequently as if in service as distributors, while the Transfer Group will cover 65 miles a day.

Illinois to Have Good Roads Association

Springfield, Ill., Oct. 17—An important step in the matter of good roads in the State of Illinois has just been taken by the organization of a State-wide association at Bloomington, which will have for its avowed purpose the up-building, repairing and general care of every road in the State. The association will be known as the State Association of Township Highway Commissioners and Town Clerks of Illinois. Officers elected were as follows: President, George W. Haywood, Joliet; vice-president, Clayton Mays, Normal; secretary-treasurer, W. D. Hall, Joilet; members of executive board, B. H. Myers, Naperville, John Schloesser, Bloomington, F. H. Hannifield, Tremont, A. P. Ferguson, Griggsville, Thomas Lyman, Champaign, B. G. Gehrig, Centralia.

Santa Monica Race an Open Event

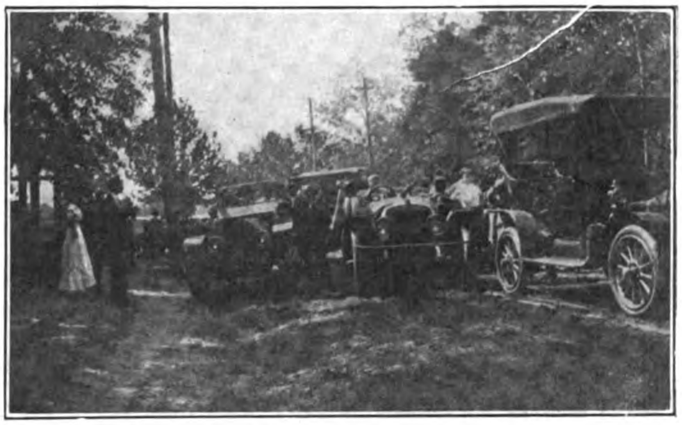
Los Angeles, Oct. 17—Entry blanks are out for the second annual Santa Monica Road Race which will be run Thanksgiving Day. Manager Dick Ferris has made the big car race an open event, and many entries are expected.

Ten thousand dollars in cash prizes have been guaranteed for these races in addition to the $1,000 Dick Ferris trophy and the $500 Leon Shettler cup. The entire list in each event is limited to sixteen, and the course is eight and two-tenths miles.

Five Miles of Cars in Cleveland Parade

Cleveland, Oct. 17—One of the features of the Cuyahoga County Centennial at Cleveland was an automobile parade on Tuesday, Oct. 11, to celebrate the opening of the new Rocky River Bridge, which is the largest concrete span in the world. There were about 1,500 cars in line, making a parade five miles long and which took two hours to pass a given point.

Bull Street, Savannah, on "Round-the-State" Run



Out of Valdosta, Ga., on "Round-the-State" Run

Savannah Races Stir Automobile Row

Scarcely a manufacturer represented along Automobile Row will admit that his car will not be entered in one or more of the contests to be staged at Savannah next month. The Coles and Falcars, winners in the light car races over the Vanderbilt Cup course this year, will try again, according to their makers. The victorious Pullman in its class at the Fairmount race will try to duplicate its excellent performance. A pair of Maxwell cars are promised as entrants in one of the smaller classes, and two Stoddard-Daytons are being prepared for the Grand Prize. The Benz and Fiat trios have been nominated for the big race, and so has the speedy Lozier. There is a possibility of a Correja, a Midland, and an Amplex. Three Abbott-Detroits are said to be ready for the Tiedeman Trophy race. The Marquette-Buick pair are being prepared for the Grand Prize. Two Marmons have been named for the big race and another for the Savannah Challenge Trophy. Three Nationals may try conclusions.

At Hudson headquarters it was said that a car was being made ready for racing and if its performance in preliminary work met with expectations it would be entered in one of the races. The Ford company declared that it would be represented. As a matter of fact only two definite statements were made among the handlers of automobiles on the row that their cars would not compete.

The additional foreign entries which have been mentioned have not yet been definitely made. Representatives of the Savannah Automobile Club will be present at and before the coming race meeting at Atlanta and will make an effort to swell the entry list from among the contestants at the Speedway meeting.

All indications point to record-breaking fields in all three events, the entry list already giving indications of surpassing in size the most sanguine expectations of the promoters, and including many of the fastest cars in the country.

Ford Wins Bloomington Reliability

Springfield, Ill., Oct. 17—T. A. Harper, driving a model T Ford, was awarded the cup for winner of first place in the reliability run of the Bloomington, Ill., Automobile Club, after two other drivers, J. L. Murray, Buick, and Velde, his partner, had withdrawn. The two other machines which had finished with perfect road scores, Orlo Price's Warren-Detroit, and Harry Arnold's Rambler, were penalized at the meeting of the contest committee, which ascertained that these drivers had failed to observe a rule which called for all machines to come to a stop at all railroad crossings.

This left Murray and Velde at the top of the list alone. Harper stood second. Because of the fact that this firm had been instrumental in promoting the affair, they withdrew their cars from the list of winners, and the first prize, a handsome silver loving cup, went to Harper.

First Successful Coast Ru

SAN FRANCISCO, Oct. 13—The Pacific Coast has had its first real endurance run, and motordom in this region is discussing the result of the contest and reviewing the work of the different entrants. The run was held under the auspices of the San Francisco Motor Club and covered a 470-mile course from San Francisco to Lake Tahoe and return. There were eleven entrants in the tour, nine of which checked in the finishing control with perfect scores. The tenth was penalized for failing to reach the fifth control on the homeward journey within the allotted time. The eleventh car met with a mishap on the last leg of the journey and was forced to retire from the contest, although up to the time it had crashed into a fence and broken a front axle it had held a perfect score.

The cars returning with perfect scores and the drivers were: Buick, Fred Gross; Buick, Frank Murray; Cartercar, E. C. Collins; Crawford, E. Stewart; Ford, E. L. Cutting; Knox, Bert Oaks; Maxwell, C. S. Harding; Rambler, Captain McCauley; Winton, H. L. Owesney.

The two cars failing to win perfect scores were the White steamer which was penalized for failing to reach one control on time, and the White gas car which slipped from the road into a ditch and broke the front axle.

The route was a well-selected one to test the reliability of the cars. Every conceivable sort of a road condition was encountered on some part of the trip. During the first portion of the trip fine boulevards were enjoyed; later dusty valley roads were experienced, then came stretches of rough foothill highways and later came the steep and heavy mountain roads with sharp curves that overlooked deep ravines. On the homeward trip rain fell and another road condition was encountered. The dusty sections of the road were converted into veritable seas of mud, and as most of the cars had not been equipped with chains the drivers had much trouble in keeping to the roads.

Winton crossing a bridge near the source of the Truckee river

The run started on Saturday morning at 7 o'clock, the cars being ferried to Oakland where the actual start began about 8 o'clock. Checked out at two-minute intervals the cars were given four hours and a half to make the city of Stockton, the first control, 84 miles from the start. The time allowance proved a generous one as the roads were good and all the cars were forced to loaf along toward the end of the journey so as not to check in ahead of time. After an hour's delay, during which time the tourists partook of lunch, the cars were again started. The second leg of the tour required the motor cars to make Sacramento, 52 miles away in 2 hours and 15 minutes. This schedule, while it was made by all the cars, required some stiff work as the roads in some places were in poor shape, undergoing repairs, and occasioned delays. A short rest of fifteen minutes was allowed at the Capital City and the cars were again set on their course to Auburn, 36 miles away. This route laid through the foothill region and the roads were in bad shape. Two hours were given to complete the distance, and again all the cars came into the control in the required time, but there was no loafing en route. At Auburn the cars were garaged for the night.

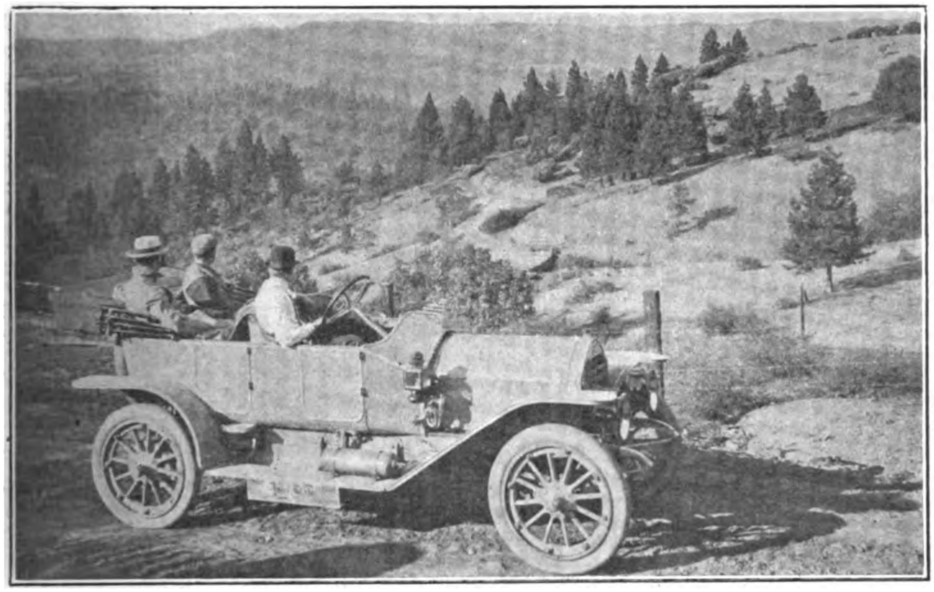
Rambler car on way to Summit, showing a well-made road and scenery that is magnificent

The second day's touring opened with the beginning of the real mountain portion of the journey, in which the cars were forced to ascend some seven thousand feet to drop some three thousand on the other side of the highest point to reach Truckee. The distance over the mountains was 68 miles and the cars were given six hours and thirty minutes to complete the distance. The same story regarding the ability of the entrants to negotiate the distance was noted here as at the other controls, all the cars reaching the goal in required time. The cars were checked out one hour later for Lake Tahoe, 16 miles off through the mountains. One hour and a half was given to make the distance, but this time was again too generous, and the cars made it within fifty minutes and had to remain outside the control until checking-in time.

ENDURANCE CONTEST OF SAN FRANCISCO MOTOR CLUB COVERS A 470-MILE COURSE OVER MOUNTAIN AND PLAIN

Sunday night was spent by the tourists at the Tavern on the lake. Some of the drivers took their cars off for small side trips on the lake shore and added to the mileage covered by their cars.

The home journey began Monday and took in the run from Lake Tahoe to Sacramento, a distance of 122 miles. The cars were given 13 hours to make the control and all, with the exception of the White steamer, which broke a brake shoe, reached the control successfully. The steamer, after making repairs, met with various other delays in the shape of being stalled by a mountain train that held the road for the good part of an hour until a section was reached which permitted the motor car passing. Then again a freight train prevented it from crossing through the snow shed for some thirty minutes. A rain and thunderstorm in the mountains which made the going dangerous reduced the running time, and later, in the darkness, losing the road increased the lost time to three or four hours until it reached the control.



Inter-State under scenic conditions in the Sierras that commands admiration

The last portion of the trip began Tuesday morning and embraced 136 miles from Sacramento to San Francisco through the San Joaquin and Livermore valleys, Dublin canyon, Hayward, Oakland, and by boat to Frisco. On its way to Livermore valley the White gasoline car slid from the road and crashed into a fence and was forced to remain out of the race. The other cars completed the journey in time to keep their winning scores, although the heavy rain that was falling caused the drivers much difficulty in getting over some of the grades.

All the contestants are enthusiastic over the tour and an effort is now under way to make it a yearly event. Scenically the course is without a peer in any section of the United States, and as far as the testing of the endurance powers of the cars is concerned it is without doubt equal to the best in the country.

A good look at Donner Lake from the road that skirts along the side of the mountains

Hilles Heads Delaware Association

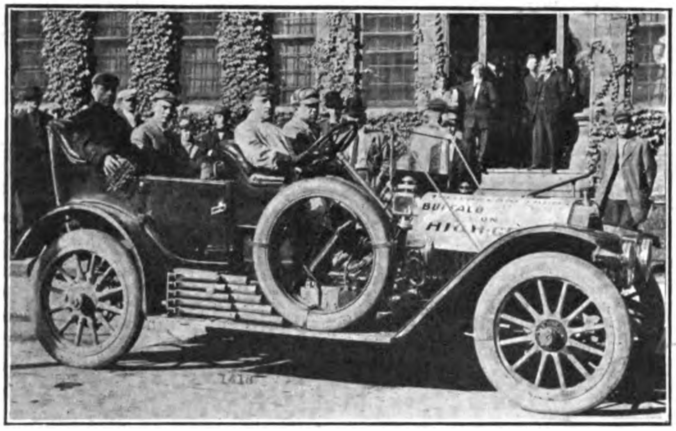
WILMINGTON, DEL., Oct. 15—The Delaware Automobile Association held its annual meeting here this week and elected the following officers: President, T. Allen Hilles, of Wilmington; first vice-president, Joseph Bancroft, of Wilmington; second vice-president, Wilson L. Cavender, of Smyrna; third vice-president, Joseph L. Cahall, of Georgetown; secretary, Charles G. Guyer, of Wilmington; treasurer, William Stanier, of Wilmington; executive committee, in addition to the above officers, John B. Martin, John B. Bird and Charles C. Kurtz, all of Wilmington.

Baltimore Club Elects Officers

BALTIMORE, MD., Oct. 16—The Automobile Club elected the following officers at the annual meeting: Dr. H. M. Rowe, president; Joel G. Nassauer, vice-president; H. M. Luzius, secretary; Thomas G. Young, treasurer; board of governors, John S. Bridges, C. Howard Millikin, James S. Reese, William A. Dickey, Joseph M. Zamoiski and Ernest J. Knabe. The club has adopted a progressive policy for the winter, pledging itself to increase the membership to 800, post road signs within 10 miles radius of the city hall, abolish bad street car and other crossings in the city and to establish with the Appeal Tax Court a uniform rate of taxation on various makes and models of autos. The club now has 421 members, an increase from 262 in May.

Stevens-Duryea Wins Prize

WILMINGTON, DEL., Oct. 15—In an automobile parade held in Chester, Pa., yesterday in connection with a "buy-at-home week" celebration a Stevens-Duryea car, owned and driven by Charles P. McCoy, of Wilmington, was awarded a silver cup valued at $100, the first prize, as the handsomest car in line. The machine had been decorated by Mr. McCoy's wife, who used 25,000 paper roses and 300 chrysanthemums.



1911 Model M 6-40 Thomas Flyer which is touring the east on high gear

—J. G. Miller, of Walla Walla, Wash., has the agency for the Elmore car.

—Burton A. Clark, of Boston, has joined the sales force of the E. R. Thomas Motor Branch Company, Boston.

—The White Automobile Company, of Baltimore, Md., has taken on the agency in that city for the Courier car.

—The F. H. Barshar Company, of Seattle, has obtained the agency for the Marion car in Washington, Idaho and British Columbia.

—LeRoy Van Patten, until recently with the Hudson Motor Car Company, is now advertising manager of the Alden-Sampson Detroit plant.

—W. H. Barnes, Rapid agent in Seattle, has secured a garage in Tacoma and will establish a resident sales and maintenance force during the next 30 days.

—The Frederick E. Murphy Automobile Company has begun operations at Third street and Third avenue, south, Minneapolis. The company will handle the Mitchell car.

—The Hudson agency in Baltimore, Md., is now in the hands of the Lambert Automobile Company which is also the representative for the Maxwell and National cars.

—The Monitor Automobile Works, of Janesville, Wis., is building three Monitor trucks for exhibition at the Chicago show. A hotel bus, an express wagon and a polished chassis will be shown.

—The Automobile Dealers' Association of Pittsburg has elected the following officers: President, W. N. Murray; vice-president, F. D. Saupp; secretary, Ed. C. McCurdy, and treasurer, G. P. Moore.

—The membership of the Seattle Automobile Club is now close to the five hundred mark, and it is expected that many members will have enrolled by the time when the annual meeting will be held.

—To demonstrate the utility of the Kelsey Motorettes manufactured in Hartford, Conn., by the C. W. Kelsey Manufacturing Company, two of these vehicles are to be sent across the country later in the season.

—The Velie Motor Vehicle Company has closed agencies with J. T. Curtiss & Company, Simsbury, Conn., and Frank E. Vallier, Lynn, Mass., for the right of sale of Velie cars during the season of 1911.

Short News of Interest

—The Goodyear Tire & Rubber Company has opened a branch salesroom in Toledo. The new concern is located at 909 Jefferson avenue, and will carry a complete line of automobile, motorcycle and bicycle tires.

—The capital stock of the Alton Motor Accessory Company, of Akron, Ohio, has been increased from $50,000 to $100,000, to provide for additional facilities in the plant. The plant is located on South street, Akron.

—The big garage and salesrooms at 310 Pike street, Seattle, are now occupied by W. H. Barnes, northwestern dealer for the Rapid Motor Vehicle Company, of Pontiac, Mich. A complete machine shop has been installed.

—An addition is being erected to the Empire factory in Indianapolis. The new building will have facilities for testing a number of completed chassis and will also be used for final assembling work and as a repository.

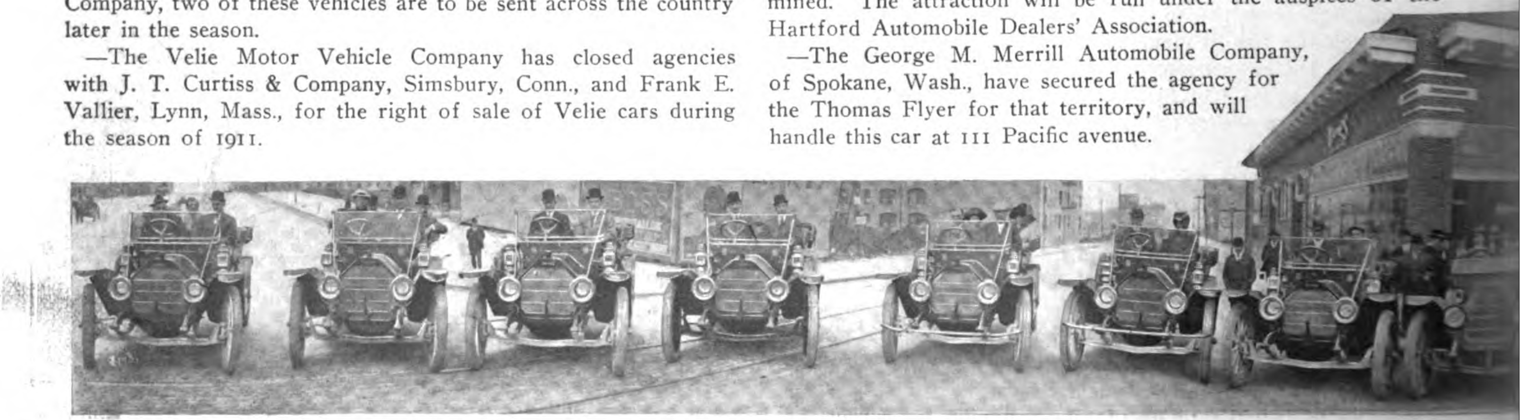
—John C. Speir has been appointed superintendent of the mechanical department of the Pennsylvania Auto Motor Company, Bryn Mawr, Pa., makers of the Pennsylvania car. Mr. Speir will assume control immediately.

Rambler "Hurry-Up" wagon recently purchased by the city of Sacramento, Cal.

—The Velie 40 has made its appearance in Portland, Ore. The John Deere Plow Company will distribute the line of automobiles in the Northwest, with headquarters at Portland. J. A. Crittenden is manager of the new branch.

—Hartford, Conn., is to have another show probably the last week in February, though the date has not been definitely determined. The attraction will be run under the auspices of the Hartford Automobile Dealers' Association.

—The George M. Merrill Automobile Company, of Spokane, Wash., have secured the agency for the Thomas Flyer for that territory, and will handle this car at 111 Pacific avenue.



Panoramic view of the gathering of San Franciscan owners of Haynes cars on the occasion of the opening of th

BRIEF ITEMS CULLED HERE AND THERE FOR QUICK READING—INTERESTING ALIKE TO MAKER AND USER

—Sam Beck, one of the oldest automobile salesmen in Minneapolis in point of service, has become identified with the Studebaker branch, caring for the retail trade. Mr. Beck was formerly identified with the Fawkes Auto Company.

—Foster & Company, agents for the Regal and Rambler, have left Automobile row on Allyn street, Hartford, Conn., and have moved into a new one-story brick garage at No. 19 Hoadley place, which is provided with an up-to-date equipment.

—Articles of incorporation have been issued to the Dusseau Fore & Rear Drive Auto Company, of Toledo. The concern has a capital stock of $100,000. The incorporators are : S. V. Dusseau, A. J. Marleau, E. F. Cousino and Martin Christy.

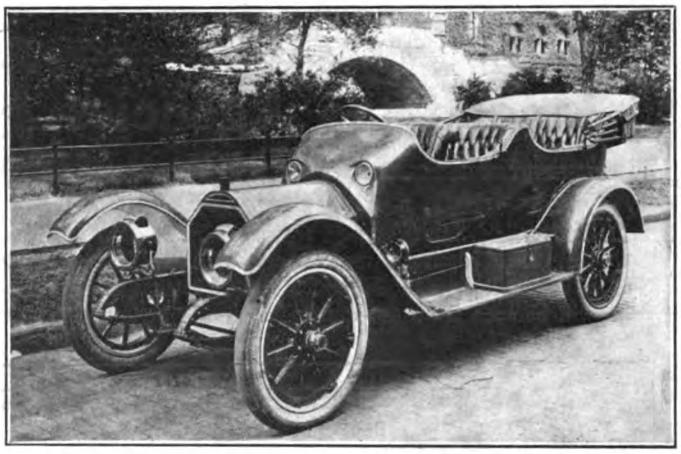
—The J. I. Case Threshing Machine Company, of Racine, Wis., will add a roadster to its line of Case cars, manufactured by the Pierce Motor Company, of Racine. It will have the same chassis as the regular model. The motor department is working overtime.

—The Enterprise Brass & Plating Company, of Cincinnati, was incorporated with an authorized capital of $25,000 to manufacture and sell automobile mountings and supplies by M. Charles Weiglein, C. J. Peimekamp, George Apple, Caroline Apple and M. C. Weiglein.

Strenuous Randolph truck which carried the baggage of the Munsey Tourists

—On page 519 of the issue of September 29th we stated that the magneto used on the Cole car in the Massapequa Sweepstakes was a Splitdorf. The Remy Magneto Co. informs us that a Remy was fitted to the Cole "30." It will be recalled that that car finished first in the race.

—The Bretton Hall garage has been recently opened at 150-156 West Eighty-third street, New York City. The building is commodious and is equipped with modern conveniences and requisites for storage, care and repair work.



15-30 h. p. Stearns, with unique Dolphin body designed by J. E. Demar & Co.

—Notices have been sent out for a special stockholders meeting of the Royal Rubber Company, of Akron, to be held October 22, at which time the proposition to increase the capital stock of the corporation from $50,000 to $200,000 will be acted on. T. Oscar Evans is secretary of the company.

—The Stoddard-Dayton car will be handled exclusively in Baltimore, Md., by the Stoddard-Dayton Automobile Company, of Baltimore, Leo H. Shaab, manager. Mr. Shaab formerly held several agencies under the firm name of the Shaab Automobile Company, including the Stoddard-Dayton.

—The Flash Manufacturing Company, of Zanesville, recently incorporated, is preparing to establish a plant for the manufacture of a compound for the cleaning of automobile cylinders and gasoline engines. E. B. Roemer, John Rowe, H. F. Achauer, Alva Rea and Stephen Mills, Jr., are the incorporators.

—The Empire Tire Company, of Trenton, N. J., has made a number of improvements and additions to its plant. A second story has been put on the office building, three stories on the shipping and stock departments, and a third story on the mill building. A six-car garage has been added also.

—A contract has been closed by the Owen Motor Car Company with C. R. Teaboldt & Company, of New York City, who will have Greater New York and several counties in the immediate vicinity of the metropolis. Teaboldt & Company will shortly occupy permanent quarters at 1597 Broadway.

—Work has been started on the first of three large buildings which will house the Seitz Automobile Transmission Company, in Wyandotte, a down-river suburb of Detroit. The building will have over 40,000 square feet of floor space, and its cost is estimated at $60,000.

—The Brush runabout is now represented in Boston by a branch instead of an agency, and F. Carleton Dole, formerly manager of the Royal Tourist branch, is manager of the Brush. Archie MacLachlan, manager of the Chicago branch of the Royal Tourist, went to Boston to take Mr. Dole's place.

—The following have been elected as new members in the Automobile Trade Credit Association: Connecticut Telegraph & Electric Company, Fletcher & Company, L. V. Gibbes Machinery Company, Martin-Evans Company, Morrison-Ricker Manufacturing Company, The Sireno Company, Smith Haines, Wenz Ludy Equipment Company.

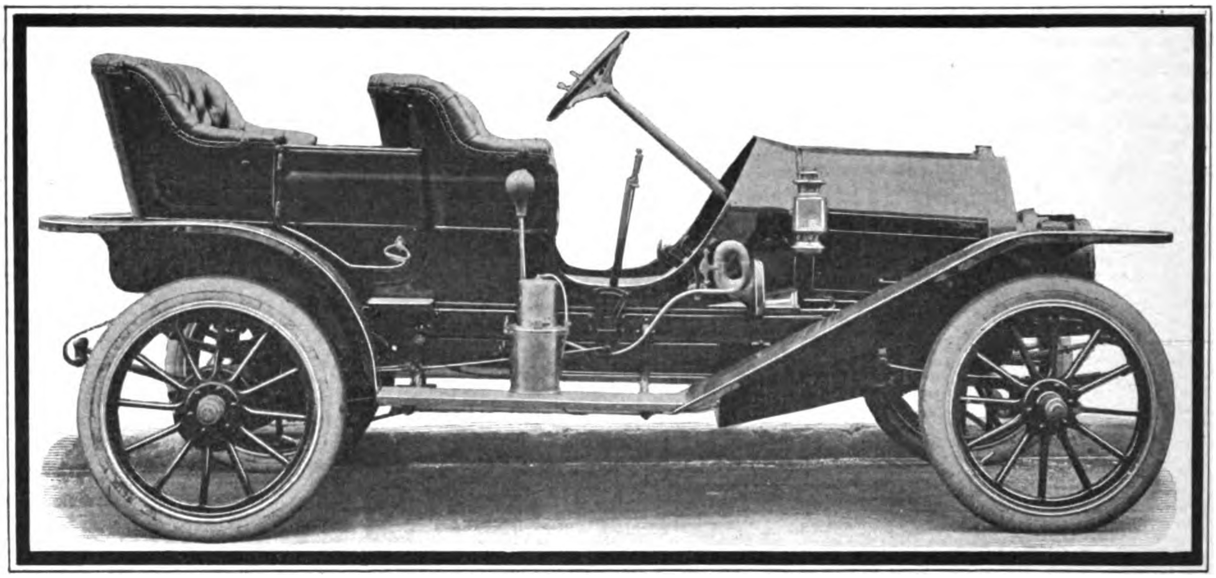
ters of the Haynes Auto Sales Company at Van Ness avenue and Hess street, San Francisco, California

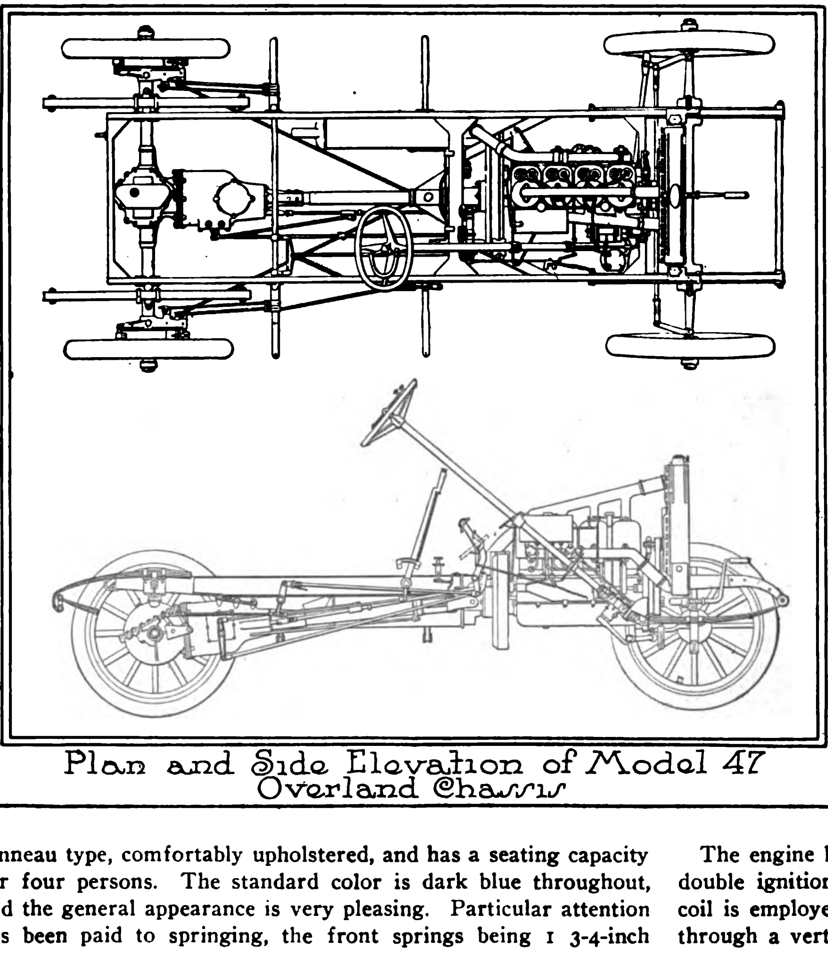
Among the Agencies

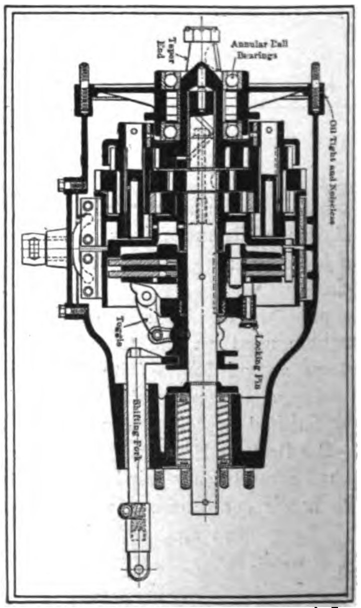
WILLYS-OVERLAND COMPANY HAS INTRODUCED A NEW MODEL, NO. 47, A LOW-PRICED DEMI-TONNEAU WITH A 19.6-HORSEPOWER MOTOR (A.L.A.M.)—OTHER AGENCY NEWS

THE Overland Sales Agency, 1657 Broadway, New York, has just received from the factory of the Willys-Overland Co., at Toledo, a new model which will be known as Model 47.

As will be seen from the illustration the body is of the demi-tonneau type, comfortably upholstered, and has a seating capacity for four persons. The standard color is dark blue throughout, and the general appearance is very pleasing. Particular attention has been paid to springing, the front springs being 1 3-4-inch semi-elliptic and the rear springs of similar dimensions but full-elliptic. The front axle is a stout drop-forging of I-section and the steering of the irreversible worm-and-sector type with ample lock for turning in narrow spaces.


Overland Model 47 Demi-Tonneau


Plan and Side Elevation of Model 47 Overland Chassis



Section View of Planetary Gear

The engine has a bore of 3 1-2 inches and a 4 1-2-inch stroke; double ignition by means of Remy magneto and dry cells and coil is employed, and the cooling is effected by a thermo-syphon through a vertical tube radiator, cooled by a belt-driven fan.

Multiple-disc clutch is used to transmit the engine power to the gears, which are of the planetary type, giving two speeds forward and reverse operated by foot pedals; the low gear and the reverse being operated by the same pedal. The gear and rear construction are in the same housing, the rear axle being of the semi-floating type.

Two independent sets of brakes are fitted and operate on the rear wheel hubs, the internal-expansion set being actuated by a lever placed convenient to the driver's right hand and the external-contraction set by a pedal. The wheelbase of the car is 102 inches and the tread can be 56 or 60 inches at the option of the purchaser; the wheels are of the artillery type, and 32 x 3 1-2 tires are fitted to all wheels.

Included in the price of the car, which is $900 f. o. b. factory, are two gas lamps and generator, two side and rear lamps, as well as a good kit of tools and a pump.

Many New Agencies are Being Established

—J. I. Daniel, a well-known Spokanite, has taken the agency for the Velie car in that city.

—Dr. F. M. White, of Klamath Falls, Ore., now has the agency for the Cole "30" in that section.

—The Gilbert & Vaughn Implement Company, of Hood River, Ore., has taken the Chalmers agency for that section.

—The Pacific Motor Car Company, of Tacoma, the past week took over the Overland agency, formerly handled by the Avenue Garage of that city.

—The United Automobile Company, of Portland, who handles the Maxwell car, have recently established agencies at Eugene, Medford, Ashland and Roseburg, Ore.

—Kaufmann Bros. have secured the agency for the Pittsburg territory for the Imperial tires made by the McGraw Tire Rubber Company, of East Palestine, Ohio.

—Wilson & Maurer are now acting as agents for the Buick line at Salem, Ore. They now have under construction in that city a thoroughly modern and up-to-date garage.

—The Columbia Garage, Spokane, of which Hodgkins & Fosdeck are agents, have been allowed 150 Chalmers for their territory of the 1911 cars. One hundred and twenty-five of these will be 30's and twenty-five of them 40's.

—W. S. Dulmage, sales manager of the Studebaker Brothers Company auto department, of Portland, has resigned to take over the agency for the Elmore car for Oregon.

—The W. King Smith Company is now handling the National and Matheson cars and the Gramm motor truck, and is removing from 109 South State street to the corner of West Willow and North Clinton streets, Syracuse.

—T. J. Toner, head of the Motor Car Maintenance Company, New York, who handles the Grabowsky power wagons, has entered two trucks for the New York *American* commercial vehicle contest to be held October 28 and 29.

—Carl Wallerich, formerly connected with the Overland Company at Indianapolis, and later sales manager for the Haynes Company of Kokomo, has again joined the Overland selling force. He has accepted a position as special agent with headquarters at Toledo, Ohio.

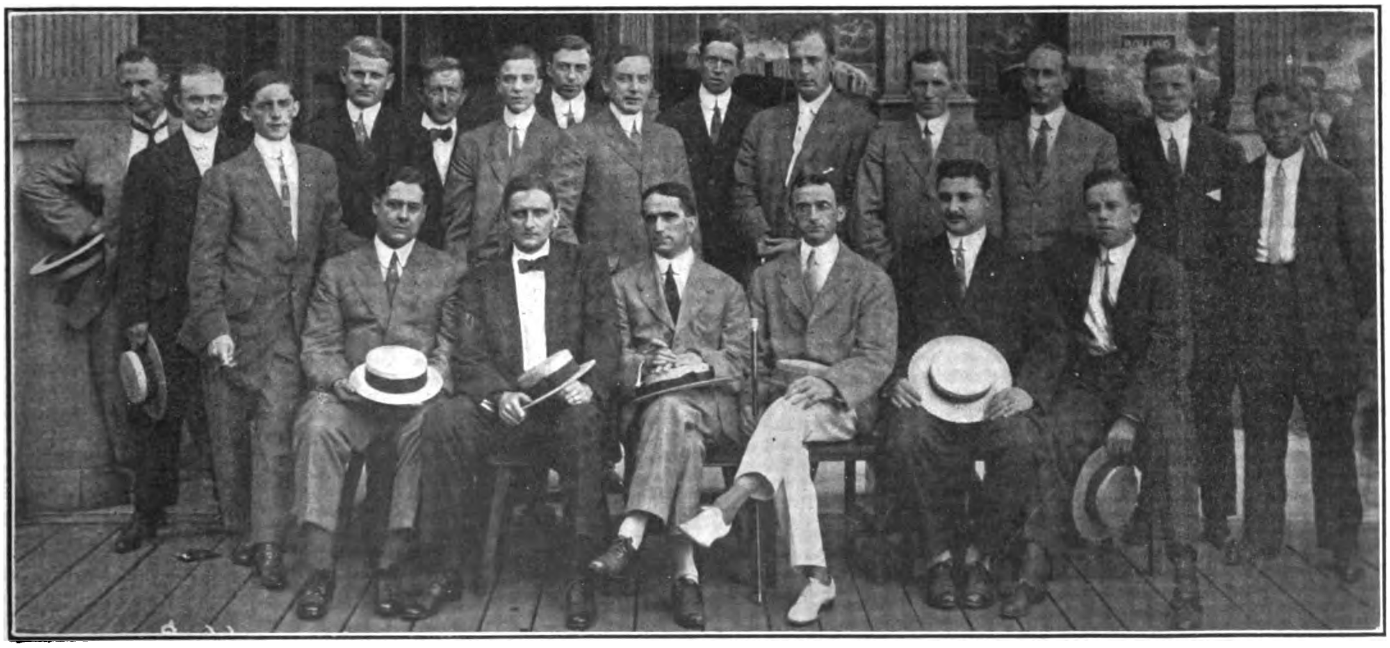
—The Metropolitan Motor Car Company, of Seattle, was last week made the Oregon and Washington Agency for the Alco car. C. S. Cummings, manager of the Metropolitan Motor Car Company, will have the agency for the entire line including taxicabs, touring and racing cars.

The Siegmund-Baylies Company, on Wabash avenue, Chicago, who have had the exclusive agency for the Rapid trucks for the past three years, have taken over the Reliance heavy-duty trucks. A new $75,000 commercial car garage and salesroom for the combined lines is in the course of construction and will be ready for occupancy about December 1.

—The Tip-Top Motor Car Company, of Hood River, Ore., is a recently organized firm to handle the Maxwell car in that vicinity, and the Lozier car in Oregon and Washington. Capt. C. P. McCan and W. T. Sleddon are the owners of the new concern. One of the many innovations introduced by Capt. McCan is the operating of a 5-8 mile track, where each purchaser of an automobile will be taught to run his car.

—During the past month an amalgamation of the Rapid and Reliance selling agencies in Kansas City has been perfected. H. C. and H. G. Shimp, formerly of the Kansas City Rapid Motor & Transportation Company, and Estell Scott, representing the Reliance Motor Truck Company, have joined forces in a new selling organization, to be known as the Rapid-Reliance Company of Kansas City.

—The Syracuse Automobile Dealers' Association has just elected John H. Valentine, president of The John H. Valentine Company, as its treasurer to succeed Harry L. Conde. The association's other officers are: C. Arthur Benjamin, president; M. W. Kerr, vice-president; George E. Messer, secretary. The organization is already busying itself with plans for its third annual show, which will be held in the Armory next March.

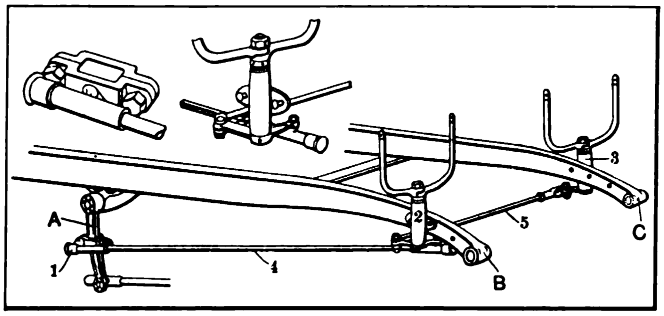


Gathering of the New York and Philadelphia selling organization of Gibney & Brother at the Marlborough-Blenheim, Atlantic City

Prominent Automobile Accessories

FOCUSES THE RIGHT SPOT

Every autoist knows the difficulty encountered in driving at night, round corners, as the rays thrown by the headlights illuminate at the opposite angle to which one is about to turn. A car fitted with the Au-Beuf brackets has its way lighted before the turn is taken, the action of the steering arm operating the brackets carrying the headlights. They can be fitted to any car, as when the equipment is sent out from the factory the bracket holders 2 and 3 are undrilled so that they can be placed in any position desired; the rod 4 is only threaded at one end and this, too, can be adapted to the requirements of any car.

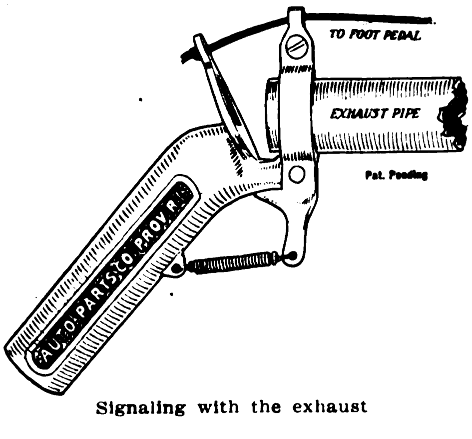


Individual view of the different parts of the headlight

Ball and socket joints with inside spring are fitted to prevent all road shocks from being imparted to the lamps, and these are made adjustable for wear to be taken up from time to time. The brackets are made to accommodate any lamp up to 9 1-2 inches. The equipment is manufactured by F. H. Au Beuf Co., Oneida, N. Y., and the price in black enamel is $25 per set.

EXHAUST WHISTLE FOR AUTOISTS

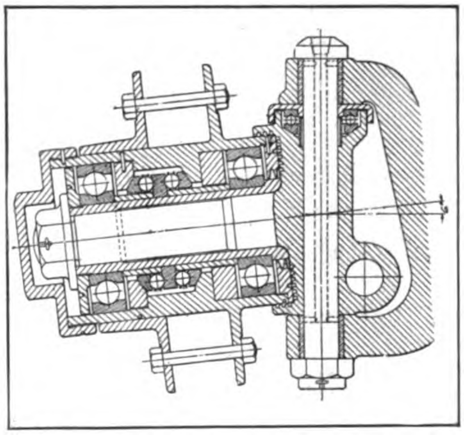
The new exhaust whistle that is being turned out by the Auto Parts Co., of Providence, R. I., is so clearly depicted as to demand almost no further reference, but it is pointed out that the method of attaching the same should prove of interest in view of the fact that the fine work that this whistle is designed to do is not hampered by difficulty in attaching the same to any make of automobile. This device is designed to warn the occupants of the highway of the approach of the automobile that has it for a part of its equipment, and, while the whistle is not intended to convey music, it is, nevertheless, a capable warning device. The design is such that clogging up is not to be considered, and back pressure is eliminated. The price of this device is $3.50 through dealers or direct from the maker.



Signaling with the exhaust

HESS-BRIGHT HUB BEARINGS

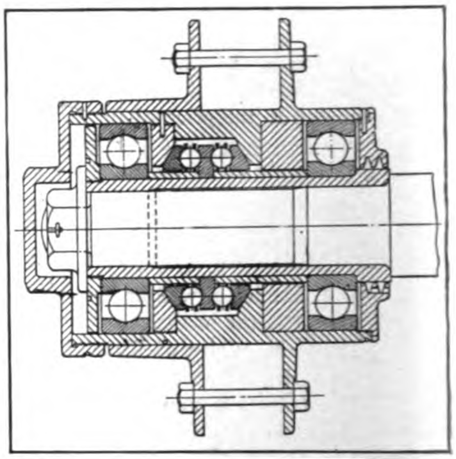
The strains and stresses imposed on the bearings of a heavy 3 1-2 to 5-ton truck are different from those on a touring car in so far that the super weight is more and center of gravity is often considerably higher. The Hess-Bright Manufacturing Co. has designed a hub to be used for either front or rear wheel that takes all radial loads and side thrusts.



Front axle hub, showing Hess-Bright method of fixing radial and torsion bearings

Both radial and thrust bearings are mounted on a sleeve inside of the hub; the inner races of the radial bearings and the center plate of the thrust bearings are clamped between the large flat nut, distance bushes and a shoulder on the sleeve.

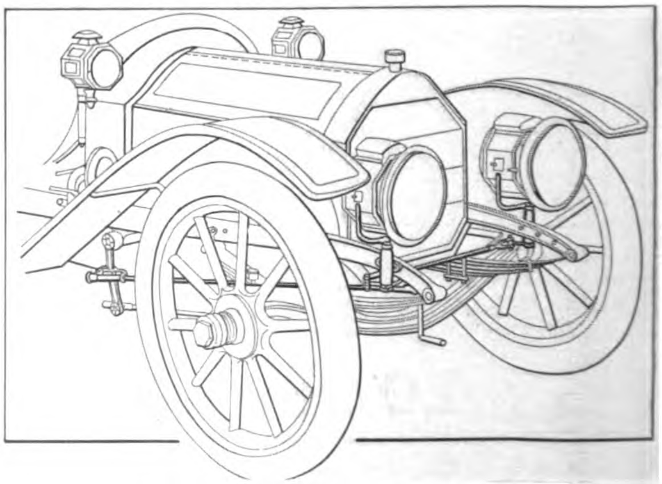
The wheel may be slipped off or on in the same manner as a plain spindle bearing without exposing the ball bearings to the surrounding dirt and grit while handling the wheel and without loss of lubrication or need of recharging. Taking into consideration the conditions of unskilled and rough labor incidental to truck operations this feature is an advantage.



Rear axle hub, showing Hess-Bright method of fixing radial and torsion bearings

The sleeve is secured to the axle by a hexagon nut, which is large enough to act as a locknut for the spindle end nut. A loose floating bush having a running fit is inserted between the inner radial and the thrust bearings. Protection from water and dirt is obtained by recessing the hub, and cutting a series of grooves which are filled with grease before the wheel is slipped on.

The use of the ball thrust bearing in the pivot assures greater ease in steering and in heavy truck work this is very tiring. It will be noticed that the dish of the front wheels is 6 per cent., whereas the customary allowance for touring cars is somewhat less. The easing up of the labor of steering big commercial vehicles will result in satisfied operators and in more work.



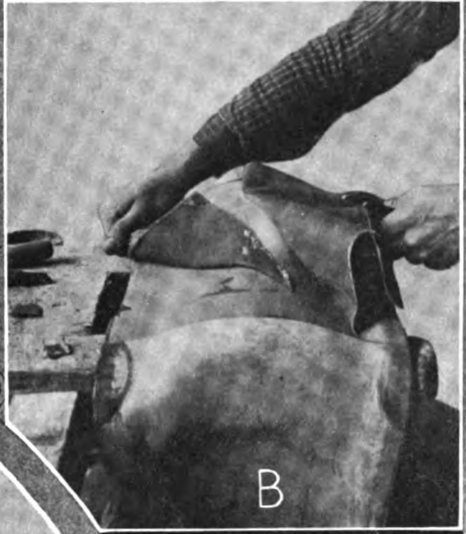
Au Beuf automatic headlight brackets for automobiles—headlights controlled by the steering wheel

Vol. XXIII New York—Thursday, October 27, 1910—Chicago No. 17

The Automobile

Care and Repair of Tires

Stripping Outside Rubber for a Complete Retread



Ripping Off Inside Layer of Canvas

Stripping Canvas from Section to be Repaired

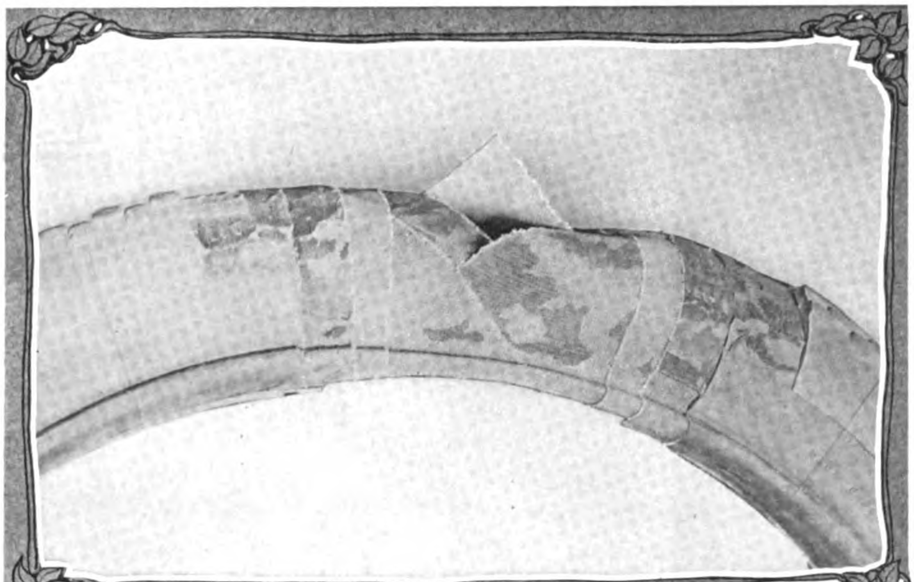
UNLESS some genius with an inventive mind will come to the rescue of the automobile business with a type of wheel that will commercially supplant rubber tires, assuming that tire makers are doing the best that they can, it is much to be feared that the statement of a man high up in the automobile business is founded on truth. This keen visioned man of automobile affairs said: "Counting cost in the long run, the automobile is the tail and the tire is the dog; the question is, Will the tail wag the dog?" If the right kind of a man with a creative mind that succeeds in commercializing the kind of a wheel that will not depend for its efficacy upon pneumatic tires, the tail will not have to wag the dog—it can be cut off.

Automobilists are not in a position to await the coming of the "Wellington" who is to give battle and subdue the "Napoleon" who is perched so conspicuously upon the throne of the automobile empire; their needs are immediate and pressing; millions of dollars' worth of automobiles are in daily use and more millions of dollars' worth of tires must be kept in a state of good repair in order that their life may be conserved for the greatest possible length of time in the face of great discouragement.

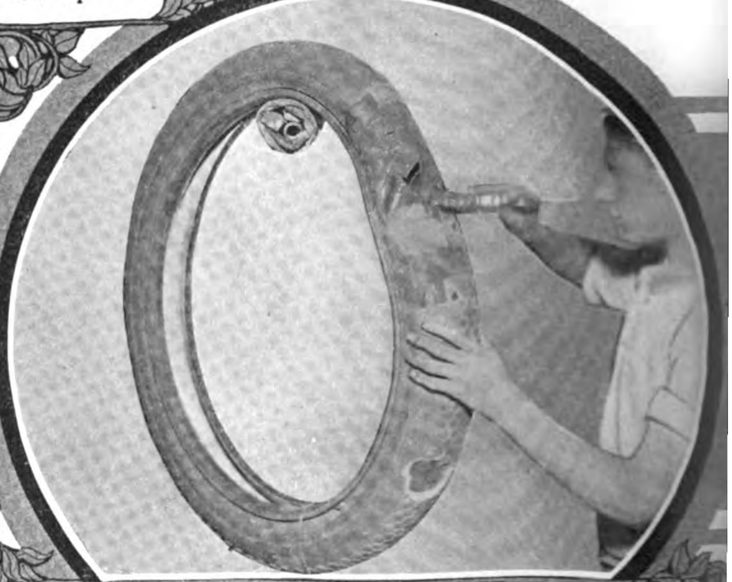
If it is true that tires, as they are now made, are up to the highest obtainable standard in point of material and workmanship, then, in the absence of something better, it devolves upon automobilists to make up the deficit, interjecting the requisite measure of caution and care in order that when the balance is struck the cost of maintenance of the automobile, as a whole, will not exceed the value of the advantages derived from its use.

The immediate and pressing need, in view of all the circumstances, is coupled with the care and repair of tires. Were an autoist to be told that he does not realize the seriousness of the situation, he would scoff at the bearer of such stale news, but the fact remains that the editor of THE AUTOMOBILE stood on the corner of Forty-second street and Fifth avenue for just one hour on October 20, during the passing of 46 automobiles, 29 of which were running on pneumatic tires that were not in a good state of repair.

Of the 29 automobiles referred to, 24 of them were driven by chauffeurs, and the conclusion reached, after considering this phase of the situation, was that automobilists who drive their own cars do pay some attention to the care and repair of tires, but that chauffeurs are more interested in collecting the commission on new tires than they are


D—Section to be retreaded showing different layers to be filled up to


E—Buffing bad places before rebuilding

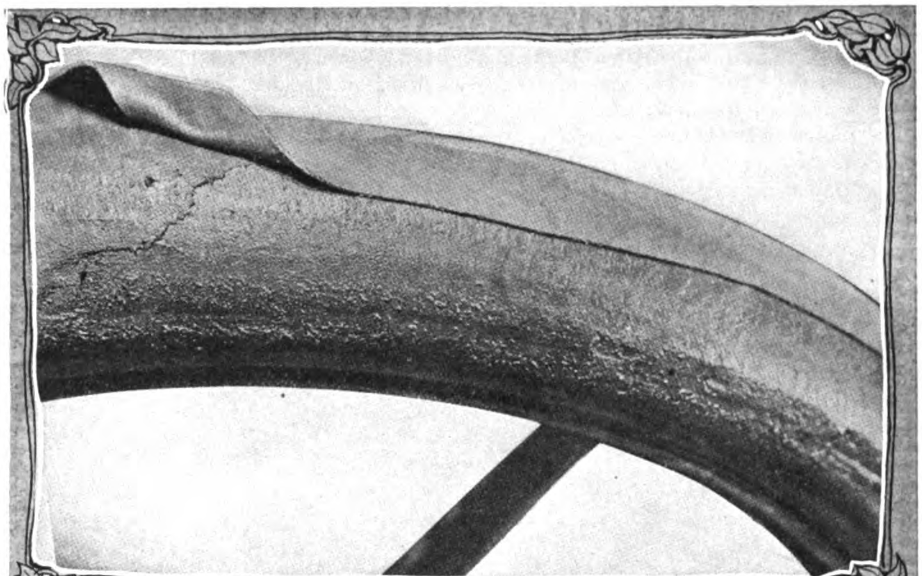

F—Solutioning part to be repaired


G—Roughing up tire before solutioning

in prolonging the life of the tires in use.

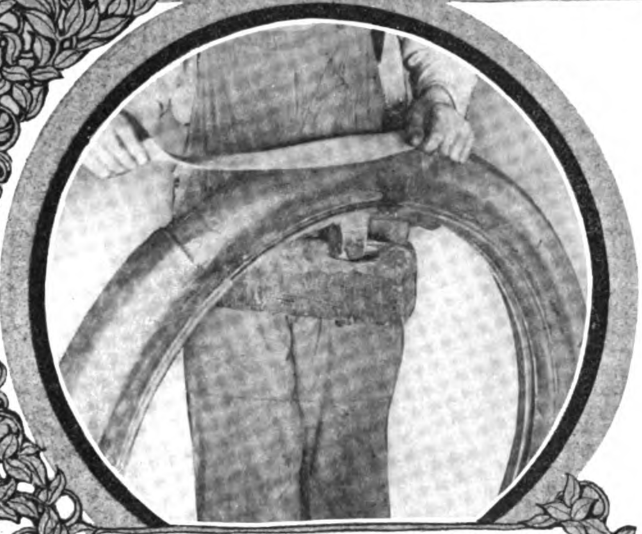
"An ounce of prevention is worth a pound of cure." This old and trite saying never applied to anything with such great soundness as it does to the tire problem. This being so, the first move in the application of the principle demands the instant dismissal of the chauffeur who is not satisfied with his position and his salary, and who fastens his fangs upon the man who employs him, aided and abetted by the tire vendor who is so lacking in business acumen and common honesty as to put himself and his business under the shadow of a crime.

In talking about the tire problem to an automobilist who keeps several cars in commission, he related an incident that bears fittingly upon the points that are here to be made, when he said: "My chauffeur when he brought me to the office this morning asked me for permission to take the car up to his place of abode in upper Harlem in order that he could attend to one of his private affairs. I refused him permission to do so and pointed out that it was far cheaper for him to take a trolley car, leaving my automobile in the garage. He did not seem to appreciate the fact that a menacing tire bill, under the best of conditions, is increased by every foot that an automobile makes; he was spending my money which made a great difference with him."

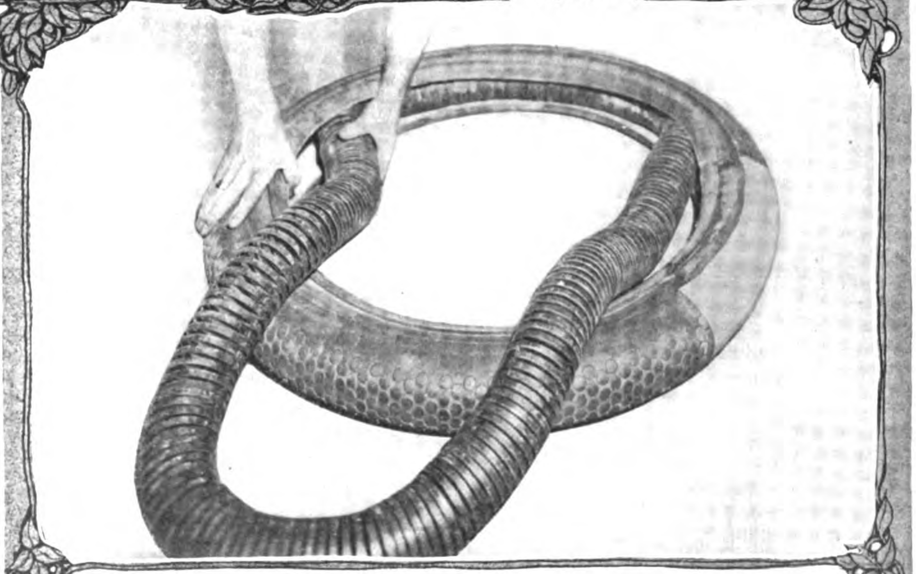


H—Solutionized cover having a strip of rebuilding fabric laid in place

J—Semi-cure process using a band press system



I—Laying four-ply unvulcanized gum on part to be repaired



K—Inserting coil spring before wrapping

The owner of an automobile who supports a chauffeur if he declines to have his automobile worn out in the service of his majestic employee is dubbed a "tight wad." Some owners are so thin-skinned that they wince at the appellation, overlooking the advantage derived, forgetting, for the moment, that a "tight wad" prefers to employ the character of chauffeur that is satisfied with an honest living and insists upon having his tires maintained in a state of good repair, and being wise, makes his own purchases, not only of real estate, but of tires as well.

Every business man knows that there are grades in quality of every commodity, and there is no reason for believing that tires are an exception to this rule. The first principle involved in the purchase of anything demands that the purchaser represent himself, but if there are reasons why he cannot do so, the second principle demands that he appoint an honest agent.

It is necessary to consider all these preliminary attending features in the discussion of the care and repair of tires for reasons as follows:

(A) Superior grades of tires will last the longest in a given service.

(B) If repairing is neglected more or less, the better the quality of the tires, the less marked the effect of abuse will be.

(C) The efficacy of repair depends absolutely upon the quality of material of which the tire is made.

(D) If the fabric of the tire is inferior, a "blow-out" will result and patching a tire that is so poor that it will blow out is a futile undertaking.

(E) If the rubber compound is lacking in cementing qualities, it is useless to try to make a repair, since the new work will not adhere to the old.

In measuring the value of prompt and skillful repair work, in view of the above considerations, the first real effort in the direction of repairing comes in the purchase of the tires. If the price lists are all alike, and the discounts are identical, it remains to discriminate between the different grades of tires and purchase the kind that will (a) last the longest in a given service and (b) submit to the repairman's manipulations most efficaciously.

Having purchased tires that will last the longest in the first place, and lend themselves to repairing operations with greatest facility, the real questions of maintenance must then be coped with, and in view of the cost of tire maintenance, the same discriminating care that is given the watch in the automobilist's pocket will bring an equal measure of result with the tires.

Remembering that destructive wear comes with increasing speed rather than with the weight that has to be borne by the tires, considering also that the road condition has a marked effect for good or ill, it remains to defer the day of necessary repairing in the ways as follows:

(A) By using the automobile as sparingly as possible, traveling the long way around rather than by short cuts, if good road conditions can be so had.

(B) By keeping the speed of the automobile down to reasonable limits at all times, remembering that the wear and tear will be multiplied by four if the speed is doubled; in other words, whatever the wear and tear might be at 20 miles per hour, it will be four times that amount at 40 miles per hour.

(C) By watching the road condition rather than to maintain some predetermined speed as measured by the speedometer.

(D) By driving slowly when the going is rough, dropping down to low gear when the top dressing of the roadway is covered with loose broken stone.

(E) By remembering that the way to cut rubber is to wet it, not forgetting that sharp stones will cut the rubber thread of the tires with relative ease on a wet day.

(F) By keeping the tires fully inflated, with never a fear of overinflation, due to any effort that can be brought to bear, through the use of a hand pump and the exertion of an autoist.

(G) By keeping out of car tracks (absolutely), with never a thought of treading into frogs and crossings under any circumstances—the frayed-out metal at these points is extremely sharp and will cut like a razor.

(H) By remembering that "flywheel effect" has a pronounced bearing upon tire life—the larger the diameter of the road wheel and the faster it travels the greater will be the flywheel effect.

(I) By going around corners slow enough to prevent skidding.

(J) By applying the brakes gradually.

(K) By letting in the clutch softly.

(L) By maintaining correct parallelism of the road wheels.

(M) By disregarding what the pressure gauge says, if the respective tires indicate that they are not equally blown up—the same roundness of section should obtain for each tire at the point of road contact.

(N) By substituting larger section tires, if those in use will not carry the load without showing flexure when they are fully inflated—no amount of pressure will suffice to make the tires stand up under the work if they are too small.

(O) By washing the tires with tepid water, rendered soft by castile soap, every time the car comes in off the road and inspecting the tread at every point, looking for cuts or abrasions, with the understanding that they will be fixed before further use.

(P) By keeping the garage floor scrupulously clean, with especial reference to lubricating oil, making sure that no lubricating oil whatever is permitted to remain on the tires.

(Q) By protecting the tires from applications of gasoline or other hydrocarbon fuel.

(R) By removing the tires at reasonable intervals and cleaning the rims, after which re-enamel them, thus preventing rust formations from attacking the fabric.

(S) By making sure that the inner tubes are of the right size.

(T) By guarding against kinking or overlapping of the inner tubes.

(U) By adjusting the clips so that they will not bite the inner tubes.

(V) By using talcum copiously as a tire lubricant, making sure that every portion of the surface of the inner tube is well coated over.

(W) By scrutinizing the inner walls of the outer casing and removing every rough zone, taking particular notice as to whether or not nails or other puncture producers are not projecting through ready to puncture every inner tube that is put into place.

(X) By exercising care in putting on tires, making sure that the tire irons do not bruise the inner tubes and fray the beading of the outer casings.

(Y) By keeping the tires out of direct sunlight, away from dry steam heating and in a cool, well ventilated room under conditions of subdued lighting—when on the road if the car must stand for a time select a shaded place.

(Z) By jacking the car up off the floor when it is not in use, thus taking the weight off the tires and letting off a little of the tire pressure, making sure, however, that the car is not rolled around until the tires are fully inflated again.

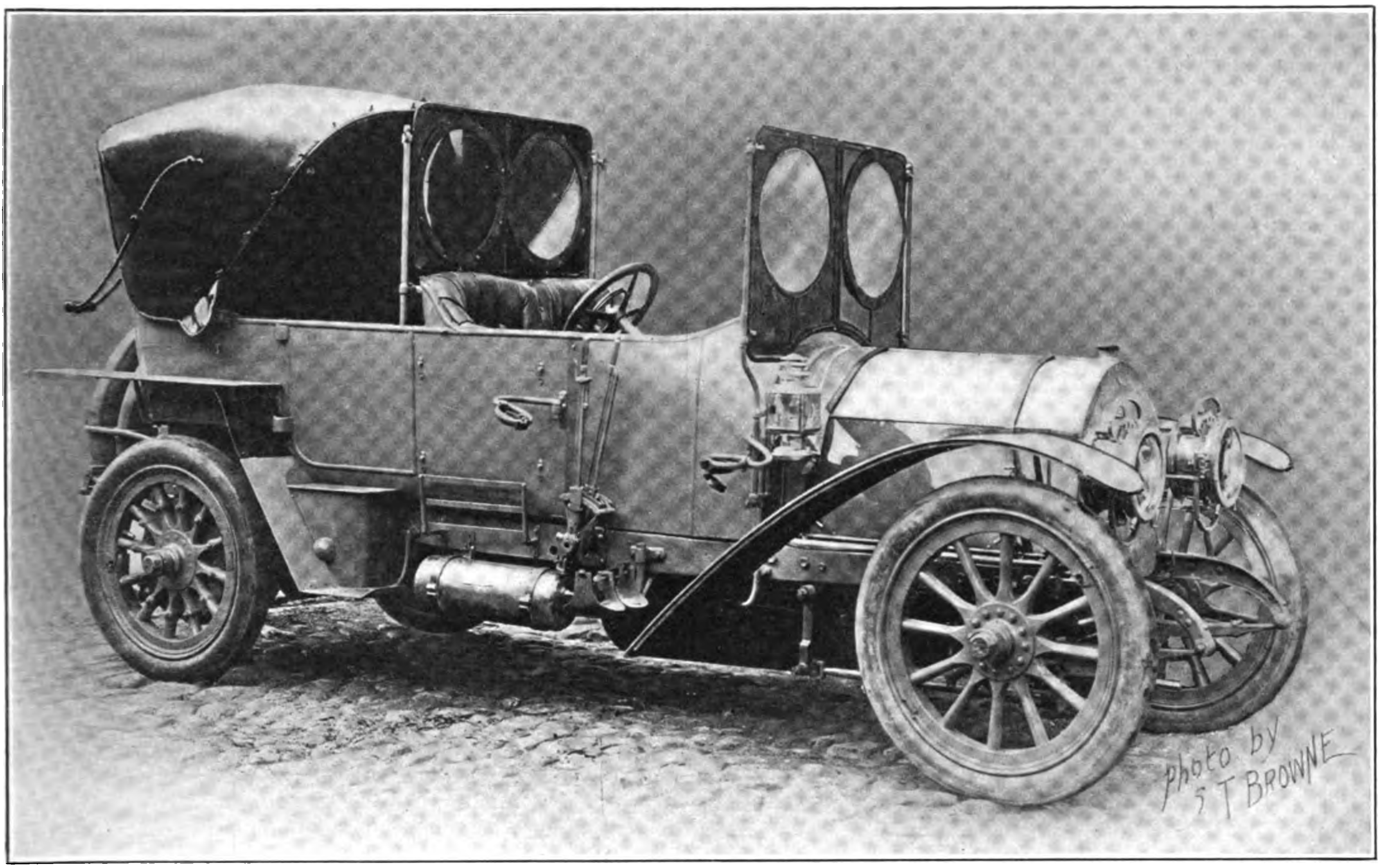
Copy the Professional in Making Repairs

Having exercised every precaution as above set down, taking advantage of experience, not relying upon these suggestions alone, it still remains for the automobilist who proposes to make the best fight he can in the face of adverse conditions to put himself in possession of the best possible information in relation to repair work, copying the methods of the professional up to the limit of unprofessional facilities, making up in added skill and greater care for the absence of the more perfect methods, calling upon the repairman to perform the truly difficult tasks rather than to display the distinguishing characteristics of the penny-wise and pound-foolish.

The series of illustrations that are offered in connection with this article were taken at the Knickerbocker Tire and Repair Company's plant, and depict the methods in vogue in professional repair plants where tires are handled in a large way. Each step from A to Z of the whole process is shown, from the healing of a simple wound on the thread of a tire to the stripping of a carcass and rebuilding from the ground up.

Among the Makers

WINTER AUTOMOBILING; MOON CAR FOR 1911; FRANKLIN AIR-COOLED AUTOMOBILES; EXPERIENCES OF A DEEP-SEA HACKMAN, ETC.



THE BODY MAKES THE APPEARANCE OF THE CAR—A ROTHSCHILD STUDY

WINTER automobiling, rather than to put the car out of service, is becoming the regular order of things. There is no longer any reason for desiring to lay up the car for the winter. On the other hand, since the going is naturally the worst when the weather is inclement, it stands to reason that the best work can be done, counting from the viewpoint of real utility, when the snow is on the ground, and the wise owner now saves himself rather than put his automobile out of use at the very time when it will be of the greatest value to him. Just why automobiles are now in fettle to do winter work on a basis that is more in keeping with the needs is difficult to explain, excepting that larger diameter wheels, more power, greater flexibility, superior material, exacting workmanship, and last, but not least, types of body work that protect the occupants from wintry blasts, are important factors. Saving the man rather than the car, is a natural and timely thing to do.

Moon Cars for 1911

MODEL 30 IS RETAINED SUBJECT TO REFINEMENT; MODEL 45 REMAINS THE HIGH-POWERED STANDBY; IMPROVEMENTS ARE MADE ALL ALONG THE LINE

ANNOUNCEMENT is made of the Moon line of automobiles for 1911, and advices from the Moon Motor Car Company, of St. Louis, Mo., lend substance to the understanding that the Moon 1910 automobiles had arrived at a level, from the point of view of standardization, to warrant the company in staking its future upon them, subject to such changes and refinements as an efficient engineering corps at the company's plant would necessarily desire to incorporate remembering that the whole procedure should be by way of an evolution rather than to depart from well-known standards that are giving satisfaction, hoping, perchance, that something new and untried will accomplish that which has never been done before.

The Model 30 car is offered to the Moon clientèle with five body options, as shown in the tabulation, with prices ranging from $1,500 for the Touring Car, and Toy Tonneau, as well as the Roadster, to $2,750 for the Landau, with a Coupé intervening at $2,250.

The Model 45 car is offered in five options, including the

Touring and Toy Tonneau at the same price, while the foredoor type and Torpedo body cars are priced at $3,100 each, and the Limousine sells at $4,000.

The Model 30 car has 114-inch wheelbase and standard tread, while the Model 45 car has 121-inch wheelbase and standard tread. The approximate weight of the Model 30 car is 2,650 pounds, and the tire equipment is 34 x 3 1-2 inches. The Model 45 car weighs about 3,100 pounds, and the tire equipment is 36 x 4 inches.

The most noticeable improvement in the motor of the Moon "45" is in the method of driving the magneto and water pump. These are now located at right angles to the crankshaft and driven with one gear off the vertical camshaft. This change has allowed the discontinuance of the pump gears formerly employed. The lubricating system has been retained in precisely the same arrangement as on former models for the past four years, the crankshaft being drilled as heretofore. The force feed lubricator, instead of being located on the dash and driven by an extension of the camshaft, is now operated by two spiral gears, which leaves the dash perfectly plain, except for the single sight feed. The exhaust manifold has been remodeled so as to leave fewer bends and angles to impede the progress of the exhaust gases.

One most noticeable change is the method of drive and rear spring sus-

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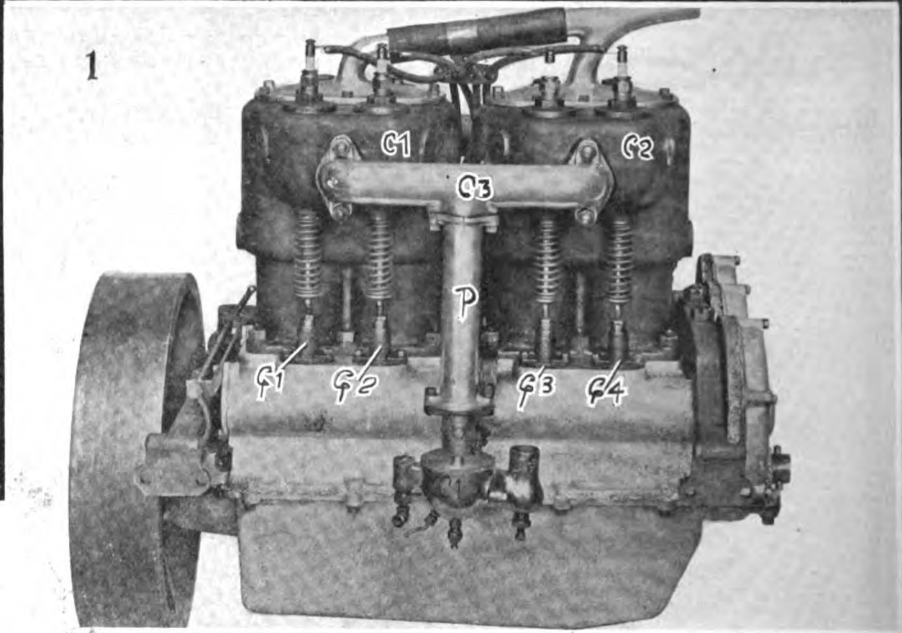

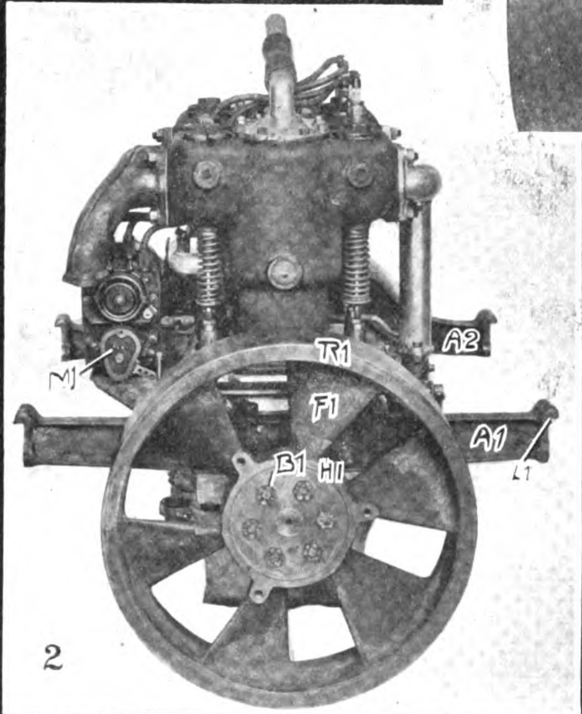

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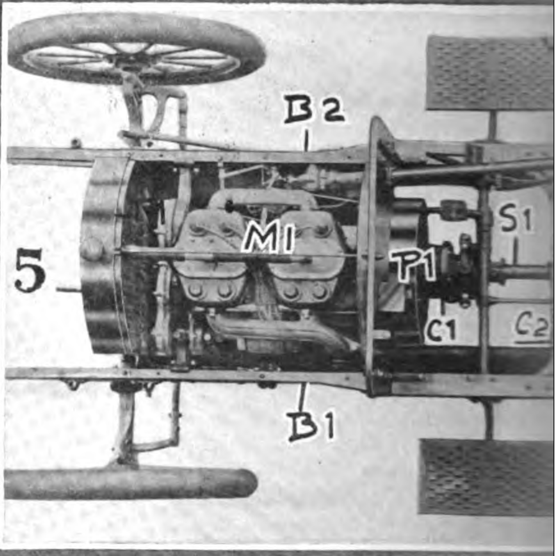


SPECIFICATIONS FOR MO

MODELS	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION	
			Type	Seats	Cyls.	Bore Inches	Stroke Inches	Cyl. Cast.	Radiator	Pump	Magneto	Battery
Moon 30........	$1500..	28.9..	Tour'g..	5	4	4¼	5	Pairs..	Tubular.	Cent'fl...	Remy...	Dry.....
Moon 30........	1500..	28.9..	T. Ton..	4	4	4¼	5	Pairs..	Tubular.	Cent'fl...	Remy...	Dry.....
Moon 30........	2750..	28.9..	Limous.	7	4	4¼	5	Pairs..	Tubular.	Cent'fl,..	Remy...	Dry.....
Moon 30........	1500..	28.9..	R'ster...	3	4	4¼	5	Pairs..	Tubular.	Cent'fl...	Remy...	Dry.....
Moon 30........	2250..	28.9..	Coupe...	3	4	4¼	5	Pairs..	Tubular.	Cent'fl...	Remy...	Dry.....
Moon 45........	3000..	36.1..	Tour'g..	7	4	4¾	5	Pairs..	H'comb..	Cent'fl...	Bosch...	Dry.....
Moon 45........	3000..	36.1..	T. Ton.	5	4	4¾	5	Pairs..	H'comb..	Cent'fl...	Bosch...	Dry.....
Moon 45........	4000..	36.1..	Limous.	7	4	4¾	5	Pairs..	H'comb..	Cent'fl...	Bosch...	Dry.....
Moon 45........	3100..	36.1..	F. door.	7	4	4¾	5	Pairs..	H'comb..	Cent'fl...	Bosch...	Dry.....
Moon 45........	3100..	36.1..	Torp'o..	4	4	4¾	5	Pairs..	H'comb..	Cent'fl...	Bosch...	Dry.....

Fig. 1—Right Hand Side of the Model 30 Motor, Showing the Location of the Schebler Carbureter.

Fig. 2—Rear End View of the 30 Motor, Showing the Fan in the Flywheel.

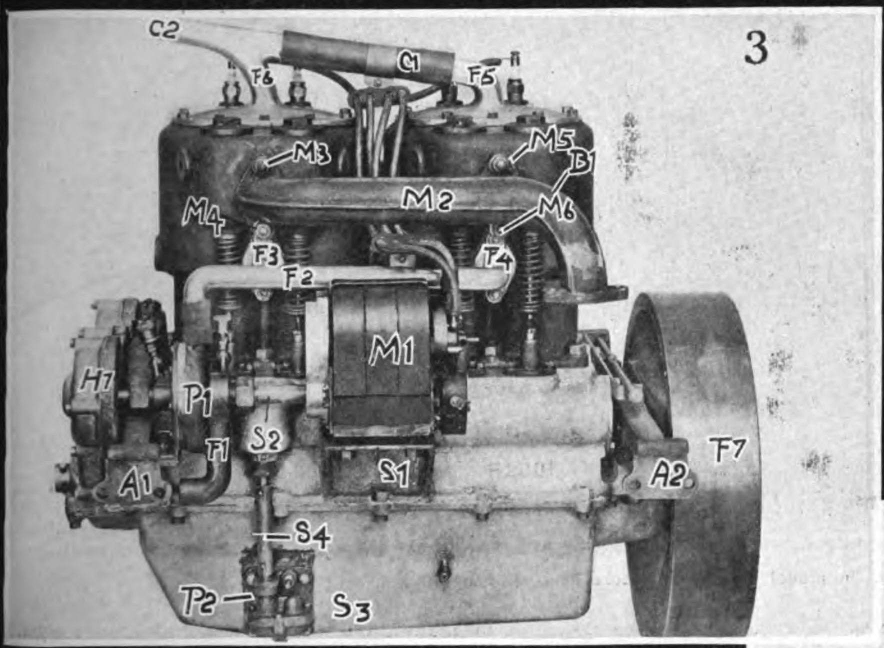
Fig. 5—Model 30 Stripped Chassis.

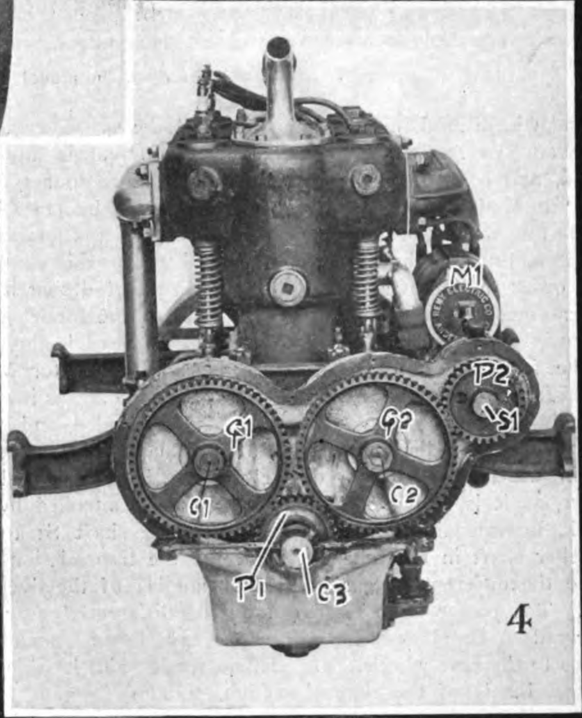
pension. Three-quarter springs are used in the rear instead of full elliptic as before, and the axle drive is direct through them to the frame, doing away entirely with the drive rods and the familiar V-type of drive with the ball and socket, which was so long a Moon characteristic. The muffler is no longer carried on the rear of the frame, but is hung longitudinally underneath the body. A dust shield takes its place in the rear.

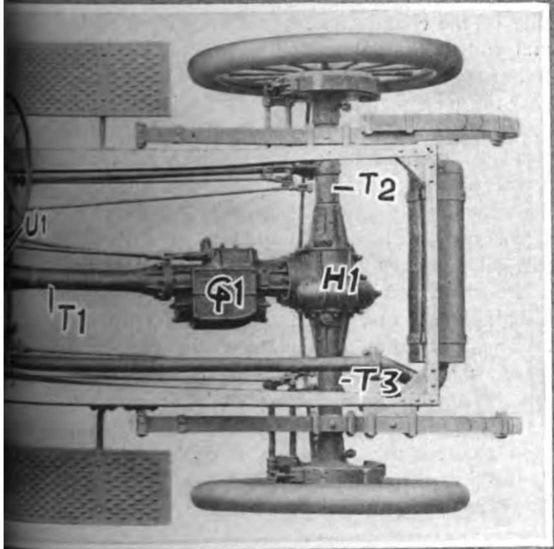
The touring car bodies for the "45" have been given two inches more room in the tonneau and the entire tendency has been in a modification of both the straight line and convex type. Fore-door bodies and torpedoes have been added to the selection of bodies.

Jump spark ignition is employed, with dry cells and a Remy magneto used in dual combination with a single unit coil and a single set of spark plugs.

In the Model 30 car ignition is by Remy magneto, with a coil and dry cell auxiliary, whereas in the Model 45 car the ignition is by Bosch magneto, using a dry battery for the secondary source of electrical energy. Both types of motors are water-cooled with a centrifugal pump for circulating the water, and the radiator of the Model 30 is of the tubular type, whereas the radiator of the Model 45 is of the honeycomb type. Lubrication is by splash in the Model







CARS AS OFFERED FOR 1911

Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight, lbs.	TIRE	
	Type	Speeds	Location	Drive				Crankshaft	Trans-mis'n	Axle		Front	Rear
disc.	Selecti'e.	3	Axle...	Shaft...	114	56	P. Steel..	Plain...	Roller...	Roller...	2650	34x3½	34x3½
disc.	Selecti'e.	3	Axle...	Shaft...	114	56	P. Steel..	Plain...	Roller...	Roller...	2650	34x3½	34x3½
disc.	Selecti'e.	3	Axle...	Shaft...	114	56	P. Steel..	Plain...	Roller...	Roller...	2650	34x3½	34x4
isc.	Selecti'e.	3	Axle...	Shaft...	114	56	P. Steel..	Plain...	Roller...	Roller...	2650	34x3½	34x3½
isc.	Selecti'e.	3	Axle...	Shaft...	114	56	P. Steel..	Plain...	Roller...	Roller...	2650	34x3½	34x3½
disc.	Selecti'e.	4	Amid....	Shaft...	121	56	P. Steel..	Plain...	Plain...	Ball....	3100	36x4	36x4½
isc.	Selecti'e.	4	Amid....	Shaft...	121	56	P. Steel..	Plain...	Plain...	Ball....	3100	36x4	36x4
disc.	Selecti'e.	4	Amid....	Shaft...	121	56	P. Steel..	Plain...	Plain...	Ball....	3100	36x4	36x4½
isc.	Selecti'e.	4	Amid....	Shaft...	121	56	P. Steel..	Plain...	Plain...	Ball....	3100	36x4	36x4½
isc.	Selecti'e.	4	Amid....	Shaft...	121	56	P. Steel..	Plain...	Plain...	Ball....	3100	36x4	36x4

Fig. 3—**Left Hand Side** of the Model 30 Motor, Showing the Magneto, Water, and Oil Pump.

Fig. 4—**Front End View** of the 30 Motor, with the Half-time Gearcase Open, Showing Details.

Fig. 6—Moon model 45 with the fore-door type of body

30, and with a mechanical system in the Model 45. The general appearance of the Model 45 fore-door type of car is shown in Fig. 6, and comparing this model with the fore-door type of body on Model 30, as shown in Fig. 7, it will be possible to realize that there is a certain standard of design and appearance that is maintained throughout the work done by this company.

In order to understand the general scheme of design it will be feasible to examine the stripped chassis of the Model 30, as shown in Fig. 5, in which the radiator R1 is located in the plane of the front axle, and the four-cylinder T-type motor M1 is placed far enough back of the radiator so that the air, as it passes through the interstices of the same, is unimpeded and flows down, due to the displacing action of the fan in the flywheel F1 within which the multiple disc clutch C1 is nested, and the power, as it is delivered by the motor, and controlled by the clutch, is transmitted therefrom through the shaft S1 to the propeller shaft in the tube T1, thence to the transmission gear G1 to the differential gear in the housing H1 of the live rear axle. The power is weighed out by the differential gear and delivered to the jackshafts within the axle tubes T2 and T3, thence to the rear wheels. The chassis frame, with its side bars B1 and B2, is of the channel section, suitably fashioned of a proper grade of steel, and the flanges are widened from the point of narrowing at the dash, tapering off toward the back, thus affording strength where it is most needed. While it is the aim to secure great rigidity of the chassis frame, not only by the selection of the material and the liberal section employed, but by the use of a substantial cross bar C2, and at the point of support of the motor, it is also the plan to maintain great flexibility of the relating members, partly by the use of a well-contrived universal joint U1, and by maintaining a straight line relation of the members and true turning centers.

Referring to the motor of the Model 30, Fig. 3 shows the left-hand side of the same with a magneto M1 on a shelf S1 back of the centrifugal pump P1 with a shaft S2 used in common for driving, the same receiving its power from a pinion in mesh with the half-time gears, all of which are encased in the housing H1. The lubricating oil is stored in the bottom half of the crankcase S3, and is circulated by means of the pump P2, the latter being driven by the shaft S4. Water enters the centrifugal pump through the fitting F1, and leaving the pump through the fitting F2 enters the two pairs of cylinders at the flanges F3 and F4, leaving the cylinders at the top through the fittings F5 and F6, there being a flexible connection C1 between

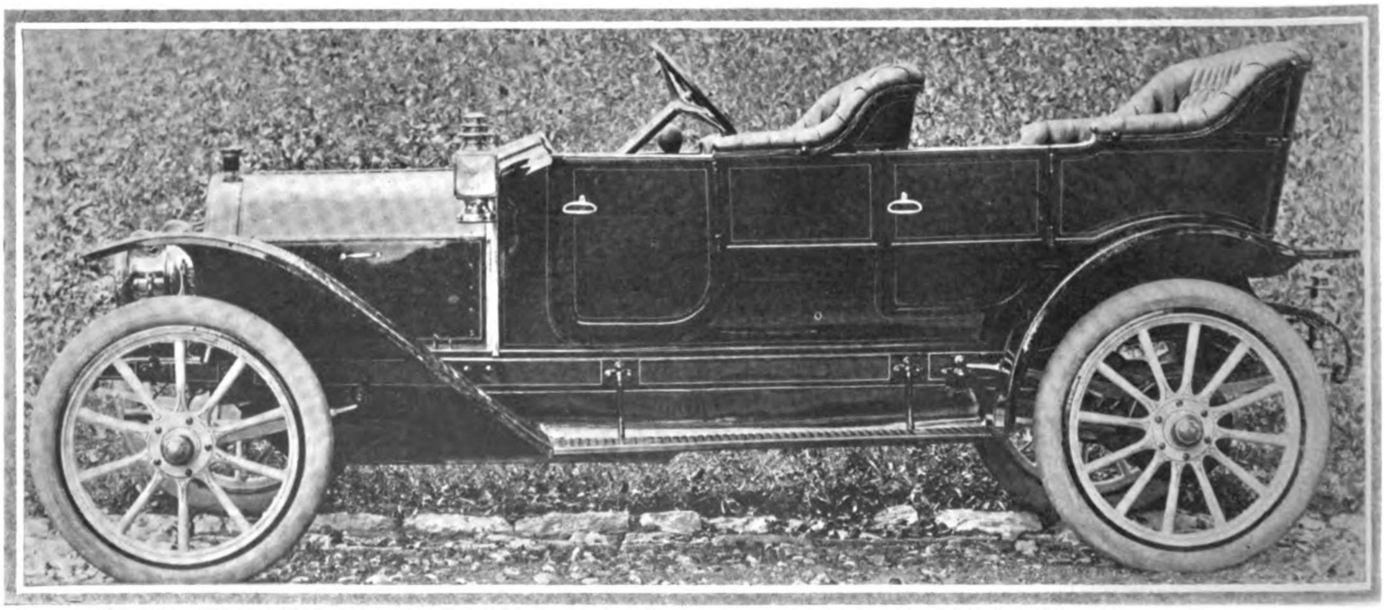


Fig. 7—Model 30 with the fore-door type of body

the fittings, and a second flexible connection C2 at the junction of the fitting F6, and the fitting leads to the radiator. The exhaust manifold M2 is shaped with an easy bend B1, and is so designed that the fastenings M3, M4, M5 and M6 are readily gotten at for purposes of assembling, tightening up, or disassembling. The flywheel F7 is of large diameter, and it is properly marked off, so that the autoist may check the timing of the motor at will, and the motor is suspended on the chassis frame by means of drop-forged arms A1 and A2, so that the weight of the motor and the gyrations of the flywheel are adequately cared for, without stressing the metal of the crankcase.

Glancing at the right-hand side of the motor, as shown in Fig. 1, it will be observed that the carbureter C1, of the Schebler type, is in an accessible position, remote from the sparking equipment, and is connected to the two pairs of cylinders C1 and C2 by a standpipe P1 and a cross-connection C3. This side of the motor shows the valve mechanism clearly, and the guides G1, G2, G3 and G4 are designed to afford a long bearing, maintain the right relation of the parts, and perform noiselessly. This being the intake side of the motor, the spark plugs are located herein, coming just above the intake valves.

Referring to Fig. 4 of the front end of the motor, the half-time gears G1 and G2 are keyed onto the cam shafts C1 and C2, and are driven by the pinion P1, which is keyed onto the crankshaft C3. The magneto M1 is driven by the pinion P2 through the shaft S1, taking its power from the gear G2.

The rear end of the "30" motor is shown in Fig. 2, bringing into view the fan blades F1, of which there are six, joining the flywheel rim R1 to the clutch housing H1, showing the six bolts B1, by means of which the flywheel is flanged to the crankshaft.

This illustration also shows the accessibility of the magneto M1, and affords a better view of the drop-forged I-section cross-arms that serve as a support for the motor, they being fastened to the chassis frame with overhanging lips L1, so that the load is carried in shear by the section, and the holding bolts are relieved of this responsibility.

There are many other nice ramifications that might be studied in connection with the Moon models, some of which, however, can only be brought out by an examination of the working drawings, or if the cars are inspected. The tabulation given enumerates the remaining general characteristics not herein discussed.

Franklin Product and Practices

AIR-COOLED MOTOR AND ACCESSORIES; DEPICTING METHODS OF MANUFACTURE; TREND IN AIR-COOLED MOTOR WORK

UNUSUAL interest is centered in the methods in vogue in the plant of the H. H. Franklin Manufacturing Company, of Syracuse, N. Y., due to its close adherence to a definite standard, with its attending and unqualified success. This plant has been devoted to the manufacture of air-cooled motors from its inception; it has never departed from its chosen class of work, and the evolution of the air-cooled motor in America will be best appreciated by observing the refinements which will be found in the 1911 Franklin motors, and studying the methods of manufacture simultaneously. The output of the plant for the immediate future will comprise four models in the line of open cars, two of which will be equipped with six-cylinder motors, and the remaining models will have four-cylinder motors. These models are known in the Franklin literature as H, D, M and G, and their horsepower ratings are 48, 38, 25 and 18, respectively.

The six-cylinder type of motor, as will be found in models H and D, is depicted in Fig. 13, showing the motor with its cylinders, C1, C2, C3, C4, C5 and C6, of the air-cooled type with vertically disposed flat steel gills, surrounded by air jackets, left open at the top and bottom so that the cooling air is drawn in over the hottest zones at the top of the respective cylinders and passes down in equal quantity for each cylinder, sweeping over the surfaces of the gills, passing out by way of the squirrel cage air propeller P1, as shown in Fig. 17. A more precise detail of the design of the cylinders will be found in Fig. 14, presenting two of the cylinders of the four-cylinder motor during the process of erection. Referring back to Fig. 13 of the exhaust side of the motor, it will be observed that after the air passes into the jackets of the respective cylinders it comes out below into the space surrounding the motor case in the lower extremities of the cylinders, and the arrangement of the partitions P1, P2 and P3 is such that when the bonnet is put on, the same resting on the chassis frame F1, the space below P1 is rendered tight, and all the air that is moved by the propeller as shown in Fig. 17 must pass down through the jackets of the cylinders, and since the openings are equal in point of arc for the respective cylinders, the supply of air is regulated so that each of the cylinders is maintained under constant conditions of cooling. The exhaust manifolds M1 and M2 are connected up so that the exhaust from the cylinders is first into the manifolds M3 and M4, thence to the manifold M1, but when the pistons travel to a point near the bottom of the stroke, the auxiliary valves V1, V2, etc., there being one for each cylinder, are open, and it has been found by test that over 70 per cent. of all the exhaust passes out through these auxiliary valves, thence to the manifold M2, from there to the muffler, through the muffler piping, and away to the atmosphere from the muffler. Observation leads to the definite conclusion that the main exhaust valves in the heads of the cylinders are maintained well below the point of destructive distillation of the lubricating oil used, due to the fact that the greater portion of the heat passes out through the auxiliary valves, and in order that the latter will serve under such conditions efficaciously, nickel steel heads are used, whereas in the main exhaust valves a type of carbon steel is employed similar to that used in the inlet valves.

There are incidental gains that must be ascribed to the plan involving auxiliary exhaust valves; the heat is distributed uniformly over the cylinders; distortions due to differences in temperature are obviated, and the combustion chamber is maintained at a constant desired temperature, which has a marked effect upon the power delivered by the motor, due to the fact that the weight of mixture taken in per suction stroke.

Referring to Fig. 19 of the intake side of the motor, the carbureter manifold M1 connects, between the carbureter and the distributing manifold, with its branches M2 to the right and M3 to the left, connecting around both ways to M4, with connections leading therefrom to the respective cylinders. The magneto M5 is located inside of the steering gear G1, somewhat below the level of the chassis frame F1, and the wires W1 leading from the magneto are distributed to the respective spark plugs through the tube T1. The same care is taken to control the direction of travel of the cooling air in the intake side of the motor as is observed in the management of the same on the exhaust side as shown in Fig. 13. The valves are actuated by a system of rocker arms, they being in the heads of the cylinders, and the valve springs are placed in relatively cool situation so that they retain their tension permanently. The rocker arms and the method of lifting are clearly brought out in Fig. 13, and the springs show in the greatest prominence in Fig. 19.

Referring to Fig. 14, it is shown how the gills G1 are stopped off above the flanges of the auxiliary exhaust ports P1 and P2, but the gills extend down well below the auxiliary exhaust ports excepting where they are stopped off as a matter of necessity. The cylinders are cast individual, and are faced off so that they rest on the finished table T1 of the crankcase, and are held in place by studs S1, of which there are four for each cylinder. The crankcase is made in one piece, and one side is faced off F1 to accommodate the cover for the holes H1, H2, H3 and H4, through which access is gained to the main bearings M1 of the crankshaft, and the connecting rod bearings C1 as well. The crankshaft C2 is inserted through the end plates E1, which are held on by studs S2 so closely spaced that the seam is made oil-tight. These end plates carry the main bearings M2 and M3, they being sufficiently long to take the extra load imposed. There is one additional feature to be noted in connection with the end plates. They are cast integral with the motor arms M4 so that the strain due to the weight of the motor and the contortions of the chassis frame is carried by these arms, rather than by the aluminum crankcase.

The flywheel effect is varied between the four and the six-cylinder motors, being more in the four-cylinder types in order to afford the requisite equalizing moment, and a reduced value in the six-cylinder motors in view of the overlapping of the torque, and back of the squirrel-cage air propeller P1, Fig. 17, the multiple-disc clutch is assembled in its housing H1 with a suitable number of discs D, including a thrust block made up of thrust plates P2 and P3, and a plurality of balls in a retainer plate P4.

The general appearance of the carbureter is shown in Fig. 10; it is of the Franklin design. Referring to Fig. 15, attention is called to the nozzle standard N1, with three inserted nozzles N2, N3 and N4, through which the gasoline passes into the surrounding depression chamber, which is of the modified Venturi-tube type. The butterfly valve V1 controls the mixture en route to the motor, but in order to regulate the ratio of gasoline

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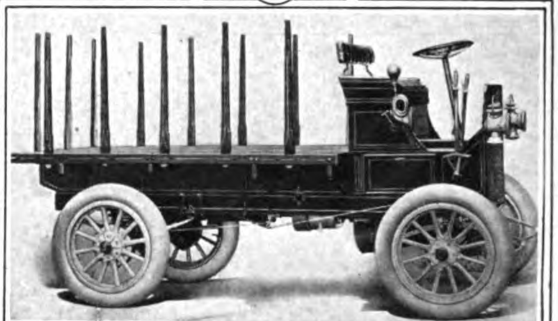

SPECIFICATIONS FOR FRANKLI

MODELS	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION	
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast.	Radiator	Pump	Magneto	
Model G	$1950	18.2	T. phaet	2	4	3¾	4	Single.	Air Cool.	Suc. Fan.	Bosch...	Non
Model G	1950	18.2	Tour'g..	4	4	3¾	4	Single.	Air Cool.	Suc. Fan.	Bosch...	Non
Model L-5	2400	18.2	Stake Pl	..	4	3¾	4	Single.	Air Cool.	Suc. Fan.	Bosch...	Non
Model L-5	2500	18.2	Express	..	4	3¾	4	Single.	Air Cool.	Suc. Fan.	Bosch...	Nor
Model L-5	3700	18.2	Om'bus	10-12	4	3¾	4	Single.	Air Cool.	Suc. Fan.	Bosch...	Nor
Model L-5	3500	18.2	Patrol..	10-12	4	3¾	4	Single.	Air Cool.	Suc. Fan.	Bosch...	Nor
Model M	2700	25.6	Tour'g..	5	4	4	4	Single.	Air Cool.	Suc. Fan.	Bosch...	Nor
Model M	3500	25.6	Limous.	7	4	4	4	Single.	Air Cool.	*Suc. Fan.	Bosch...	Nor
Model M	3500	25.6	Land't..	7	4	4	4	Single.	Air Cool.	Suc. Fan.	Bosch...	One
Model H	4500	48.6	Tour'g..	7	6	4½	4½	Single.	Air Cool.	Suc. Fan.	Bosch...	Nor
Model H	4500	48.6	Torp'o..	4	6	4½	4½	Single.	Air Cool.	Suc. Fan.	Bosch...	Nor
Model D	4400	38.4	Land't..	7	6	4	4	Single.	Air Cool.	Suc. Fan.	Bosch...	No
Model D	3500	38.4	Tour'g..	5	6	4	4	Single.	Air Cool.	Suc. Fan.	Bosch...	No
Model D	3500	38.4	Torp'o..	4	6	4	4	Single.	Air Cool.	Suc. Fan.	Bosch...	No
Model D	4400	38.4	Limous.	7	6	4	4	Single.	Air Cool.	Suc. Fan.	Bosch...	No

*Also

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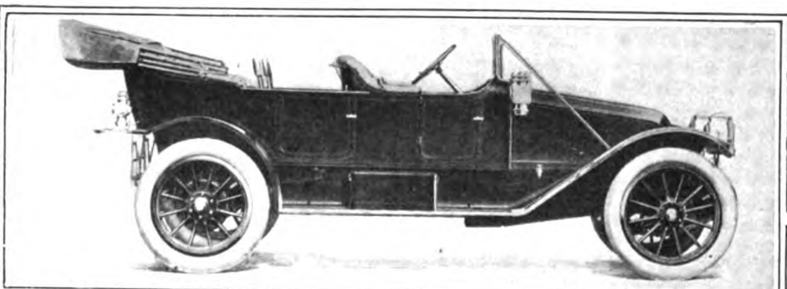

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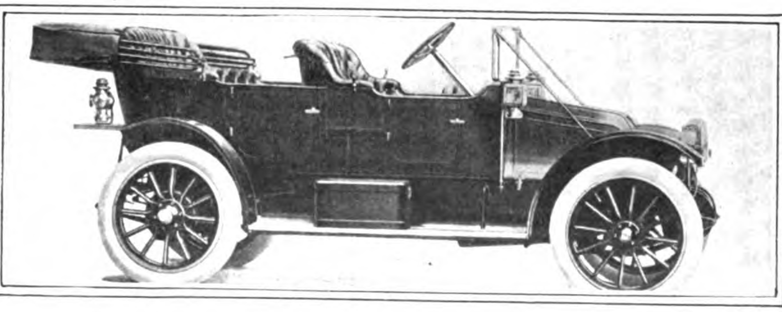

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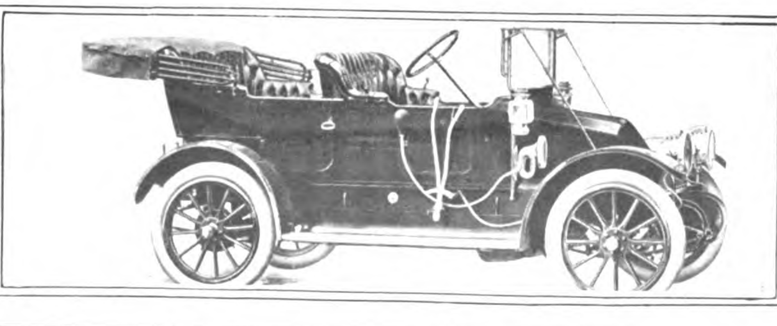


Fig. 1—Model H Open Body Touring Car Seatin Seven Passengers, Using the Six-Cylinder 48 Horsepower Motor

Fig. 2—Model M Open Body Touring Car Seatin Five Passengers, Using the Four-Cylinder 25 Horsepower Motor

Fig. 3—Model G Open Body Touring Car Seatir Four Passengers, Using the 18-Horsepower Fou Cylinder Motor

Fig. 4—Model L-5 Stake Platform Truck with Capacity of 2,000 Pounds, Using the Four-Cyli der 18-Horsepower Motor

Fig. 5—Model L-5 Passenger Bus Seating

CARS AS OFFERED FOR 1911

Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			TIRES	
	Type	Speeds	Location	Drive				Crankshaft	Trans-mis'n	Axle	Front	Rear
M'l disc..	Selecti'e.	3	Unit...	Shaft...	100	56	Wood...	Plain....	Ball....	Ball....	32x3½	32x4
M'l disc..	Selecti'e.	3	Motor..	Shaft...	100	56	Wood...	Plain....	Ball....	Ball....	32x3½	32x4
M'l disc..	Progress.	3	Unit...	Shaft...	94	56	Wood...	Plain....	Ball....	Roller.	36x5½	36x5½
M'l disc..	Progress.	3	Unit...	Shaft...	94	56	Wood...	Plain....	Ball....	Roller...	36x5½	36x5½
M'l disc..	Progress.	3	Unit...	Shaft...	94*	56	Wood...	Plain....	Ball....	Roller...	36x5½	36x5½
M'l disc..	Progress.	3	Unit...	Shaft...	96½	56	Wood...	Plain....	Ball....	Roller...	37x5	37x5
M'l disc..	Selecti'e.	3	Motor..	Shaft...	108	56	Wood...	Plain....	Ball....	Roller...	34x4	34x4½
M'l disc..	Selecti'e.	3	Motor..	Shaft...	108	56	Wood...	Plain....	Ball....	Roller...	34x4	34x4½
M'l disc..	Selecti'e.	3	Motor..	Shaft...	108	56	Wood...	Plain....	Ball....	Roller...	34x4	34x4½
M'l disc..	Selecti'e.	3	Motor..	Shaft...	133	56	Wood...	Plain....	Ball....	Roller...	37x5	38x5½
M'l disc..	Selecti'e.	3	Motor..	Shaft...	126	56	Wood...	Plain....	Ball....	Roller...	37x5	38x5½
M'l disc..	Selecti'e.	3	Motor..	Shaft...	123	56	Wood...	Plain....	Ball....	Roller...	36x4½	37x5
M'l disc..	Selecti'e.	3	Motor..	Shaft...	123	56	Wood...	Plain....	Ball....	Roller...	36x4½	37x5
M'l disc..	Selecti'e.	3	Motor..	Shaft...	123	56	Wood...	Plain...	Ball....	Roller...	36x4½	37x5
M'l disc..	Selecti'e.	3	Motor..	Shaft...	123	56	Wood...	Plain....	Ball....	Roller...	36x4½	37x5

†Chassis Weight.

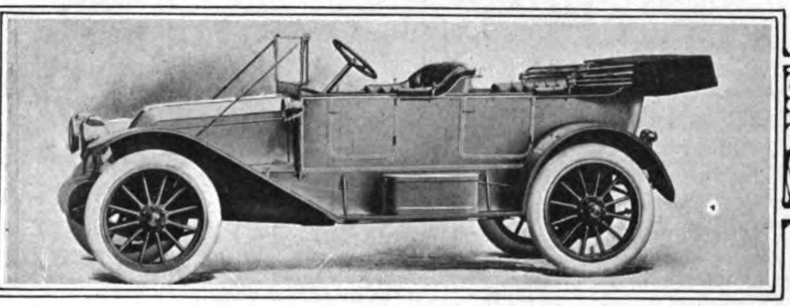
Fig. 6—Model L-5 Express Body Truck with a Capacity of 2,000 Pounds, Using the Four-Cylinder 18-Horsepower Motor

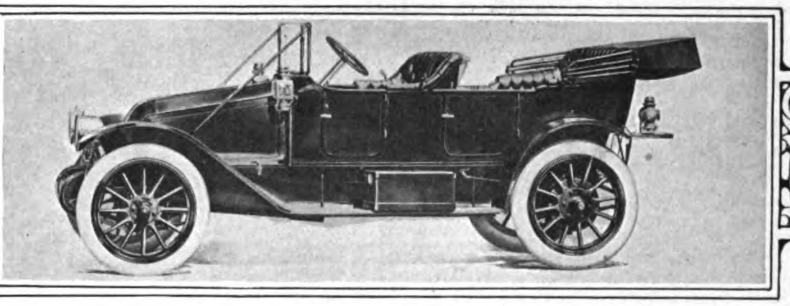
Fig. 7—Model D Torpedo Phaeton Seating Four Passengers, Using the Six-Cylinder 38-Horsepower Motor

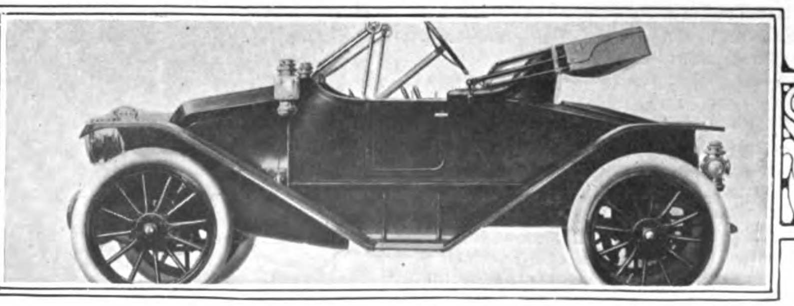
Fig. 8—Model D Open Body Touring Car Seating Five Passengers, Using the Six-Cylinder 38-Horsepower Motor

Fig. 9—Model G Torpedo Phaeton Seating Two Passengers, Using the Four-Cylinder 18-Horsepower Motor

sengers, Using Four-Cylinder 18-H. P. Motor.





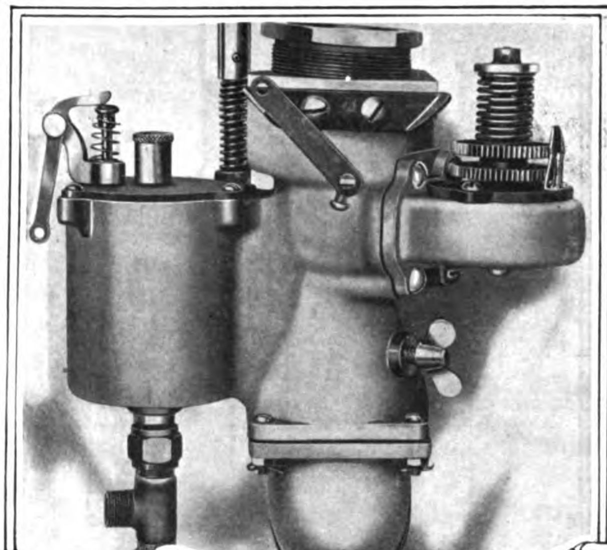


to air an auxiliary air valve is utilized, as shown in Fig. 16 at A1. This valve is of the automatic type, admitting air in response to the suction of the motor, with a means available for regulating the action of the valve, utilizing springs S1 and S2, the tension of which is fixed by manipulating the knurled thumb nuts N1 and N2. The flow of gasoline from the supply pipe P1 is into a filtering chamber C1, thence through the filter into the float bowl B1, under the control of the float F1, lifting the needle off its seat S3 when the gasoline falls below the level of the nozzle orifice by a predetermined amount. As a further means of regulating the flow of gasoline, the needle valve V1 may be regulated by means of the tumble shaft T1 with a universal joint U1. When it is desired to regulate the flow of gasoline this needle valve V1 is screwed down against its seat by turning the shaft P1, the latter extending up to the dash, with a handle to operate it.

The magneto, which is of the Bosch type, is shown in Fig. 12, disclosing a method of construction that obtains in the Franklin plant, utilizing the unit idea of assembling. The magneto M1, with its extension shaft S1, is driven by the pinion P1, under the control of a governor G1, assembled in the spider S2. On the 18-horsepower engine the spark is fixed, but the remaining models are equipped with a governor, the function of which is to automatically advance the spark, consistent with the requirement, in view of the speed, at any given instant.

The transmission gear as shown in Fig. 11 is of a light but stout construction, using special nickel steel cut from hammered bars for the gears and spindles, and subject to a specific heat-treatment to afford the requisite wearing qualities. A wide-faced brakedrum with external contracting bands B1 and B2 is included in the transmission unit, and Fig. 18 shows the details of the clutch and the method of taking up for wear with great clearness. One member of the universal joint U1 is nested within the brakedrum B, and the exterior of the crankcase C1 as shown affords an idea of the compactness of the transmission unit.

The tabulation as here offered affords specific information in relation to the respective models.



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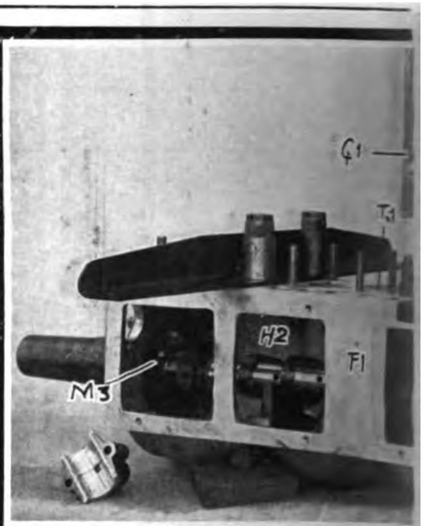

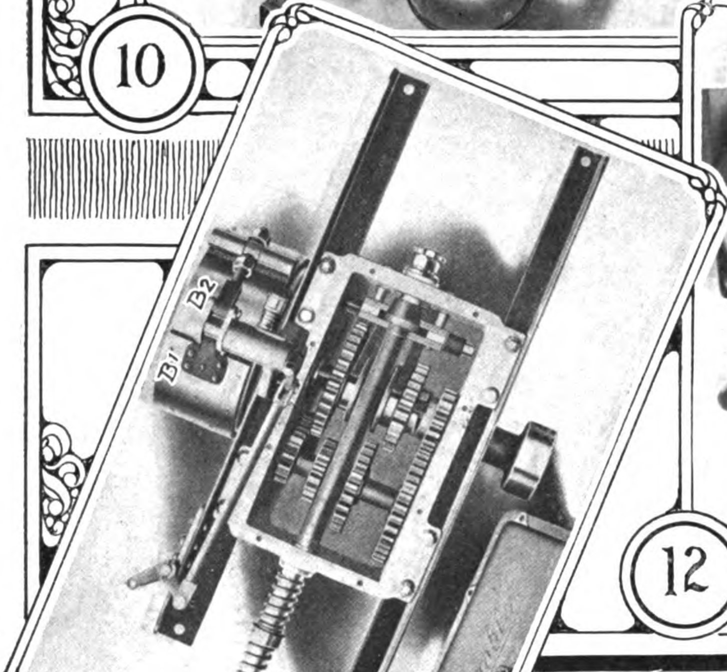

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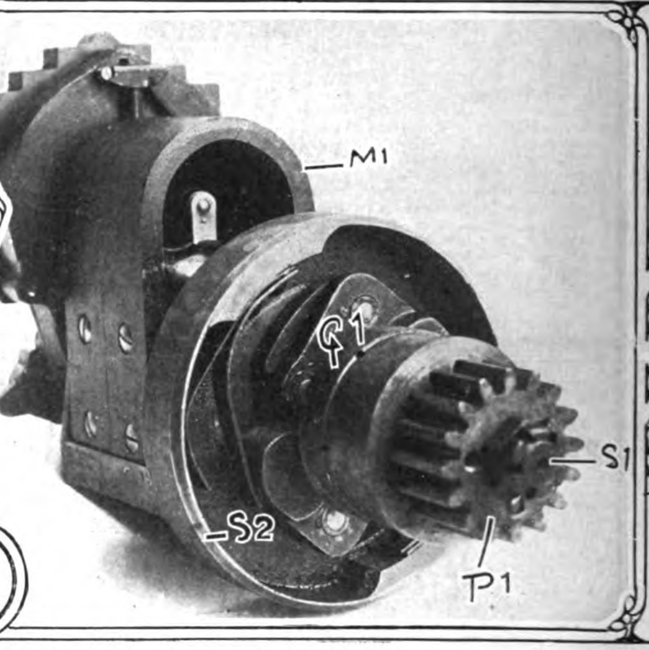

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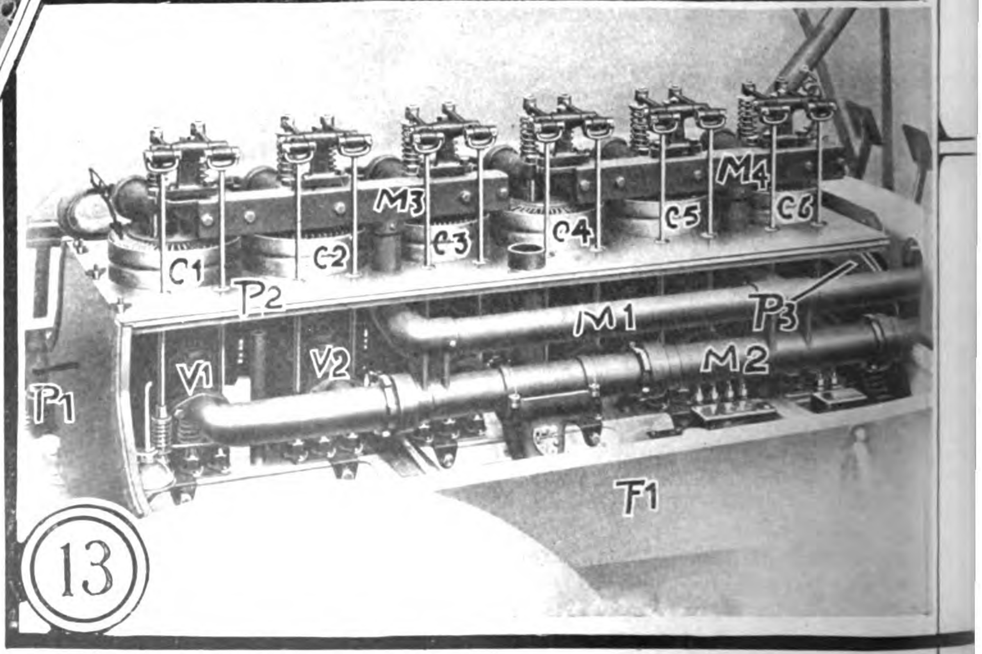

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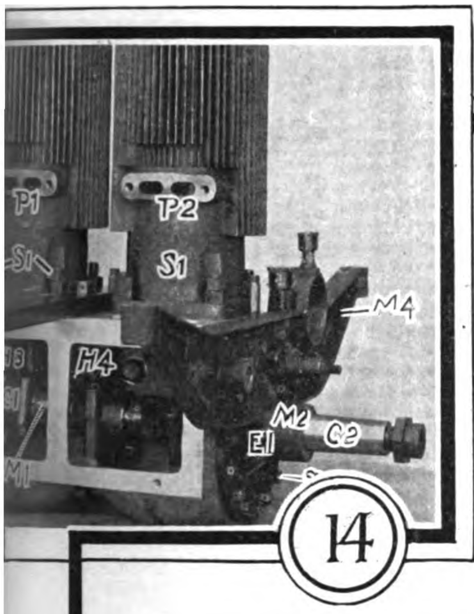
Fig. 10—The Franklin Type of Carbureter, Showing the General Appearance, with Adjustments for the Automatic Valve and Control Mechanisms

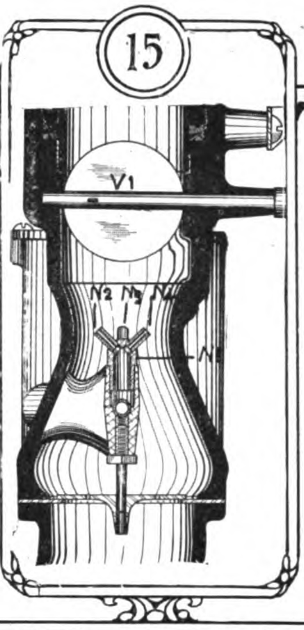
Fig. 11—Looking into the Three-Speed Selective Transmission Gear, Showing the Service Brake Attached

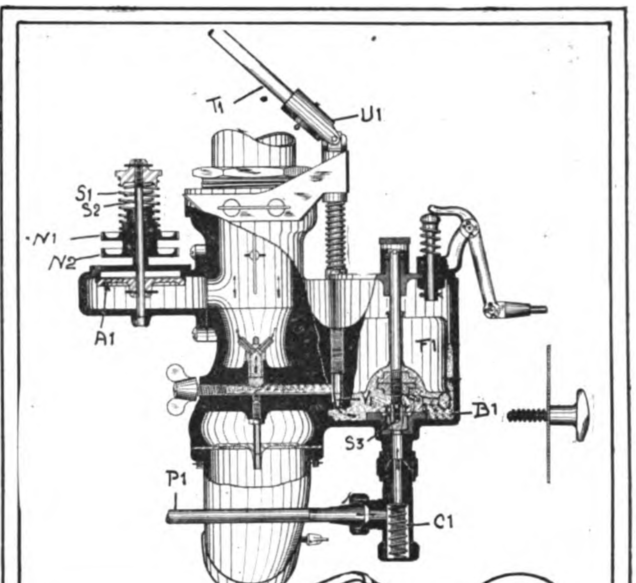
Fig. 12—Magneto Assembly, Presenting the Details of the Governor for Automatically Advancing the Spark

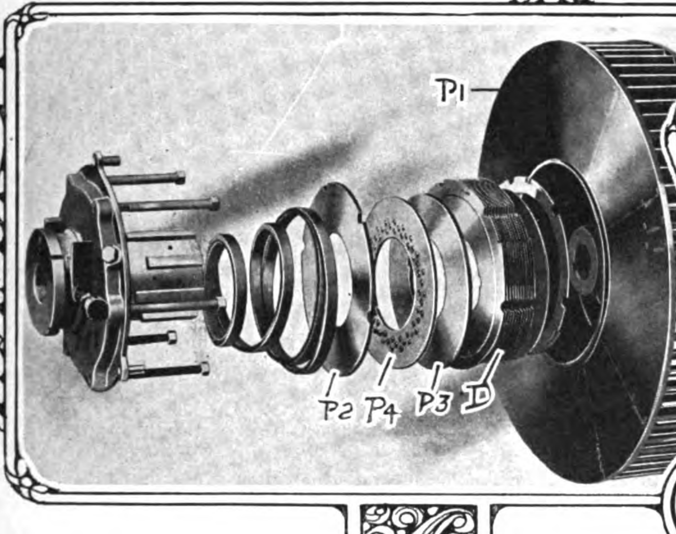
Fig. 13—Exhaust Side of the Six-Cylinder Air-Cooled Motor, Showing the Manifolds from the Initial and Supplementary Exhaust Valves

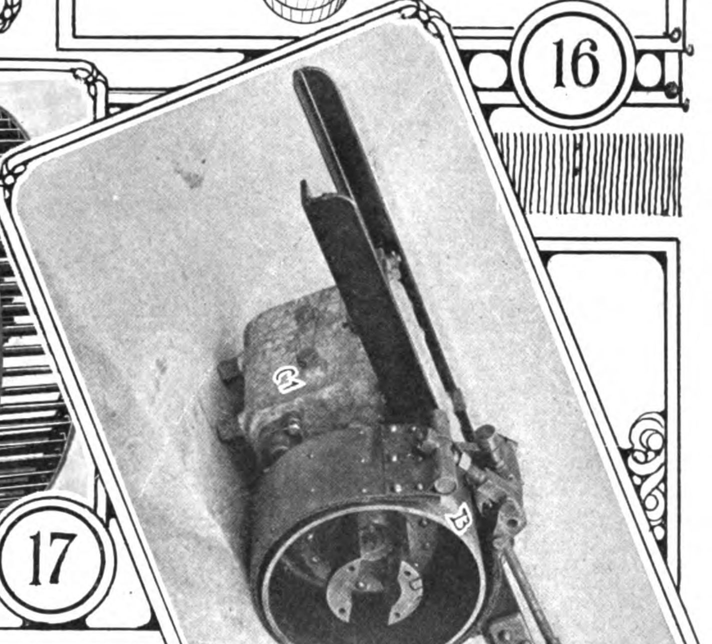
Fig. 14—Partly Assembled Four-Cylinder Motor with the Covers off, Disclosing the Crankshaft and Two of the Cylinders in Place











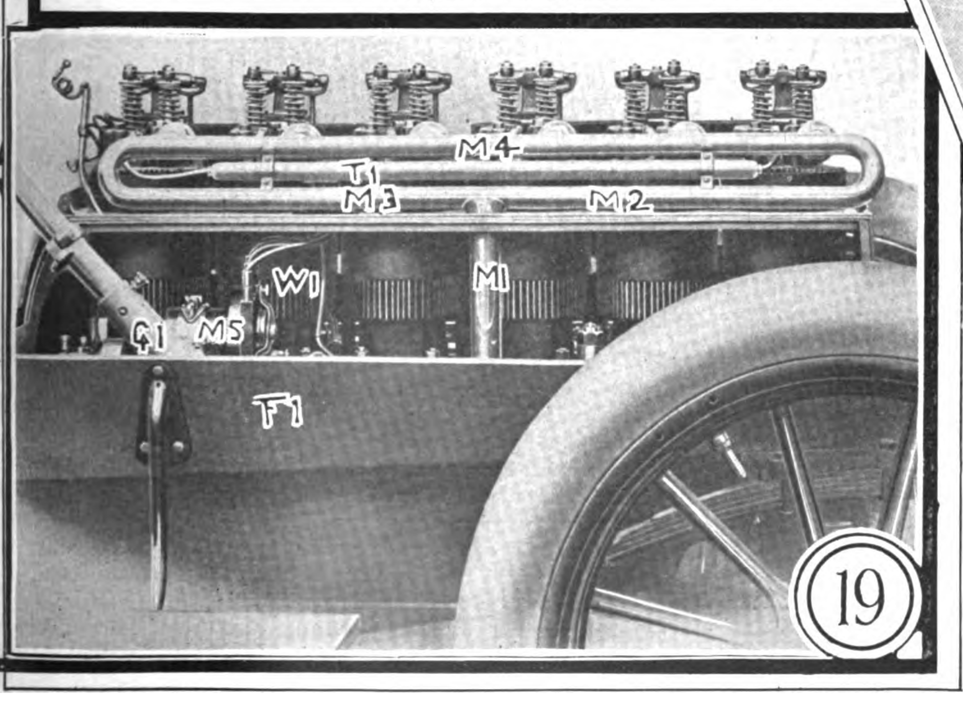


Fig. 15—Section of the Franklin Carbureter through the Multiple Jet Nozzle in the Plane of the Butterfly Valve

Fig. 16—Section of the Carbureter through the Float Bowl, and the Automatic Supplementary Valve

Fig. 17—Squirrel Cage Air Propeller Built Up in the Flywheel, and Multiple Disc Clutch Disassembled to Show the Component Parts

Fig. 18—Transmission Gear and Service Brake System in Perspective, Disclosing Details of the Braking Mechanism

Fig. 19—Intake Side of the Six-Cylinder Air-Cooled Motor, Showing the Location of the Magneto, Position of the Steering Gear, and the Intake Manifold

Stronger than the Shells

"OLD WALT," THE DEEP-SEA HACKMAN, TELLS WHAT HE LEARNED ABOUT THE SURE-THING MEN WHO RACE AUTOS ON THE BUSH CIRCUIT

"'TIS better to hev run and win than never to hev run at all," hummed Walter Thornton O'Brien, better known as "Old Walt," chauffeur and mechanician of one of the most popular deep-sea-going hacks along the White Way. "Old Walt" was indulging in a bit of double-handed work in front of Flaherty's free-lunch counter and paused between mouthfuls to moralize upon the general situation, particularly as it applies to the automobile.

Having finished all the lunch he thought the barkeep would allow him to consume, he stepped back from the counter and nodded toward Flaherty's end of the bar.

"What's that you're singing?" inquired Flaherty, wiping his hands on the bar towel and settling himself to hear the words of wisdom that he was sure would follow the opening.

"It's just a little song that's making a hit up the line," answered Walt. "I heard a fellow singing it to-night and I ast him the same question you ast me."

"What did he say?" asked the proprietor.

"Why, the fellow was one of those automobile guys and I nailed him at the station. He had a grip full of kale and had just landed from a train. He was happy about something and the first thing he sez to me is: 'Hey, kebbie,' sez he, 'drive me around the park a few times; I wants to stack up this junk.'

"'Must be pretty good in the Bush League,' I sez, and climbs on the box.

"I had taken him two miles when he tells me to pull up in front of Grogan's side door and asts me to have something. We get out and after a round or two he sez:

"'It's a measly shame to take the money. I'm J. Wilfred Wishington, the automobile race promotor,' he sez, and swells up his chest.

"I simply looks at him and feels nervous about the fare. You know, Flaherty, what a bum finish I made last year trying to collect from one of them promoters over on Long Island. I had to black his eyes and break his nose and two ribs before I found that he had been joy-riding without the necessary funds. I was almost tempted to use force in that case, but durn my tender heart, I just couldn't bring myself to it.

"'We certainly slipped one over,' chuckled my fare. 'Y'see the bush racing game is a frame-up most generally. All y'have to do is to get a sanction from the Three B's and invite the natives to participate. Then when some of the smart Alecs enter, all y'have to do is to slip one of your ringers into the event and there ain't a living chanct for the Alecs to collect any prize money. The durn fool public ain't wise yet, although the game is a little tougher than it was last year. They came pretty near handing us one a while ago, though. Y'see some jealous gink wants to annoy us and he slips in a big, strong car in the biggest race we've carded. He has it jiggered up like a dope-horse and disguised so that we didn't suspect nothing until post time. Our car was about twict as big as anything in the race except the ringer, but after the start we found without no sense of glad surprise that somebody had been trifling with our "extra agent of oxidation." In fact, we found that the agent had been slipped into the tanks of the ringer instead of into those of our car.

"'Well, they was off in a cloud of dust and the ringer shot out in front and led us for eight miles and going easy. It was a ten-mile race and we had to do something quick. So I take an axe-handle and runs up the stretch about to the last eighth pole and waits for the ringer.

"'I waved to the ringer to stop and he like a chump done so. I told him he was suspected of using some unfair means of giving his mixture a kick and held him until our mut came along and got such a lead on the last mile that the ringer didn't have a chanct.

"'The ringer was a sore butcher, but we needed the money and it would never do to let anybody get away with anything; which, by the way, they did not."

"Well, but what's the answer?" inquired Flaherty as Walt stiffened up and accosted a newcomer, evidently in a hurry, with: "Keb, sir?"

Saturated Mixtures of Air and Vapor

Primarily the weight of any vapor that air will hold will depend upon the temperature to which it is raised, and the higher the temperature the greater will be the volume, and the lower the weight of the air. A state of saturation will follow for each temperature, and while the volume of air will increase with increasing temperature, thus decreasing weight, even so, the capacity of the air for vapor will increase. The weight of vapor per hundred pounds of air, at different temperatures, may be determined in the manner as follows:

$$w = \frac{62.3 \times E}{29.92 - E} \times \frac{29.92}{p}$$

When,

E = elastic force of the vapor at the given temperature, in inches of mercury;

p = absolute pressure in inches of mercury, = 29.92 for the pressure of the atmosphere as ordinarily taken;

w = weight, in pounds, of vapor, for complete saturation, at the given temperature, at which the elastic force is determined.

The vapor carrying ability of the air is of the utmost importance in connection with carburetion, since, if the air is not in a state to hold vapor of gasoline to the desired extent, the results will fall off accordingly. The accompanying table will serve to render comparison potent, as well as to clearly indicate the reasons why atmospheric influences do affect the performance of cars in practice.

CAPACITY OF ATMOSPHERIC AIR FOR VAPOR AT DIFFERENT TEMPERATURES

Temperature in degrees Fahrenheit	Pounds per cu. ft. dry air	Pounds of vapor in one pound of air	Weight in pounds cu. ft.		
			Saturated Air	Vapor in air	A|V
32	0.0807	0.00379	0.0802	0.000304	263.7
42	0.0791	0.00561	0.0784	0.000440	178.18
52	0.0776	0.00819	0.0766	0.000627	122.
62	0.0761	0.01179	0.0747	0.000881	85.
72	0.0747	0.01680	0.0727	0.001221	59.5
82	0.0733	0.02361	0.0706	0.001667	42.3
92	0.0720	0.03289	0.0684	0.002250	30.3
102	0.0707	0.04547	0.0659	0.002997	22.

The ratio A to V clearly indicates the rate at which the air changes in its ability to sustain a vapor, and, too, the effect produced on the weight of vapor per cubic foot of the air.

A Timely Tip to the Tyro

When buying a car, insist upon magneto being fitted; there is nothing more annoying than to have to stop on account of a battery being run down. When the magneto is fitted there is often a secondary ignition one can fall back upon, and a good way to see that this is always in proper order is to light the side lamps by electricity and kerosene as well. The driver will have to see that the batteries are charged for his lights and at the same time you will be able to use the current for starting and in case of trouble with the magneto.

Engineering Section

DEVOTED TO THE DISCUSSION OF ENGINEERING PHASES OF AUTOMOBILING, INCLUDING DESIGNING AND CONSTRUCTION FEATURES OF PRODUCTS, AND INFORMATION TO AUTOISTS

ILLUSTRATING METHOD EMPLOYED IN BROACHING SQUARE HOLES IN SPROCKET WHEELS AND GEARS AT WOODS PLANT

WE are given to understand that God made man in the exact image of Himself and that nothing is hard or impossible to Him. Reasoning backwards, a process that every man should practice, there is nothing hard or impossible to man. In other words, if man is a replica of his Maker, and there is nothing hard or impossible to the Creator, then it is self-evident that there is nothing hard or impossible to man. This form of reasoning is taken for the time being to help inventors to appreciate the fact that they are not justified in neglecting to devise some form of mechanical wheel that will be quite satisfactory in automobile work; doing all that rubber is supposed to do, costing less to make and much less to maintain. It is far from a credit to the brains with which America is so liberally endowed that almost no progress is being made in this broad field, and, as the rubber men claim, the demand for that material, also of the better grades of cotton, is outstripping the supply, so that the needs of to-day are infinitesimal as compared with what they will be to-morrow, to say nothing about the influence of years upon this most important phase of industrial development.

When rubber strayed into the arts it brought with it a good example of the character of service that is wanted, but this material seems to labor under great difficulty in commercially imitating its own good example. If there is no possible chance of improvement on the length of service that rubber is capable of giving, then what is wanted is the service that rubber seems to render so efficaciously, the same to be delivered by some other material that will last longer under actual working conditions. The form of the new wheel may have to be quite different from all present forms; there may have to be many modifications of present practice, but all such matters are the merest details in the face of the main demand. Don't be discouraged; go to work.

Cantor Lectures on Motors

PROFESSOR W. WATSON, D.SC., F.R.S., DELIVERED THREE LECTURES ON THE GASOLINE MOTOR, OF WHICH THIS IS THE OPENING—BY PERMISSION OF THE ROYAL SOCIETY OF ARTS

IN these lectures I propose rather to deal with generalities and principles which are common to all petrol engines than to describe those details of construction which vary from one make of engine to another. I shall commence, however, by briefly describing in this first lecture some typical forms of engine, since a knowledge of the general construction will be required in order to follow some of the points with which I shall be dealing in the subsequent lectures.

Petrol engines, like all other internal-combustion engines, may be divided into two great classes, according as an explosion takes place in each cylinder once in every two revolutions of the crankshaft, or once in every revolution of the crankshaft. Engines belonging to the first of these classes are called four-cycle, or Otto-cycle engines, because the whole cycle of operations in each cylinder repeats itself after four strokes of the piston, two of these strokes taking place in one direction and two in the opposite direction, this corresponding to two complete revolutions of the crankshaft. Engines of the other class are called two-cycle engines, and here the complete cycle is repeated after two strokes of the piston.

Let us first consider the four-cycle engine. The sectional model which I exhibit represents what, up to within two years ago, appeared to be the type to which all engines of this class were settling down, and even now the vast majority of engines only differ from that shown in minor details. The peculiarity which distinguishes this type lies in the manner in which the admission of the explosive charge to the cylinder and the escape of the burnt products is governed, that is in the form of the valves. These valves, which are called poppet valves, are mushroom shaped, and they fit down on a conical seating formed by the cylinder wall. The valves are raised off their seats when required by means of cams on a shaft or shafts, which are connected, by gearing, to the crankshaft, and turn at half the speed of the crankshaft. In some engines the valves are in separate pockets, on opposite sides of the cylinder head, as shown in the model. In others the two valves are in the same pocket, while, finally, in some engines there are no valve pockets, but the valves are in the cylinder head.

Turning the crank of the model it will be observed that as the piston descends the inlet valve opens and allows a charge of petrol and air to be drawn into the cylinder. When the crank has slightly passed the lower dead center, the inlet valve closes, and then the rising piston compresses the charge. Just before the piston reaches the top of its stroke an electric spark is passed which ignites the charge. As we shall see, however, the mixture of air and petrol gets alight very slowly, so that before the pressure has appreciably increased, due to ignition, the piston will have reached the top of the stroke. While the piston is descending, the pressure developed by the burning of the charge does work, the downward pressure of the gases on the piston being converted into a turning movement on the crankshaft by the connecting rod and crank. A little before the piston reaches the bottom of its stroke, the exhaust valve is opened, and allows the hot gases to escape from the cylinder, the pressure in the cylinder rapidly falling from about 40 pounds per square inch to nearly atmospheric pressure. During the upstroke of the piston, the exhaust products remaining in the cylinder, are further expelled through the exhaust valve, which remains open throughout this stroke. The whole of the products of the explosion are not expelled, for the piston, when at the top of its stroke, leaves a space in the combustion head of the cylinder, which is about a fourth of the volume swept out by the piston. The cycle is now complete, and, as the piston descends, a fresh charge is drawn in and the whole process is repeated.

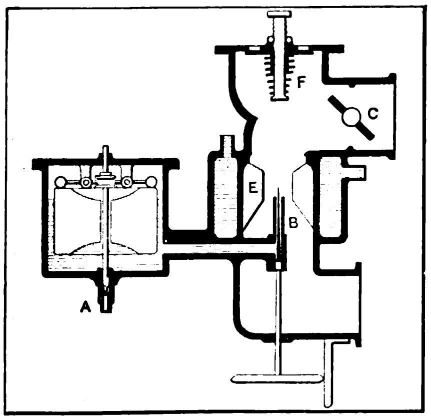


Fig. 1—Showing a simple form of jet carbureter

It seemed at one time as if the poppet valve would continue to be used exclusively, but the adoption, last year, of the Knight pattern of sleeve valve by the English Daimler Company, to the exclusion of the poppet valve, and the triumphant way in which two such engines came through a full-load test, lasting for 132 hours continuous run, conducted by the Royal Automobile Club, has not only silenced those who ridiculed the idea that there would be anything to compete with the poppet valve, but has started a number of designers and inventors testing other forms of valve. The section model exhibited, and the sectioned engine, which the Daimler Company have been good enough to lend me to show you this evening, will enable you to see how the Knight valve works. There are two sleeves inside the cylinder, the piston itself moving inside the inner sleeve. Ports are cut in the upper portions of the sleeves, those on one side for the inlet and those on the other for the exhaust. The sleeves are given a reciprocating motion by means of two eccentrics which are carried on a long shaft, which turns at half the speed of the crankshaft. As I rotate the crank (the piston starting at the top of its stroke), you will notice that the ports in the right of the sleeves register with the inlet port, thus allowing the charge to enter. By the time the piston has reached the bottom of the stroke, the ports in the sleeves no longer register, and, as the piston rises, communication is entirely cut off, so that the charge is compressed. When the piston has nearly reached the end of its path on the firing stroke, the ports on the left-hand sides of the sleeves register with the exhaust port, allowing the gases to escape, and this continues during the whole of the exhaust stroke. The peculiarity of this engine, to which I desire to call particular attention, is the large size of the inlet and exhaust ports. This can be clearly seen in the two separate sleeves which are exhibited. The size of the ports, and the uninterrupted path provided for the gases is a matter of very considerable importance.

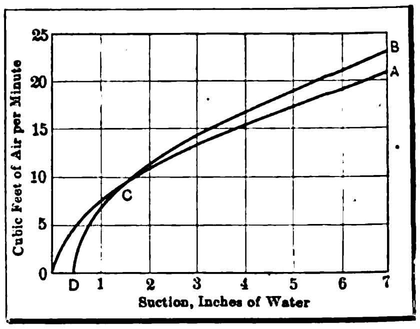


Fig. 2—Curve showing air taken in at different pressures

In the four-cylinder engines described above the cylinders and the crankcase to which they are attached are held fixed, while the crankshaft revolves, and with such a design it is necessary to provide a flywheel, even when four or six cylinders are used. In order to save the weight of the flywheel some designers of engines for aviation purposes have inverted the above-mentioned arrangement, the crankshaft being held stationary, while the cylinders and crankcase revolve, the propeller being either directly attached to the crankcase or driven by a sprocket carried by the crankcase. With this arrangement the cylinders themselves act as flywheel, so that the weight of a separate flywheel is avoided. Further, the movement of the cylinders through the air keeps them cool, so that no separate cooling arrangement, such as a waterjacket or fan, is required.

A diagrammatic section of the Gnome seven-cylinder rotary engine is shown, from which you will be able to form some idea of the general arrangements. Since, however, I have been unable to obtain drawings of the engine, the details shown must only be considered as more or less conjectural. It will be noticed that only one connecting rod has a bearing on the crankpin. The other connecting rods have bearings on this one connecting rod. The inlet valves are fitted to the top of the pistons, so that the charge enters the cylinders from the crankcase. The charge enters the crankcase through an axial hole down the stationary crankshaft. The exhaust valves are in the head of the combustion space, and are operated by levers and a camshaft, which turns at half the engine speed. It will be noticed that balance weights are provided to the valves. The object of these balance weights is to eliminate the effect of centrifugal force. The necessity for such balance weights will be obvious when I state that if the inlet valves weigh only 4 ounces, the centrifugal force at 1,200 revolutions per minute would amount to 160 pounds.

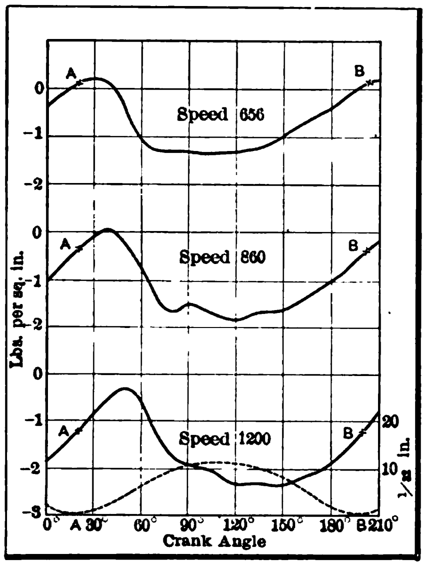


Fig. 3—Curve of pressure measured in the intake pipe of a four-cylinder engine

The great difficulty with the rotary type of engine seems to be that of securing adequate lubrication without an excessive consumption of oil. Thus, in a test of one Gnome engine, conducted by the French Automobile Club, the consumption of oil per horsepower-hour was 0.4 pounds, just half the consumption of petrol. An engine of the ordinary stationary cylinder type hardly ever requires more than about 0.05 pounds of lubricant per horsepower-hour, even when run continuously at full load.

The other diagram represents the two-cylinder, five-horsepower Granville rotary engine, which is of English design and manufacture. Here, as in the Gnome, the inlet valves are of the automatic type, *i. e.*, are opened by the fall of pressure in the cylinder on the induction stroke, and are situated in the piston head.

It is of interest to note that if the impulses due to the working strokes of the various cylinders are to be equally distributed throughout each rotation of the engine, it is necessary that there shall be an odd number of cylinders. This is at once evident if we remember that one complete cycle of each cylinder occupies two complete revolutions of the engine. Hence the firing of every alternate cylinder must follow, and. going round in this way, taking every cylinder, we must include all the cylinders while going twice round.

The two-cycle engines, in which there is a working stroke in each cylinder for each revolution of the crankshaft, act on a cycle which is the invention of Mr. Dugald Clerk. Although there are comparatively a small number of two-cycle petrol engines in use in England, in America there are a large number—chiefly in boats.

The principle on which most of these engines work is illustrated by means of the section model I now show. Let us suppose the piston to be at the top of the stroke, the combustion space containing a charge of inflammable mixture which has just been fired. The piston then descends on the working stroke and when near the end of the stroke it uncovers an exhaust port on the right-hand side of the model, allowing the exhaust gases to escape. During the descent of the piston the gases in the crankcase have been slightly compressed, and when, by its further descent, the piston uncovers a port connected with a short passage leading to the crankcase, these compressed gases flow through into the cylinder. The current of incoming gas is deflected upward by a baffle plate attached to the upper surface of the piston, and as they fill the cylinder they drive out most of the exhaust products through the exhaust port which is still open. As the piston rises it first covers the port leading to the crankcase and then the exhaust port. Further rise compresses the charge, which is ignited when the piston is nearly at the top of the stroke. During the rise of the piston a partial vacuum has been produced in the crankcase, and, when the piston is nearly at the top of its stroke, its lower edge uncovers a port connected to a carbureter, through which an explosive mixture rushes in to fill the crankcase. It is this explosive mixture which, after being compressed by the descending piston, passes into the cylinder through the inlet port when the piston reaches the lowest part of the stroke. It will be noticed that there are no valves in this engine, the piston itself performing the functions of both inlet and exhaust valve. The further consideration of this engine I will postpone till the next lecture, when I will exhibit some indicator diagrams, and discuss some of the advantages and disadvantages of this type. I may, however, draw attention to one of the chief difficulties in designing a satisfactory two-cycle engine. This is to prevent loss of the incoming charge through the exhaust port, and admixture of exhaust products with the fresh charge. In the case of the Lucas two-cycle engine, an attempt has been made to overcome this difficulty by dividing the cylinder into two parts; in each part there is a piston, the one piston uncovering the exhaust port and the other piston the inlet port. Since the combustion head is common to the two portions of the cylinder, the entering charge can blow right through, sweeping the exhaust products before it, and the liability to admixture between the fresh charge and the exhaust products, and the escape of the fresh charge through the exhaust port, is greatly diminished. Owing to the kindness of the Valveless Car Company I am able to exhibit a section model of the Lucas engine, from which the working of the engine will be clear.

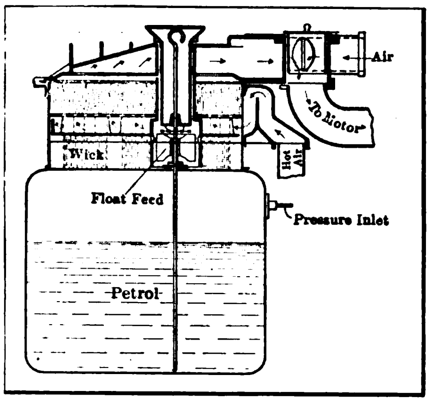


Fig. 4—Type of carbureter used on the Lanchester motor

Having briefly described the general construction of a petrol engine, it is necessary to consider, equally briefly, some of the auxiliary apparatus necessary before the engine can function. Chief among these is some arrangement for supplying an explosive mixture of air and petrol power, *i. e.*, a carbureter. Here, as before, I shall only take examples of the two types in common use in their most simple form. In the first class, which in practice is the most numerous, the petrol is supplied through a fine orifice or jet, and the air, as it passes to the cylinder, is sucked past this jet, and mingles with the petrol. A simple form of jet carbureter is shown diagrammatically, in section, in Fig. 1. The petrol reaches the carbureter by the pipe A and by means of a float and needle valve the level of the petrol in the jet B is kept normally a little below the top of the jet. The air enters at D, and at E passes a construction which surrounds the jet.

The air carrying the petrol, partly vaporized and partly as a fine spray, proceeds to the engine through the tube C. Owing to the reduction of pressure when the engine sucks air through C, and to the flow of the air past the jet, the petrol is projected in a stream through the jet, the amount of petrol flowing depending on the size of the hole and the amount of suction exerted. In the carbureter shown, the size of the orifice of the jet can be adjusted by advancing or retiring a needle which passes up through the center of the jet. With such a carbureter it is found that if the size of the jet is adjusted to give a correct mixture of air and petrol at low engine speeds, then at high engine speeds, when the velocity with which the air passes through the carbureter is much increased, the mixture becomes too rich in petrol. In this carbureter, however, as the suction increases, so that the difference in pressure between the induction pipe C and the external air increases, a valve F opens and admits air which has not passed the petrol jet, and this extra air mixes with the too rich mixture formed by the air which has entered at D, and so tends to keep the strength of the mixture supplied to the engine at the proper value. The necessity for the extra air at high engine speeds, *i. e.*, when the suction increases, is clearly shown by the curves given in Fig. 2. The curve O C A represents the number of cubic feet of air which will pass through a given carbureter for different values of the suction, that is of the pressure difference between the induction pipe and the external air. The curve D C B represents the amount of air which would have to pass in order that, when mixed with the petrol which was found to flow, it should give a correct mixture. It will be observed that till the suction amounted to nearly half an inch of water no petrol flowed. From this point up to a suction of about 1.7 inches the actual amount of air, as shown by the curve OC, is greater than the amount required to supply a correct mixture as shown by the curve D C, that is to say for engine speeds below that which will produce a suction of 1.7 inches of water, the mixture supplied is too weak. For higher engine speeds, on the other hand, it will be noticed that the mixture supplied is too rich. The meanings to be attached to the terms "too weak" and "too rich" will appear later when we are dealing with the combustion of air-petrol mixtures. The curves given in Fig. 2 were obtained when a constant suction was maintained, but when we come to attempt to apply these results to an engine, matters are further complicated by the fact that the suction exerted, even by a multi-cylinder engine, is by no means constant. This is clearly shown by the curves given in Fig. 3, which represent the pressures measured in the induction pipe of a four-cylinder engine at three speeds. The subject of the action of a jet carbureter is a most complex one, almost as complicated as are some carbureters on the market; and it will not be possible to consider it further in the time at my disposal.

The other type of carbureter is one in which the air, or at any rate part of it, as it passes into the induction pipe is drawn over a large surface of lamp wick, these wicks sucking up petrol from a reservoir. The best known carbureter of this type is that used on the Lanchester cars, and is shown in Fig. 4. Only part of the air passes over the wicks, this air being heated so as to assist the vaporization of the petrol. This air becomes heavily charged with petrol vapor, and is mixed with a certain proportion of cold air, which enters by the port marked "Air" on the figure. The advantage of this form of carbureter is that it is much simpler to regulate the constancy of the proportions of the hot petrol-charged air to the cold air, as we are dealing in each case with a gas, than to regulate the constancy of the proportion of liquid petrol flowing through a narrow orifice, to that of the air, which is a gas, for the laws of flow of gases and liquids are by no means the same.

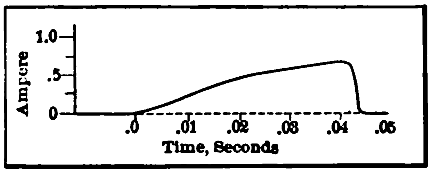


Fig. 5—Oscillograph curve of spark-coil performance

Since a considerable proportion of the petrol is vaporized in the carbureter and induction pipe, owing to the latent heat of the vapor, unless some method of heating is employed the temperature of the carbureter will soon fall below zero. That the vaporization of petrol will cause such a fall in temperature I can show by blowing air through some petrol contained in a flask. The temperature soon falls below zero, which fact is shown by the flask freezing a little water on which it stands, so that a block of wood adheres to the flask. The objection to the excessive cooling of the carbureter is that the vaporization of the petrol is retarded, so that an increased quantity of petrol is sucked into the cylinder in the liquid condition, and the presence of this liquid petrol probably increases the rate at which a crust of carbon forms in the combustion head. Further, if the temperature of the carbureter sinks below zero, the moisture, which is always contained in the air, becomes deposited as snow, and the carbureter becomes choked. The necessary heat can be supplied either by providing the carbureter with a jacket, through which some of the circulating water, or exhaust gas, is passed, or by heating the air before it enters the carbureter. This is generally secured by taking the air from the neighborhood of the exhaust pipe.

I shall proceed to show one or two experiments to illustrate the principles which are involved in firing the charge in the cylinder of a gasoline engine. When I pass an electric current through this coil, not only is the iron core magnetized, but also what is called a magnetic field is set up in the space surrounding the coil. The presence of such a field is indicated by the movement of a compass needle placed at some little distance from the coil. Now to move such a compass needle work must be done, and in the case before us this work has been done by the battery which has been employed to produce the current in the coil. Not only has the battery exerted a force on the compass needle, the effect of which is visible to us, but it has also produced a state of strain throughout the surrounding space, and has thus done work, although by our senses we are unable to perceive it. I can, however, make the energy which has been stored up in the medium in this way evident by suddenly breaking the circuit, so that a current no longer passes, when the energy stored up is returned to the coil, and, as a result, produces very considerable electrical effects. Thus, in this experiment the two ends of the coil are joined together through an electric lamp which to make it glow brightly would require a much higher voltage than exists while the current is passing. When, however, I break the circuit, so as to cut the battery out entirely, the energy in the field, which returns to the coil, is sufficiently great to cause the filament to flash out very brightly. That this effect is due to the energy stored in the field I can at once show, for the windings of the coil are double, and I can cause the current in the two halves either to circulate in the same direction or in opposite directions. In the experiment just shown they circulated in the same direction. I will now reverse the current in one of the windings. We now have the same current flowing as before and just as many turns of wire. There is no magnetic field, however, the iron core is not magnetized and the compass needle is not affected. On breaking the current the lamp does not glow.

The same effect can be shown by simply breaking the circuit in such a way that you can see the spark produced. With the current circulating in the same direction in both sets of windings a bright spark is produced. If, however, the direction of the current in one winding is reversed there is hardly any spark. This coil, and the spark which occurs when the circuit is broken, is an example of what is called the low-tension system of ignition. In this system there is a movable contact inside the engine cylinder, and by means of a cam or some such device, just before the piston reaches the top of the stroke on the compression, a circuit containing a battery and coil is first completed and then suddenly broken by the separation of the movable contact within the cylinder, the spark produced firing the charge.

The kind of time the current takes to reach its maximum value in an ordinary low-tension coil is shown in Fig. 5, which gives the curve obtained by Prof. F. W. Springer by means of an oscillograph. It will be seen that the current was still rising after 0.04 seconds.

(To be continued)

In the Operation of a Car

THE STEERING WHEEL SWITCH; USING THE MOTOR IN STOPPING THE CAR; OTHER MEASURES FOR SAFE DRIVING. BY JAMES S. MADISON

ANYTHING which adds to the comfort or pleasure of the man or woman behind the wheel or anything which increases one's skill or tends to make the control of the car more perfect, is a boon for which we should be cordially grateful. Of all the accessories and additions which an owner may purchase for his car there are not many that are capable of giving him so much satisfaction as to have the control of the ignition under his thumb on the steering post or on one of the cross-pieces of the wheel. While many articles have been written directing attention to the obvious advantages of this simple device, it has been adopted by surprisingly few. Its merits and advantages are so pronounced that it is rather remarkable that its adoption has not become general. A recent count of automobiles passing a certain point on the Jersey Coast showed that out of 100 only 3 had the switch on the steering post or wheel.

With the present style switches of the lever, plug or knife variety, which are usually mounted on the dash, it is always necessary, in order to cut off the ignition at any moment, to lean forward, in what is often an uncomfortable position, and throw the switch with one hand, leaving the other free to steer the car if it is moving, or to remove one foot from the clutch or brake-pedal and throw the switch if it be of the lever or knife variety. If it be of the old-fashioned plug type, the hand must necessarily be used.

It is an excellent practice, as the initiated know, to use the engine for braking purposes on all possible occasions. The tendency to brake with the engine is a growing one. No driver should be satisfied with his progress until he has learned to use his engine as a brake regularly and consistently—this is one of the elements of skillful driving. With the control of the ignition on the steering post or wheel this becomes a simple matter, since the ignition is cut off or turned on with the thumb or a finger with the same ease that the spark or throttle lever is advanced or retarded. The definite advantages in having the mechanism controlling the ignition so conveniently placed that it requires no effort to manipulate it, are these:

1. In coasting down a hill, even a short one of not more than 50 yards, the ignition may be cut off, leaving the clutch engaged. This will cause the explosions to cease, but the fan and pump and all other moving parts actuated by the engine will continue in motion and perform their functions just as they do when the explosions are driving the pistons out and in. This gives the engine an excellent opportunity to cool off. When the ignition is cut off one should not fail to close the throttle, otherwise an explosive mixture will be drawn into the cylinders and transferred to the muffler, which may be easily damaged by the explosion which would follow on turning on the current. This is an economical procedure in so far as it saves gasoline, oil and current (unless one is running on a magneto). The disadvantage is that when the clutch is let in, near the bottom of the hill, there is a certain jar to the chassis and body, and a certain wear of the clutch which is avoided by leaving it engaged and cutting off the ignition.

2. In going along a crowded city street it is sometimes necessary to throw out the clutch and apply the brake many times before the car is clear of the congested traffic, or to reduce the speed by letting the clutch slip. The same object may frequently be accomplished more easily and economically by throwing the ignition off and on as often as may be necessary.

3. In descending a hill with a right-angle turn at the bottom, a condition frequently met in city or town streets, the turn may be easily and safely taken with the ignition off.

There are other advantages of the same kind that will readily suggest themselves to the careful driver.

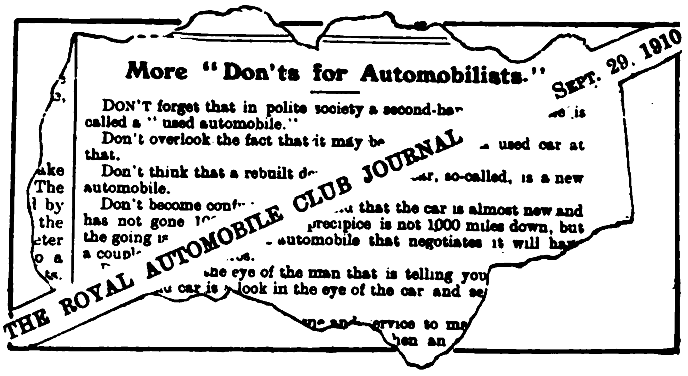
To attach the device to the steering column proceed as follows: Select a suitable switch of any convenient size of the lever type, at any price the buyer wishes to pay from 25 cents up. This should be mounted on a block of wood about 2 1-2 x 3 x 5-16 inches, the back of which is hollowed out so that it will closely fit the steering post. The switch is fastened to the block by three small brass screws. The block is secured to the post by means of a piece of tin, sheet brass, or copper (which has been bent carefully to fit the post) fastened to the block by four small brass screws. The piece of metal is then painted black unless the steering column should be nickel-plated, in which case it would be desirable to use a piece of nickeled brass or aluminum. The binding posts of the switch are then connected to the magneto or battery, as the case may be, by a good quality of waterproofed insulated wire, of inconspicuous color, which is wrapped two or three times around the steering column. If one wishes to avoid the bother of making a switch for the wheel or post, he will find very excellent ones of neat design on the market costing from $3.50 to $5.

The only disadvantage the writer has found from using this device was owing to the fact that the bulb of the horn on his car is also fastened on the steering post, in order that it may be reached more easily than if it were at the side. It is necessary at times to leave the car stand for an hour or more in exposed places. On two occasions the passing small boys in surreptitiously honking the horn, inadvertently or otherwise threw on the switch, with disastrous results to the battery. In order to eliminate this trouble, a common "Ideal" knife-blade switch, costing 25 cents, was screwed on the battery box; one of the lead wires was cut and the two ends connected to the binding posts of the switch. When it is necessary now to leave the car stand unprotected for any length of time, the knife blade switch is left open.

If a car provided with such a switch should be caught without the top in a rainstorm, it would be necessary to protect the exposed parts of the switch from the rain in order to prevent faulty ignition.

Took Permission to Publish for Granted

There are two sides to every question, and, while the giving of credit may convey a flattery, it might even be construed to the contrary. But when the plagiarist exhibits absent-mindedness, it is the sincerest of flattery, for then it is plain, on the face of it, that he wishes to retain the credit for himself.



More "Don'ts for Automobilists."

SEPT. 29. 1910

DON'T forget that in polite society a second-ha ... is called a "used automobile."

Don't overlook the fact that it may be ... used car at that.

Don't think that a rebuilt d ... ar, so-called, is a new automobile.

Don't become conf ... u that the car is almost new and has not gone 10 ... precipice is not 1000 miles down, but the going is ... automobile that negotiates it will ha a coupl ... es.

... the eye of the man that is telling you ... u car is ... look in the eye of the car and se

... ne and ervice to m ... hen an

THE ROYAL AUTOMOBILE CLUB JOURNAL

1910 Edison Storage Battery

SECOND INSTALLMENT—DEALING WITH WALTER E. HOLLAND'S PAPER AS PRESENTED BEFORE THE TWENTY-SIXTH ANNUAL MEETING OF THE ASSOCIATION OF EDISON ILLUMINATING COMPANIES, HELD AT FRONTENAC, THOUSAND ISLANDS, N. Y., SEPTEMBER 6, 7 AND 8, 1910

INNUMERABLE repetitions of tests have shown that the cells as commercially manufactured have surprisingly uniform capacity and that under any similar conditions, no matter how abnormal, different cells will give practically identical results. The same characteristic of constancy of behavior applies also to the different sizes of cell, and at comparative rates they have similar characteristics, except for inconsequential variations in heating due to differences of radiating surface. This is shown in the curves of Fig. 4.

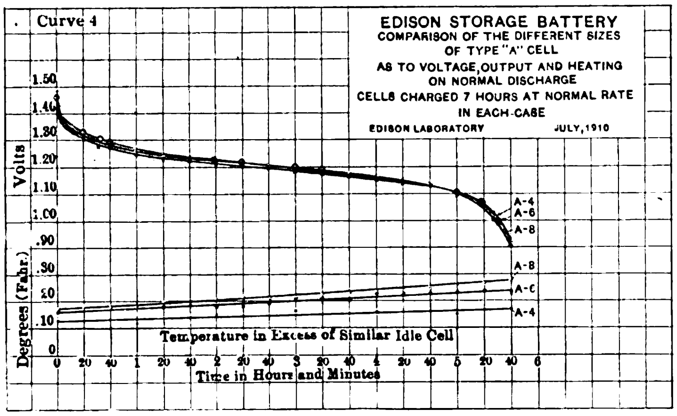


Fig. 4—Showing effect of temperature upon the capacity of the different sizes of battery

In work with the Edison battery the necessity of some reliable and convenient method of analyzing voltage curves, to determine which electrode was limiting the capacity or causing changes of voltage, was early appreciated. The only scheme which had then been tried was the use of the metal container of the cell as a third electrode in the same manner that cadmium is used in lead cell tests. This was a most convenient scheme, but the readings so taken were inconstant and not at all reliable on account of polarization which would be set up at the surface of the nickel-plated steel, even by the infinitesimal current taken by a high-resistance voltmeter.

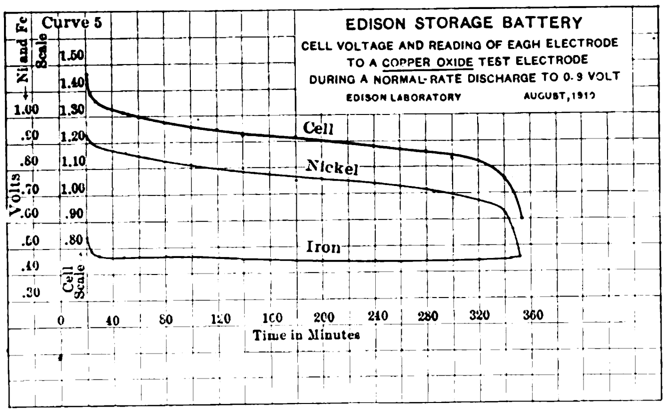


Fig. 5—Cell voltage of the respective electrodes using a copper oxide electrode for testing purposes

The author has devised several successful schemes to the end in view. One of these is theoretically applicable to any kind of primary or secondary battery, and practically also where suitable means exist.

The first device tried was that of a duplicate charged cell standing idle alongside the cell under test and having electrolytic connection with it through an inverted U-tube. Voltage readings would be taken from the positive of the cell under test to the negative of the auxiliary cell, and from the negative of the working cell to the positive of the auxiliary cell. The voltage of an idle charged cell remains practically constant over long periods of time, so variations in the readings thus taken must be caused entirely by the working electrodes, and the resultant curves would show the independent behavior of these. This method proved reliable, but was inconvenient; and in the case of batteries in actual service could hardly be employed at all. The best scheme devised—one which has been used many years at the Edison laboratory and has been successfully applied to various kinds of battery, including the lead storage battery—may be described in general terms as follows: The use as a third electrode of a partially reduced oxide which will undergo electrolytic oxidation or reduction in the given electrolyte without polarization. That the oxide should also be insoluble in the electrolyte is of course highly desirable, as its use cannot then contaminate the cell in any way. The oxide must be mounted in a suitable conductive support, and the electrode is preferably encased in perforated hard rubber so that it may be rested on the plate tops with impunity. For the common electrolytes substances fulfilling the above requirements are numerous, but those which the author has found best adapted to use are: lead peroxide for sulphuric acid batteries, and either cupric oxide or the high nickel oxide of a charged Edison positive for all alkaline batteries.

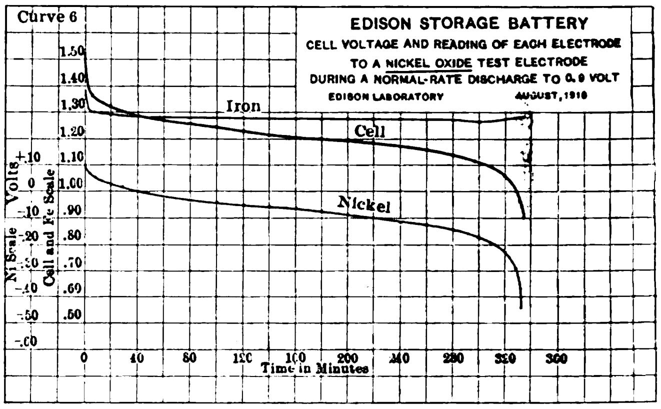


Fig. 6—Cell voltage of the respective electrodes using a nickel oxide electrode for testing purposes

A copper-oxide test electrode can be prepared very easily from a plate of agglomerated cupric oxide such as is sold for use in the Lalande primary battery. A small block cut from a new plate of this kind is bound with fine copper wire and suitably insulated. It is then made cathode, using a passive anode, in a jar of the alkaline electrolyte—a medium current being passed for an hour or so, or until about one-fifth of the block has been reduced to metallic copper. After this treatment the electrode should be allowed to stand in electrolyte for a few days fo "season"—that is, to become stable in voltage. The electrode is then ready for use and will remain in working condition almost indefinitely, provided it be kept in dilute electrolyte when not in use. If exposed to the air for very long the reduced layer of metallic copper will reoxidize. Cupric oxide is very slightly soluble in strong alkaline solutions; but in the case of the Edison battery it has been found to have no deleterious effect, even when present in large amount, and can be used with perfect safety.

Test electrodes of nickel peroxide and lead peroxide are best made from portions of positive plate of the respective batteries in which they are used. Connection should be made to each by metal of the same kind as that used for support of the active material, and perforated rubber insulation should be provided. These electrodes are prepared for use by fully charging and partially discharging them. They should also be seasoned by standing in electrolyte, as in the case of copper oxide.

Test electrodes of nickel peroxide and of lead peroxide have been found to give excellent results in tests of the Edison and the lead battery, respectively, and have the advantage of being indigenous to those batteries so that no foreign substance is introduced. Peroxide of lead also has the advantage over cadmium of not requiring so much care to keep in condition; its properties do not seem to be affected, even by a drying out in the air.

Fig. 5 shows a normal rate discharge of an Edison cell with independent curves of the electrodes taken by means of a copper-oxide test electrode, and Fig. 6 shows the same taken with a nickel-oxide test electrode. Fig. 7 shows typical nickel-oxide readings for a normal charge.

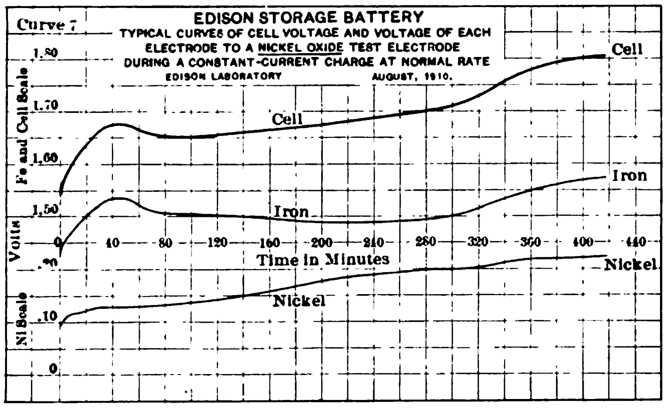


Fig. 7—Typical curve of cell voltage using a nickel-oxide electrode for testing purposes

The fixing of the normal charge and discharge rates and normal length of charge of the Edison battery is mostly arbitrary. The "normal" current rates given were determined by a careful consideration of the factors of I^2R loss in cell and the resultant heating, of time rates of charge and discharge, and of output; and were presumed to strike the best balance between the governing factors to suit the conditions of vehicle practice. Seven hours is taken as the normal length of a charge at normal rate simply because at this point the output and efficiency were judged to be in the best relation for average practice. These ratings are not obligatory, but the length of charge may be varied between zero and infinity as desired, and should be varied according to the output required in any particular service. The rates of charge and discharge are optional also when just two points are kept in mind. The first is that very low charge rates will not completely reduce—that is, charge—the iron element, and the resultant discharge will be anomalous as to voltage (see Fig. 8). No permanent injury has ever been known to come from low-rate charging, and the discharge will usually recover normal characteristics when the cell is again worked regularly at normal rate. If not, then overcharging at normal rate and discharging to complete exhaustion will certainly re-establish normal conditions. Secondly, it should be kept in mind that although excessive heating does no immediately apparent harm to the battery, continuous working at high temperature will have an injurious effect tending to shorten its life.

What the true ohmic resistance of a storage cell is need not be known; the virtual internal resistance, that is, the factor which is effective in causing internal dissipation of energy, is the value of practical importance. The prescribed method of finding this is to momentarily open the switch at intervals during a discharge and read the electromotive force; then the difference between the value thus found and the potential difference while current is passing would represent the I R drop in the cell due to its effective resistance, and this value divided by the current rate would give the virtual internal resistance at the given point of discharge. This method is hard to apply because when the switch is opened the interruption of current changes the electromotive force to such an extent that the voltmeter needle continues to rise for some time afterward, and the true value of the electromotive force is very difficult to determine.

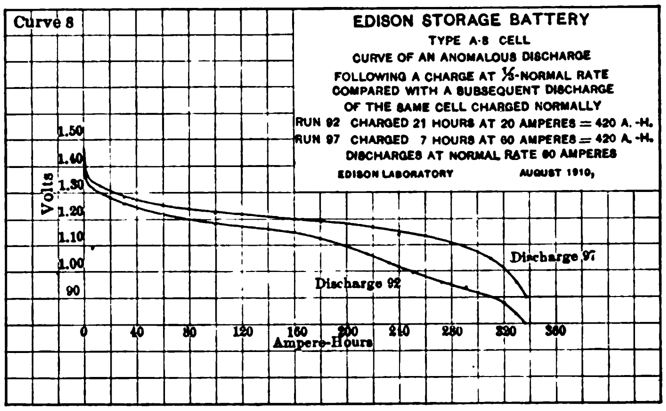


Fig. 8—Curve of an anomalous discharge after a charge at 1-3 normal rate, making comparisons

A better scheme is to simply reduce the current to a lower value instead of interrupting it entirely, and dividing the difference between the voltages at the two rates by the change of current. Obviously the same result can be achieved through momentary increases of current; and to get the most reliable test the methods should be combined and the current worked both ways on the same discharge. Thus, taking the concrete case of an "A6" cell discharging at 45 amperes, the current should be changed to 15 amperes and 75 amperes alternately for, say, half-minute periods every twenty or thirty minutes. Then the difference between the voltage at 45 amperes and that at either the low or high rate, divided by 30 amperes would give the true virtual internal resistance for the particular conditions. Fig. 9 is a curve of internal resistance obtained by this method; it shows the average values for an Edison cell discharging at normal rate under ordinary conditions.

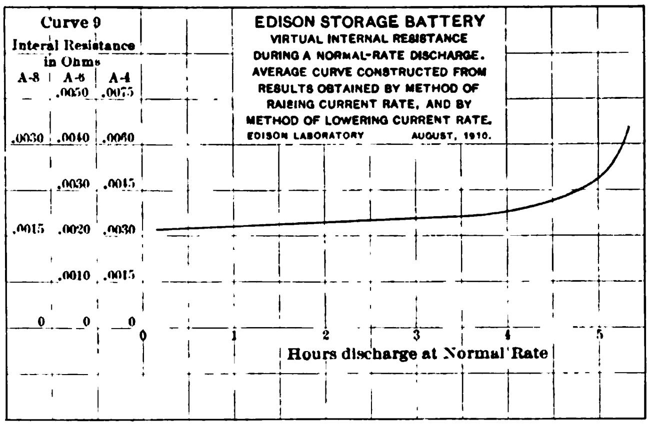


Fig. 9—Showing virtual internal resistance determinations during a normal rate discharge

Letters

DISCUSSING MATTERS OF INTEREST TO USERS OF AUTOMOBILES; LOCATING ENGINE KNOCKS; TO PREVENT INJURY TO THE LEGS IN ACCIDENTS IN SCUTTLE-DASH CARS; PEINING PISTON RINGS; A REMEDY FOR WORN BRAKE BLOCKS, ETC.

Locating an Engine Knock

Editor The Automobile:

[2,405]—I wonder if you can aid me in identifying and correcting a knock in my engine. The knock is regular, occurring in one cylinder. It cannot be in the ignition, as it is distinctly noticeable after cutting off the ignition when stopping the car; nor in the compression, which tests all right in all cylinders. It is more noticeable when the throttle is well open than when it is nearly closed.

There is also a pronounced "hissing" sound in one cylinder when the car is running and the engine is at all labored. This may have something to do with the knock, but it is doubtful. It is less noticeable when the throttle is closed down than when wider open with the engine running slow.

Mesilla Park, N. M. Francis E. Lester.

This knock may be due to a number of different causes, and we are inclined to think that the noise is in the cam shaft. On some of the earlier models of this make of motor the retaining screw in front camshaft bearings wore slightly and if there is any end play in camshaft it would knock against the screw, causing a very distinct and regular knocking noise. This can be overcome by discarding the use of this screw and substituting an automatic thrust take up fitted to the front end of the camshaft. This consists of a little bronze boss with ball bearing and spring adjustment. If this is fitted, however, the knock may be due to a ring slap, which can be overcome by slightly slotting the tops of the rings.

In looking for trouble of this sort in a motor it is half the battle to make up your mind that you are going to locate it. If you feel whipped from the start it is a moral certainty that the knock will have the best of you from the start to the finish.

Scuttle Dashes and Accidents

Editor The Automobile:

[2,406]—In the event of an accident to a car that is fitted with a scuttle dash, what possibility is there of the passenger and driver seated in the front clearing the metal covering without injury to their legs? One often hears of accidents where the passengers are thrown clear and coming off with only slight bruises.

G. T. Melson.

York, Pa.

The scuttle dash is being used for two reasons—one to improve the lines of the car and the second with the addition of front doors to keep the wind from the lower parts of the body. It would be useful to have a leather pad fitted in the manner shown in the accompanying sketch (Fig. 5); this would soften the impact in case of collision.

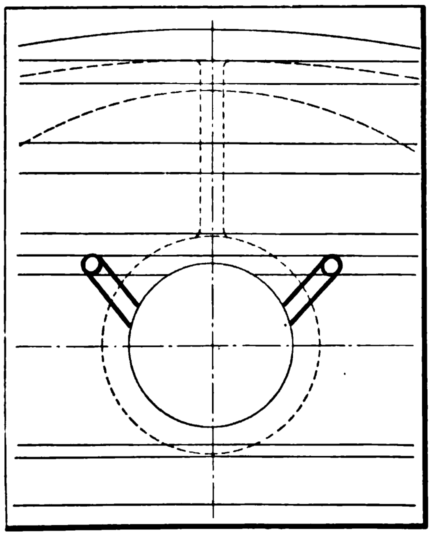


Fig. 1—Method of overcoming insufficient lubrication of wrist pin

A Trio of Pertinent Inquiries

Editor The Automobile:

[2,407]—Being a subscriber of your magazine, I would like to ask some questions:

1. Why does a motor lose power as it is speeded up above 1,800 revolutions per minute?
2. What do you think of a worm-gear drive for a magneto as used on Rutenber motors, the worm being on timer shaft?
3. Which do you think is better, valves on one side or opposite sides? Give reasons. Fred Wells.

New York.

1. Motor does not necessarily lose power over 1,800 revolutions per minute, as there are several motors that give maximum power at speeds well over 2,000 revolutions, and some over 2,500 revolutions per minute. The maximum speed of an engine is governed by the setting of the valves and the size of the valve seat and outlet ports; as an example, one of the small cars with a 4-inch bore had three exhaust valves to its one cylinder. On engine speed curves of some motors the falling off of power indicated by the falling line is due to the fact that the speed is too great to allow the charges to be either properly gotten to the cylinders, weakness of mixture, or back pressure of the exhaust. It is supposed that the ignition is correct, although, while it is possible to obtain instruments to fire at, say, 3,000 revolutions per minute, some do not give satisfactory results above a certain speed, and this can only be determined by trying out several different makes.

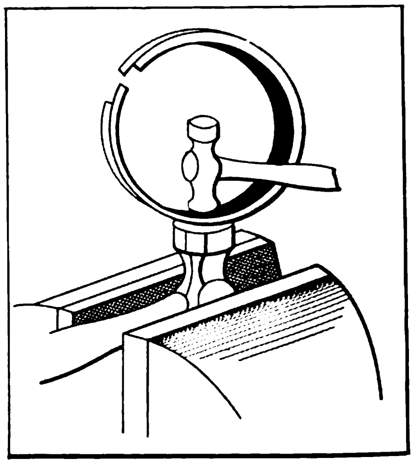


Fig. 2—Showing method of peining piston rings

2. The worm gear for magneto drive is equally as good as the straight-tooth type, with the advantage that it is quieter, and the backlash occasioned by the armature leaving the magneto suddenly could be better taken care of with a worm.

3. As to which is the best is a matter that depends upon how the motor is made; or, better still, how well it is made. The type you do not mention, viz., the overhead type, obviates all pocketing, which is bound to occur to some degree, no matter how small in the "L" or the "T" type of motor.

Another Tip on Piston Rings

Editor The Automobile:

[2,408]—With reference to your recent replies on piston rings and the method of peining same, I have heard it said that they should be struck from the inside. As I should like to try this method, could you tell me how it is done? Tyro

Wilmington, Del.

The accompanying sketch (Fig. 2) will show you the method employed, as in the case where a blow is struck externally care must be exercised in hitting a fair blow.

To Remedy Worn Brake Blocks

Editor The Automobile:

[2,409]—I am troubled with the brakes on my car, as after adjusting them to the full extent they will not hold the car on an incline. The car is of foreign manufacture, and the agents say it will take some time to obtain the part from the factory if I wish to order new shoes. How can I use the old shoes?

Georgetown, D. C. **Mark Baldwin.**

First of all, you do not say if the shoes are of an internal expansion or external contraction type of brake. The latter can be fitted with new liners made from cast iron, copper or hard brass, but the former can be remedied by filing the places where the opening block touches and fitting two new pieces of steel, as shown in Fig. 4, so that when the wheel is put on again and the brake rods are set at the smallest amount of adjustment possible the brake will start to operate, and your trouble will be ended.

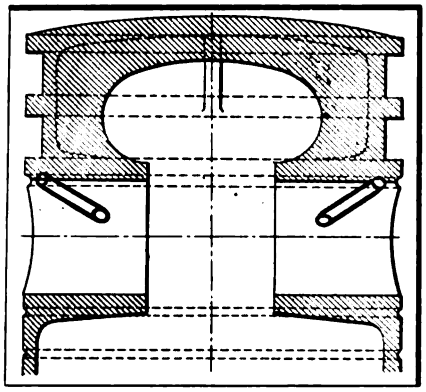


Fig. 3—Showing holes drilled through flanges of piston

Removing Carbon from Cylinders

Editor The Automobile:

[2,410]—Will you please inform me as to the best method of removing carbon from cylinders by the use of kerosene? I have had trouble with the carbon fouling the valves when blowing it out after using kerosene. Will you kindly tell me how much to use in each cylinder and the best way to get rid of the kerosene after using? I have put cocks only in the tops of the cylinders.

Also, do you recommend pouring kerosene in the air intake of the carbureter for the purpose of removing carbon instead of pouring the kerosene in the tops of the cylinders? Also, should a small quantity of lubricating oil be put in the pet cocks in the tops of the cylinders after using the kerosene?

I am a subscriber to your paper, and your courtesy in answering these questions will be much appreciated.

Newark, N. J. **H. J. Bradley.**

To remove carbon by injection of kerosene in the cylinders is at the best a makeshift method of removing this objectionable foreign matter. A method that has given satisfaction is as follows, if the valves are not placed in the head of the cylinder:

Turn the engine so that the pistons are on a dead level, and pour through the pet cocks or valve plugs sufficient kerosene to cover the pistons about one and a half inches and allow it to remain all night. A good quantity by the morning will have found its way past the rings into the base chamber. Now take out the exhaust valves and exhaust manifold and turn the engine several times to allow any remaining kerosene to be expelled; turn the engine so that the piston is in position. If you have no such implement, make or purchase a carbon-removing tool, and through the exhaust valve plug or outlet port, if it is placed conveniently, rake out the carbon, which will be soft. The next operation is most important, and it is upon the care with which this is done that the success of the whole operation lies. It will be understood that the inlet valve has not been touched. Take the inlet valve plug out, and what it was impossible to reach from the exhaust side should be pushed toward the latter. Wash out with kerosene from the inlet plug to the exhaust by means of a syringe, and finally with a mixture of kerosene and gasoline, half and half, clean out with some fresh rag, but always see that the inlet valve of the cylinder that is being worked upon is closed. It is advisable when the pet cock is placed in the head of the cylinder to remove same and pass a wire down it, as the orifice often becomes clogged with carbon, and although the piston and cylinder are clean the carbon in the cock becomes incandescent and causes preignition. It is preferable to pour the kerosene into the cylinder direct rather than to take it in by way of the induction pipe.

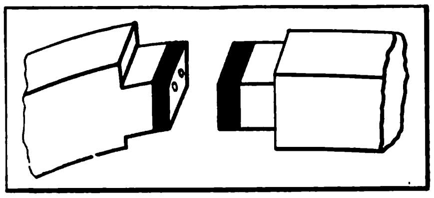


Fig. 4—Worn brake blocks repaired

As regards the lubricating oil, the base chamber should be emptied and fresh oil inserted before running the engine, and, as you suggest, insert a small quantity of lubricating oil in the cylinder as well. This can be done through the valve covers, first allowing the piston to go below half-way down, and by this means pour the oil on the walls instead of on the piston head.

Inserting a small quantity of kerosene through the pet cocks after every 300 miles should help to keep the engine clean. Some piston heads are turned rough, and will pick up carbon quickly. If this is so in your case much trouble can be avoided by taking them out and having them polished smooth.

Lubrication for Wrist Pins

Editor The Automobile:

[2,411]—I have a four-cylinder car that has recently developed a knock, and the other day I took the engine down and found that the wrist pins had worn perceptibly, and showed signs of scoring, as if they had not sufficient oil. Lubrication is by pump to maintain a constant level, and the walls of the cylinders and the wrist pins are dependent upon splash. Is there any method you can suggest to lubricate the new wrist pins to prevent them going like the original set? J. W. L.

Philadelphia, Pa.

If the hole in the top of the connecting rod is not large enough the following method ought to cure your trouble: As Figs. 1 and 3 indicate, drill the pistons through the inside flanges or webs and turn a small slot to catch the oil, and on the upward stroke it will find its way to the wrist pin.

There should be oil slots cut in the bush in the connecting rod, otherwise oil cannot find its way in to lubricate the pin. The pins should be turned a few 1,000ths larger than required. case hardened and afterwards ground to the required size.

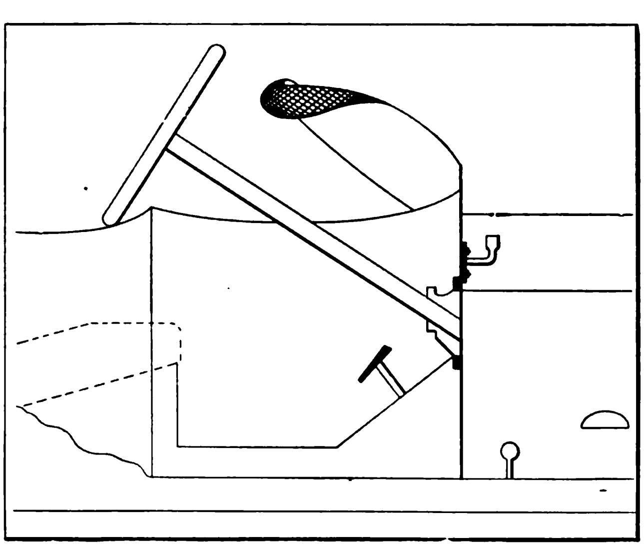


Fig. 5—Leather protection for torpedo dash

Questions That Arise

CONCERNING PUMPS FOR MAINTAINING PRESSURE IN THE GASOLINE TANK; SPANNER FOR INACCESSIBLE NUTS; TO START A CAR IN COLD WEATHER; CLEANING ACETYLENE GAS BURNERS

[254]—What is the specific gravity, weight per cubic inch and weight of aluminum compared with cast iron and copper?

Specific gravity pure aluminum in cast state is 2.58; weight per cubic foot, 0.092 pounds; weight compared with wrought iron, 1:2.90; as to copper, 1:3.60.

[255]—What style of pressure pump is there in use which does not require a relief valve for keeping pressure in the gasoline tank?

The accompanying sketch (Fig. 1) shows a section of a hollow plunger pump operated by a cam from the half-time shaft. When the plunger is forced upwards air contained in the upper enclosed chamber is compressed until the highest point is reached, when a small port is uncovered, forcing the gases past a ball valve acting as a non-return. The contained air, which, owing to the capacity of clearance space, cannot exceed a pressure of 4 pounds, does away with the necessity of the safety valve.

[256]—What is the condenser on an induction coil?

A number of sheets of tinfoil laid together with thin oiled or varnished paper or other non-electric substance between them. The ends of alternate sheets of the foil are connected together and two groups of interlying sheets are thus formed. These become charged with electricity when the current is interrupted and when the circuit is closed again the electrical energy stored is quickly given out.

[257]—Can a spanner for inaccessible nuts be made?

A method employed by some mechanics (?) is to take a chisel and hammer and strike a few blows on the nut side to loosen it when it is stiff. This method cannot be too strongly condemned. If a nut is inaccessible and has to be taken off from time to time it is better to make a spanner to fit it and with one such as shown in Fig. 2 the hammer and punch can be used *ad lib.*, as it is the correct way to use this spanner.

[258]—When should the inlet and exhaust valves begin to open and when should they close?

This is a matter that has been differently handled by different makers, and a great amount of variation is found in the opinions of eminent designers of gasoline motors. Taking the inlet valve first, in some cases this is made to open when the piston is on the dead center, others with a seven per cent. advance, and again with as much as 14 degrees retard, or the valve does not open till the piston has traveled 14 degrees down on the suction stroke.

The time of closing cannot be altered on any particular car once the opening has been set, as this is controlled by the profile of the cam. In two different motors where the inlet valves open 13 and 14 degrees late respectively the closing of the former takes place 10 degrees after the piston has started on the upward compression stroke, while the latter does not close till the piston has arrived at 35 degrees of its upward stroke, allowing that 180 degrees is the equivalent of one whole stroke, and not one revolution.

With regard to the exhaust valve this is usually made to close almost immediately the piston starts on the suction stroke, but slightly over the dead center, and it is on the closing of this valve that the timing must be set and not on the opening, which may vary from 10 to 50 degrees on the explosion stroke. From the foregoing it will be seen that the inlet valve must be timed by its opening and the exhaust on its closing.

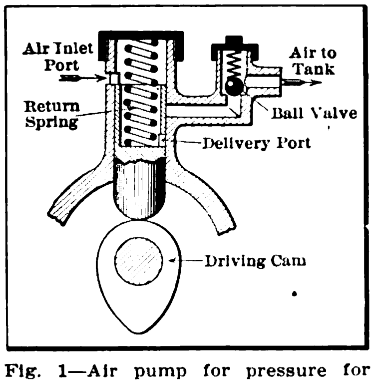


Fig. 1—Air pump for pressure for gasoline tank

In some motors the inlet valve opens before the exhaust has fully closed and in case of doubt or if the timing wheels are not marked, communication with the makers will be the easiest way out of the difficulty.

[259]—What is the best way to start a car that has been laid up for some time, or refuses to start owing to cold weather?

Do not fly to the usual remedy of pouring gasoline into the cylinders by the compression cocks or spark plug holes if it is stiff. The cause of the stiffness is probably due to the dryness of the cylinder walls, as the lubricating oil has either dried up or found its way back to the base chamber. Mix an equal quantity of kerosene and lubricating oil together and inject same into the cylinder and with the spark off turn the engine several times to allow the mixture to percolate past the rings and so lubricate the walls. Injection of gasoline will aggravate the trouble of dryness and render the compression weaker than it already is, and it is due to the poor suction on the carbureter that a mixture strong enough cannot be gotten to the cylinders to ignite and start the motor. If, after the lubrication treatment has been applied the motor refuses to start, then a small quantity of gasoline can be used. In Winter the cold may have the effect of partly solidifying the lubricating oil and in this case also kerosene is a better remedy than gasoline to liquefy it.

Holding a heated rag over the carbureter and induction pipe may be resorted to if a coating of ice forms on the outside of the pipe. Once the engine has been started it is better to allow it to run for a few minutes before starting to run the car.

[260]—Is there any means of cleaning lamp burners for acetylene headlights that have become clogged?

Soak the burners in nitric acid and afterwards hold them in the flame of a Bunsen burner. Clearance may be effected by a piercer of exact size, but this is difficult to obtain and the matter from which burners are made being very brittle, extreme care should be exercised.

French Makers Alarmed at Importations

Alarmed at the success attained by the importers of foreign cars, and the numerous victories of foreign cars in speed and hill-climbing contests, the French manufacturers have voted in favor of some big demonstration for the year 1911. The nature of the demonstration has not been decided upon, but it is understood that the French manufacturers have in mind a big road race or an important touring competition. The race is more likely to be adopted than the touring competition, for European manufacturers are of the opinion that definite racing restrictions, whether they be limited bore, limited fuel, or a weight restriction, have more influence on the breed of automobiles than the most trying touring competition that can be devised. The movement in favor of the "demonstration" has taken the form of a recommendation from the Chambre Syndicaee de l'Automobile that the Automobile Club of France should take this matter in hand for the 1911 season.

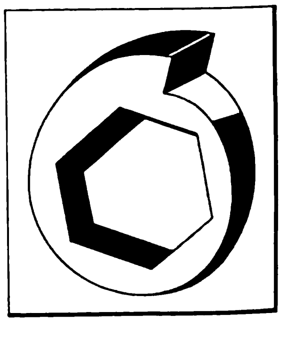


Fig. 2—Spanner for inaccessible nuts

Digest

EXTRACTS FROM CONTINENTAL JOURNALS ON SUBJECTS ALLIED TO AUTOMOBILE ENGINEERING: CAST IRON STRENGTH AND SPECIFICATIONS—THE SABATHE KEROSENE MOTOR —THE RISE IN BENZOL

Specifications for cast-iron parts have only of relatively recent date been subjected to regulations of recognized value and this has been one of the reasons for discrediting castings as parts in automobile construction, their strength being difficult to determine in advance. The reason why practice and science have refrained from formulating basic rules for deciding the strength and properties of cast-iron parts, even though foundry science has progressed by leaps and bounds, is to be sought in the fact that the unit strength of a casting, even in the case of comparison between materials derived from the same ladle, depends largely upon the dimensions of the piece and the more or less rapid cooling to which it has been subjected. The same difference arises with regard to a single cast piece, according to the direction and location of the stress. The strength along one cross-section varies from the strength through another section, and the difference is not pro rata with the dimensions. Slow cooling, as where the diameter is greatest, produces a coarser structure and also causes carbon to be precipitated as graphite between the walls of adjacent crystals, greatly reducing strength. Flexion tests made by O. Leyde with bars of square section of different dimensions and all cast in one piece with a heavier bar uniting them across one end, showed that the softest iron developed the most pronounced differences in unit strength, in favor of the bars of small section. A bar 10 by 10 millimeters in section endured a stress of 47 kilograms per square millimeter, while a bar of 150 by 150 millimeters cross-section endured only 18 kilograms per square millimeter. In three series of tests the materials differed mainly in silicon, this metalloid running from 2.1 per cent. in the hardest to 1.5 per cent. and 1.2 per cent. in the softer grades. The composition otherwise was carbon 3, phosphorus 0.6, manganese 0.7 and sulphur 0.12. Similar results were reached in tests by Sulzer Winterthur Brothers with bars from 5 to 50 millimeters in diameter, giving a strength decreasing from 63 kilograms for a bar of 5 millimeters diameter to 27 kilograms for the largest size. The Society of German Iron Foundries has now created regulations for cast-iron tests in which the principal source of error in previous rules—the use of only a single dimension of bar—is eliminated. The new regulations distinguish between: A, machine castings of (1) medium, (2) high and (3) very high strength; B, architectural and construction castings, and C, pipe castings, comprising (1) gas and water pipe and (2) steam pipe. Each subdivision is further divided according to dimensions of the casting in three classes: (1) Pieces with walls up to 15 millimeters thick, (2) between 15 and 25 millimeters and (3) average wall thickness of more than 25 millimeters. Further regulations extend to shapes, properties of the material and method of producing test bars. In addition to flexion tests here is provided test by internal hydraulic pressure for tubular castings. The testing work which was called into action by these regulations at the various foundries has created a demand for a special machine for facilitating the measurements, and one such has been produced by the Düsseldorfer Machine Company, Inc., and is provided with automatic stress-measuring instrument and recording manometer giving direct reading in kilograms.—*Metall Technik,* August 6 and 13.

The construction of the Sabathe kerosene motor, mainly intended for boats, which was described in this column last week, is shown in Fig. 1. *A* is the admission pipe, *E* the exhaust pipe, *C* the camshaft from which are operated the valves and the kerosene injection pump *G*. *D* represents four rings made of anti-friction metal and placed below the piston rings to insure rigidity and tightness and avoid danger of fire from gas leaks. One similar ring is placed above the piston rings. Note the mounting of the cylinder in the jacket, by which it becomes possible to turn the cylinder around its axis and avoid ovalization.

Each ton of coked coal yields 3 to 5 kilograms of rectified benzol. The annual French production of 32 million tons of coal offers a sufficient supply of automobile fuel. At present France consumes 50,000 tons of benzol annually. The new industry of producing it was begun in 1896. First the mines in the North, especially those at Lens and Anzin, which are engaged in the production of coke for the steel furnaces, installed new apparatus for recovering the by-products, viz., coal tar, ammonia, benzine, benzol, toluene and heavy oils. France was far behind Germany in this respect. The consumption of benzol was then only a few hundred tons per year, in France, and the price was high, reaching 100 to 200 francs for 100 kilograms. The principal employment of the substance was for dyeing and similar small chemical industries. After the first installation of benzol-producing apparatus there was a sharp decline in the price, due to overproduction. But in three or four years the demand more than caught up, and in 1901 new installations were made. The mines at Aniche, Escarpelle, Bethune, Dourges, Douchy and the Société Lorraine de Carbonisation began to produce benzol. Prices at once dropped again. There was a lull in production. Suddenly the gas engineers took up the idea of using benzol, which has a very high illuminating value, for the enrichment of illuminating gas, and it also began to be employed as fuel for stationary motors, and prices again rose to 40 and 50 francs per 100 kilograms. Finally the automobile movement gained strength. England turned to the production of benzol and makes now 35,000 tons per year. Belgium produces 6,000 tons, and Germany 70,000 tons. At the present moment France produces 13,000 tons and uses 50,000 tons of benzol, a large part of which comes from Germany. The anomaly has arisen, says M. F. Laur in *Journal du Pétrole,* that German benzol competes duty-free in France against American, Roumanian and Galician gasoline on which an import duty of 12.50 francs per 100 kilograms is collected, thus reducing the State revenues about 5 million francs, while at the same time free-trade England has imposed a tax of 3 francs per 100 kilograms on motor fuels, with especial view to the exclusion of German benzol. Rectified and washed 90 per cent. benzol sells now for 13 to 19 francs per 100 kilograms, f. o. b. Paris (city excise not included), while gasoline costs 30 to 33 francs. A rise in its price seems imminent.—*La France Automobile,* September 3.

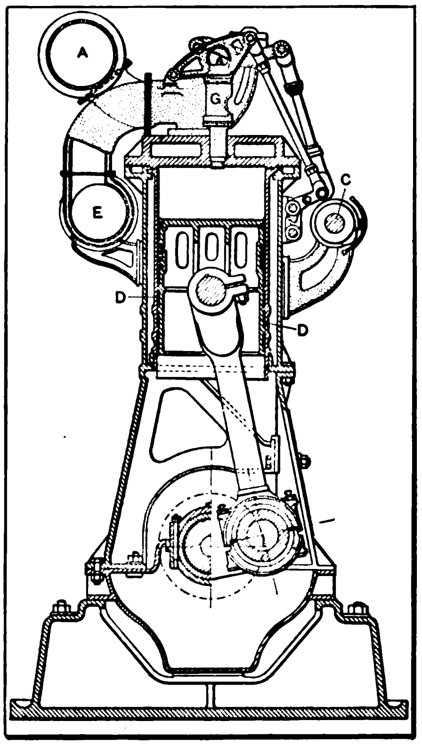


Fig. 1—The Sabathe kerosene motor

Injunctions

Don't fiddle on one string; the noise is dreadful; the string is sure to break.

Don't tell about what you are going to do—go do it.

Don't pray to the Lord for a chicken dinner and take that as a license for you to rob a hen roost.

Don't jolly yourself into the idea that robbing a hen roost differs much from overcharging an autoist who entrusts you with the repair of his automobile.

Don't obligate yourself with promises to deliver more automobile than the kind that you are selling represents; the purchaser might hold you to it.

Don't pray to the Good Lord to come and relieve you of your earthly burden and then say that you are out when the Lord knocks on the door.

Don't burden yourself with a load that you would like to palm off on the Lord—if you will only play fair with the automobiling public the sunshine of prosperity will gladden your soul.

Don't grow corns on your tongue telling every person whom you can buttonhole how you scalped a farmer's chicken—you would squeal like a stuck pig were you to drop a sou in a crap game.

Don't listen to a knocking demonstrator: while he is riveting your attention to the failings of a competing make of car he is leading you away from the good qualities of the automobile that he is trying to fasten upon you.

Don't loan money to the character of man who would hold you so lacking in acumen as to listen to him while he tells you how bad the other make of car is—he is a biased advocate, and he is so hungry that he would charge you interest on any money that you might be foolish enough to loan him.

Don't saunter around Automobile Row making believe that you are about to invest in an automobile, only that you are having difficulty in finding one that is good enough for you—just go home; bewilder your wife by displaying a little sense; besides, she may be in need of the car-fares that you are squandering in a futile attempt to disguise a pouter pigeon—it can't be done.

Don't start out to buy a car by telling the maker all about how you think it ought to be made; it would require as much time in relating what you do not know about automobiles as it would to describe the clothing that a South Sea islander does not sport.

Don't approach a prospective with the solemnity of an undertaker; he may not feel sure that there is a vacancy in Heaven; be cheerful.

Don't murder a prospective's resolve to join the ranks of autoists; if the automobile you have to offer does not check up with his requirement, direct him to the place where he can get it—you know.

Don't fail to lubricate the springs; this is a simple thing to do; pry open the leaves with a screwdriver and squirt a little lubricating oil in between them.

Don't put up with a strange noise; if it is noticed get out a search warrant and serve it upon the pest; it will grow and prosper if you disregard it.

Don't imagine that a noise is too insignificant to pay attention to; it means that there is something the matter; have it fixed.

Don't assume that membership in a club, even if it is a large one, gives you any right that is not enjoyed by other autoists when it comes to driving an automobile on the highway; the mantle of the law is supposed to cover all with equal protection.

Don't forget that membership in a club multiplies the loudness of the voice for good by the number of the members if all pull together—pull in unison, that is the wise course to pursue.

Non-Freezing Solutions

GRANTING that there is very little trouble from freezing water in automobiles when the motors are in more or less constant use or stored in a garage that is kept fairly heated, the fact remains that the cylinder jacket water will freeze up if automobiles are in an unheated garage, or if they are stood out in the cold all day without running the motors to maintain a state of warmth sufficient to prevent the water in the circulating system from reaching the freezing point, which is 32 degrees Fahrenheit. Experienced autoists understand this situation quite well, but those who are newcomers may not realize that the very efficiency with which radiators serve their intended purpose constitutes a source of danger, due to the ease with which heat is transferred from the water to the surrounding atmosphere.

What is true of the water that is circulated to maintain the cylinders at a working temperature is equally to be said for the water that circulates through the carbureter for heating purposes, it being the case that the water first goes to the cylinders, where it is heated, and some of it then passes into the carbureter jacket, where its heat is abstracted from it by the gasoline which, being something of a refrigerant, tends to lower the temperature and the heat from the water overcomes this difficulty. But when the motor is shut down and there is no means of maintaining the heat in the water, it is then under the influence of the surrounding temperature and, on account of the efficiency of the radiator and other parts for the transfer of heat, it is but a matter of a short time when the water will be so reduced in temperature that it will freeze.

There are a number of ways of preventing water from freezing, as when some foreign substance is placed in solution. Of the several materials that are used for this purpose some of them are not recommended, due to the fact that they will either foul up or attack the metals with which they will contact as the water holding these elements in solution is circulated in contact with these metals. Common salt is used in refrigerating work on account of its ability to take up a large amount of energy in the form of heat at low temperatures without freezing. In this class of work, in view of the corroding action of the salt, nothing but iron is used throughout, but in radiators and the piping system of automobiles there is more than iron, and salt is therefore debarred from use.

Calcium chloride is available to some extent; it must be chemically pure, however, and this is a difficulty that is not easily overcome owing to the danger of not being able to procure chemically pure calcium chloride with absolute certainty. For those who care to experiment with this material for non-freezing mixtures, the table as here given for its properties will afford the requisite data from which to make a solution that will suffice for the coldest Winter work in the latitude of New York.

One of the safest solutions to employ is made up of water and glycerine. The proportions of glycerine to water for the various temperatures may be determined by consulting the table as here afforded, for which THE AUTOMOBILE is indebted to Messrs. McKesson & Robbins, New York City.

There still remain the various solutions of alcohol and water, using either wood alcohol or the denatured product, which is sold under the trade name of "Pyro-Alcohol." In any event, using alcohol, it is necessary to test the cooling solution at frequent intervals in order to determine its strength and to replenish the alcohol as often as may be necessary to maintain the strength of the solution, compensating, of course, for the part of the alcohol that evaporates off. Just how often it will be necessary to re-establish the strength of the alcoholic solution depends upon the

.CIUM CHLORIDE MIXTURES; GLYCERINE IS REC- IENDED; WOOD ALCOHOL MAY BE USED; DE- TURED ALCOHOL IS POPULAR

efficiency of the cooling system and the amount of boiling off that takes place in regular service.

SOLUTIONS OF WOOD ALCOHOL AND WATER FOR MOTORS

Percentage of wood alcohol	Freezes at Degrees Fahrenheit	Specific gravity
5	25	.994
10	17	.988
15	10	.982
20	5	.975
25	—3	.969
30	—10	.963

Note.—The specific gravity of alcohol or other solutions may be determined by means of a suitable hydrometer. For alcohol there are special instruments of this character to be had.

SOLUTIONS OF GLYCERINE AND WATER FOR MOTORS

Per cent. glycerine	Freezes at	
	Deg. Cent.	Deg. Fahr.
10	—1	30
20	—2.5	27
30	—6	21
40	—17.5	0
50	—31	—25

Note.—Up to 30 per cent. glycerine can be used without material effect on the rubber hose connections, but if a stronger proportion is used the connections will have to be renewed frequently. No matter how little glycerine is added to the water the mixture will after some time become muddy and must be thrown away and a new solution made to replace the old.

CALCIUM CHLORIDE SOLUTIONS FOR MOTORS

Percentage of calcium chloride	Freezes at Degrees Fahrenheit	Specific gravity
5	27	1.04
10	22	1.08
15	15	1.13
20	about 0	1.18
25	—10	1.22

Note.—The best way to make the solution is to make a saturate solution of the chloride and then use this, by adding water to it till the required mixture is reached. This is done by taking half a gallon to 8 pounds of chloride for each gallon of saturate solution desired. You can tell if it makes a saturate solution by the fact that some of the crystals will remain in the bottom undissolved. It is advisable to add to this solution a handful of lime to render it alkaline. This latter is done, as it is said that this solution has an acidic action on the metals of the whole cooling system, setting up an electrolytic action.

SOLUTIONS OF DENATURED ALCOHOL AND WATER FOR MOTORS

Percentage of alcohol	Freezes at Degrees Fahrenheit
10	25
20	12
30	—3
40	—20
50	—35

[The figures given are from the United States Industrial Alcohol Company.]

The volume of the mixture of alcohol and water does not remain the same as their combined addition. This is due to the fact that gases that are held in the liquids separately are less soluble when the two are brought together and the contraction described is the result of the disengagement of such gases.

5 per cent. alcohol in water 0.31 contraction
10 " " " " 0.72 "
15 " " " " 1.20 "
20 " " " " 1.72 "
25 " " " " 2.24 "
30 " " " " 2.72 "
40 " " " " 3.44 "

Automobile Trade Directory Just Out

The Automobile Trade Directory for the current quarter has just been issued and in some respects the work is more complete than ever before. It contains 808 pages, of which considerably more than half are devoted to classified text covering every branch of the trade, the remainder being occupied by a selected list of advertisements. In addition to the ordinary indices the directory contains thirteen pages of cross references touching 2,125 subjects.

Instructions

Should the magneto fail to properly perform its functions the fault may be due to:

(a) Lack of protection.
(b) Second-thought installation.
(c) Poor wiring.
(d) Inferior spark plugs.
(e) Improper timing.
(f) Lost motion in control system.
(g) Weak magnets.
(h) Defective insulation.
(i) Loose electrical connections.
(j) Open circuit.
(k) Excess of lubricating oil.
(l) Bad alignment.
(m) Defective bearings.
(n) Worn out brushes.
(o) Pitted collector rings.
(p) Poor ground connections.
(q) Static discharge.
(r) Induction interference.
(s) Defective design.
(t) Mechanical interferences.
(u) Unequal polar gaps.
(v) Magnetic leakage.
(w) Loose driving gear.
(x) Loose spindles.
(y) Loose magnets.
(z) Faulty switch.

Remedies for Magneto Troubles

(a) Fit leather or vulcanite cover.

(b) Take down and reinstall properly.

(c) Poor wiring always spells trouble; fit new.

(d) Inferior plugs are worse than bad wire; the best for magneto is not too good.

(e) Retime; if you are not sure ask some one who is.

(f) Take up slack, and keep connection oiled to obviate wear.

(g) Have them remagnetized.

(h) This is sometimes difficult to locate; after you are sure it does not lay in the wiring or bedplate, send the magneto to the makers if the mechanic handy does not thoroughly understand magnetos.

(i) These should be looked to often, and where possible fit lock nuts.

(j) Go over switch to find fault.

(k) If it has not got in the armature clean all parts and use less oil often and little rather than a lot now and then.

(l) Causes wear quickly if sideways; make holes for holding bolts larger; if too low pack up with thin fiber.

(m) Have them rebushed.

(n) Fit new ones.

(o) Clean with gasoline, or if badly worn use very fine emery paper.

(p) Undo same, wash with gasoline and clean with emery paper; if the spot is likely to be covered with oil make new connection elsewhere.

(q) Close safety gap slightly.

(r) Caused by flaw or improper windings; have same repaired.

(s) Outside owner's power.

(t) Readjust the parts so that they clear.

(u) Take out all plugs and adjust them all to one gauge of between 1-32 and 1-64 inch.

(v) Avoid a magnetic short-circuit by keeping the magnets clear of iron brackets, etc.

(w) If key is worn, have new key cut and keyways cleaned; if pinned to shaft, ream holes and fit larger pins.

(x) Have shaft turned true and rebushed to accommodate same.

(y) Tighten up holding screws.

(z) Repair same, but if cracked it is better to fit a new one.

Electric Vulcanizers

DISCUSSING THE NECESSITIES OF TIRES; STATING HOW REPAIRING MUST BE DONE; ILLUSTRATING AN ELECTRIC VULCANIZER, AND THE TOOLS THAT ARE NECESSARY

RAW RUBBER, while it is sticky and has certain cementing properties, is lacking in permanence in this regard. The adhesive properties of the rubber may be compared to molasses under temperature changing conditions. When the weather is cold the molasses will stick like flypaper, but as the temperature is raised the sticking properties of the molasses fall away until at a high Summer heat it will run like water. Raw rubber has properties that are not possessed by molasses and it is on this account that it is found to be of value in tire making; rubber is waterproof; molasses is not; in fact, it dissolves in water. Now, while molasses is thinned by heat, rubber is hardened; here is another distinct difference. The rubber may be so altered in its chemical composition, or better yet, characteristics, that, when it is diluted with sulphur or other suitable substances, it will not only harden under high temperatures, but it will thereafter remain so. If it is desired to keep the rubber from hardening too much, all that has to be done is to use less of the sulphur, or other vulcanizing substances, and regulate the vulcanizing heat to that which is known to produce the desired result.

Now, rubber is used in tire making for the purpose of sticking the layers of fabric, one to the other and all together. It is also employed to seal up the cotton, of which the fabric is composed, in order that mildew and other rotting agents may be locked out. In addition to the performance of these functions, the rubber is employed in a compound to make a toughened tread for the tire, so that when it rolls over the rough ground, contacting with sharp stones and other impediments, the fabric will be protected, it being the case that the toughened tread of rubber compound is better for this purpose than any other material that is now sanctioned for use, excepting, of course, that there are special forms of treads that do good work, and they are frequently used in conjunction with rubber for the accomplishment of this end, notably leather treads.

At all events, the rubber does several things, none of which is of the character that popular belief seems to accord to it. True, rubber is a resilient material, and that a rubber ball will bounce is too well known to be denied. The fact remains that it is the air in the pneumatic tire that is given the privilege of doing the bouncing part, and it is understood by those who have studied the matter, that air, under pressure, is far better than rubber for all such purposes, as cushioning the blow.

Leaving it to air, then, to do the work of dampening the blow and serving as springs for the automobile, it remains to emphasize the part that rubber plays in tires, and right here it will be well to mention the fact that this strange material, in addition to being waterproof, is airtight; inner tubes will hold air under pressure because the walls are of such fine texture that air, even under pressure, leaks through very slowly indeed.

If it is understood just what part rubber plays in tires it will be possible to discuss the care of them, with the hope that the needs of the occasion will be appreciated. The strength of the tire resides in the cotton fabric; this strength will prevail as long as the fabric is protected from its enemies, they being mildew, rust, acid, grease, dirt, and mechanical efforts, as flexure, centrifugal strains, excessive loading, and abrasion or cutting.

Disregarding the mechanical strains for the time being, since they are secondary to the present point of view, it remains to discuss the points that rubber is mostly concerned with. It will be seen that anything that will keep mildew away from the fabric will also bar out everything else that will not serve as a solvent for the rubber compound. Unfortunately, some of the substances that come into contact with the rubber will dissolve it; among these solvents grease is the material that is most likely to be encountered, although it is well known that dishonest chauffeurs, when they want to collect commission on new tires, put gasoline in the casings, and this liquid soon eats away the rubber compound, exposing the fabric, which the gasoline helps to rot out in a short space of time.

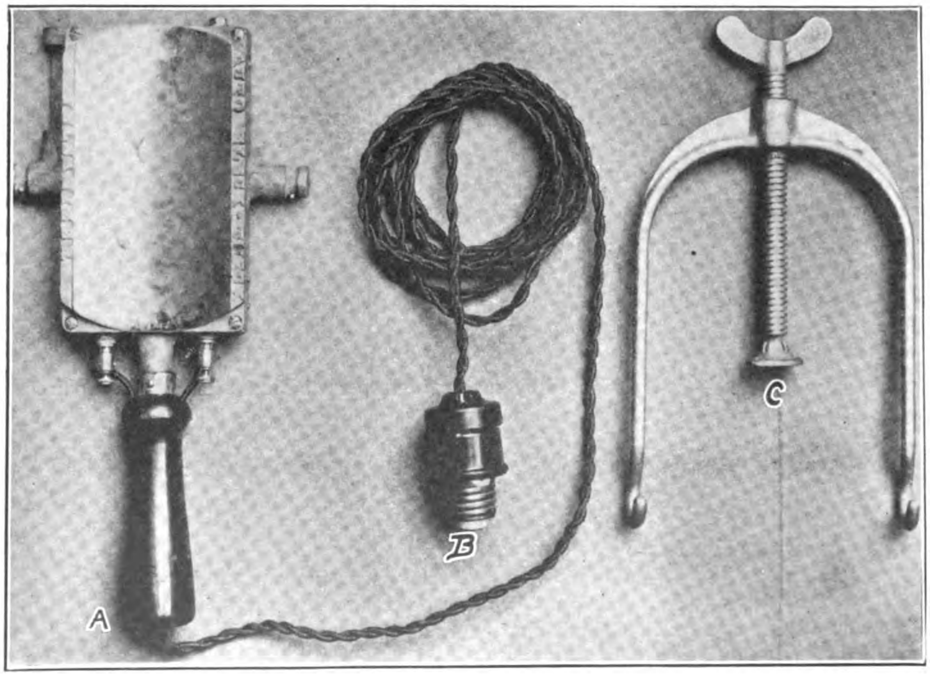


Fig. 1—A, vulcanizer; B, plug to screw into electric light socket; C, clamp for holding the vulcanizer to the tire

But the rubber, as long as it is kept in perfect condition, does ward off all honest natural enemies, as mildew, dirt, etc., and if the rubber can be kept in perfect condition, the tires will last for a long time. But this is the difficulty; automobilists, while they kick like the dickens at the tire bill, fail to appreciate the needs of the occasion, and, instead of healing up the little blemishes on the surfaces of the outer casings before they begin to fester, they wait until the cotton fabric, which, as a wick, pulls in a vast amount of water, and with it a horde of mildew, is all eaten away, sometimes for a foot or more away from the surface blemish that is responsible for the damage.

Just how large an opening will have to be to allow the cotton fabric to "wick in" water and mildew, that is ever in solution, is a matter which autoists differ about, but it is a moral certainty that the water and the mildew are content with a very minute opportunity. With such an active, though natural enemy, it is no wonder that there are so many dissatisfied automobilists, and there are as many of them as there are careless men who use automobiles and let them go to the dogs.

Since tires are very expensive, and none too lasting under the best of conditions, why is it such a large undertaking to do the small amount of work that will make them wear perhaps three times as long, as they will when they are neglected.

In the repair of little wounds—remembering that they are more dangerous than big cuts because they may be left unattended to for a month or more, whereas big cuts will compel immediate attention—assuming that the tire is cleaned with tepid water and castile soap to begin with, it remains to swab out the wounds and open them up a little, if necessary, preparatory to the application of the desired amount of the proper grade of cement to be used for this purpose.

The best cement to employ is not to be arrived at by just going to the nearest bicycle store and buying a tube of rubber cement. Each make of tires on the market has some proportion of rubber compound that differs from the other, and the right cement to use is that which will stick to the particular compound of which the rubber of the tires is composed.

Having procured the proper grade of cement for this purpose and having applied it to the cleaned and enlarged wound, it still remains to vulcanize the patch, if such it might be called, ere the new rubber will adhere and remain permanently attached to the old.

There are various types of vulcanizing appliances to be had; some of them are large and cumbersome, depending upon the heat from steam, under pressure, to afford the desired warmth; this class of vulcanizers is used in the plants where tires are made; room and bulkiness are not important factors there, but in the owner's garage it is scarcely to be supposed that a steam vulcanizer would lend facility to the plan. Electric vulcanizers, under the circumstances, are looked upon with much favor, and, since they afford the desired amount of heat at the right temperature, if they are properly designed, all that remains is to procure and use them with the assurance that the tire bill will be very materially reduced, provided, of course, that the work is promptly done.

The principle of the electric vulcanizer is that of the electric heater or rheostat. It is made up of a shell of metal as shown in Fig. 1, holding a set of electric conductors, they being relatively high in resistance. When the electrical energy is connected to the vulcanizer through wires leading from a proper source, as an electric light wire of the right voltage, by attaching the two wires to the binding posts of the vulcanizer, the electric current that will flow through the resistance wires, as they are called, will deliver up its energy in the form of heat, and the amount of heat generated will be sufficient to raise the temperature of the vulcanizer to about the point of vulcanization of the rubber compound. A means is available for regulating the flow of electric current, and a thermometer is also provided for the purpose of reading the temperature at any time during the process of vulcanization. It is desirable to avoid having the temperature crawl up too high, and the repairman should watch out for this. The thermometer should be a "corrected" one, that is to say, it should be one that has been tested to make sure that it will read off the true temperature within very narrow limits.

Fig. 2—A, folding case; B, brush; C, pliers; D, hook; E, skiver; F, marker; G, shears; H, roughener

For this class of work there are certain tools that will be of excellent service, and the wisest way to purchase an outfit is to include the tools. Fig. 2 shows just such a set of tools, and the vulcanizer with tools complete may be had with a sufficiency of detailed instructions to enable an automobilist of no great skill to do a good job the first time. The illustrations are of the vulcanizer made by James L. Gibney & Bro., New York City and Philadelphia, Pa.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL-CLIMBS, ETC.

Nov. 19-26.......Oakland, Cal., Idora Park Show, Under Management of Oakland Automobile Dealers' Association.
Dec. 1...........Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11.New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 15-21, 1911..Detroit, Wayne Gardens, Detroit Automobile Dealers' Association.
Jan. 16-21, 1911..New York City, Madison Spuare Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4,'11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11,'11.Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Mch. 4-11, 1911...Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.

Races, Hill-Climbs, Etc.

Oct. 22-30........Belmont Park, New York, International Aviation Tournament and Show of Licensed Automobile Dealers of New York City.
Oct. 27-29........Dallas, Tex., Track Meet.
Oct. 28-29........New York City, New York "American's" Motor Truck Contest.
Nov. 3-5..........Atlanta, Ga., Speedway Meet, Atlanta A. A.
Nov. 5-6..........New Orleans, La., Track Meet.
Nov. 5-7..........Los Angeles-Phœnix Road Race, Maricopa Automobile Club.
Nov. 7-11.........Five-day Reliability Run of Chicago Motor Club, 200 Miles a Day.
Nov. 10-12-13.....San Antonio, Tex., Track Meet.
Nov. 11-12........Savannah, Ga., Road Race, Savannah Automobile Club, and Grand Prix, Automobile Club of America.
Nov. 24...........Santa Monica Road Race, Los Angeles, Cal.
Nov. 26-27........Los Angeles, Cal., Track Meet, Motordrome.
Dec. 25-26........Los Angeles, Cal., 24-Hour Race, Motordrome.

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NOW that the first cost of automobiles is reduced to a stable and satisfactory level, concomitant with an increasing quality that eliminates speculation bearing upon the cost of maintenance from the purely mechanical point of view, it remains to discuss the phases of maintenance cost, such as will ultimately better the situation, thereby bringing the automobile well within the reach of the man who has no hesitancy in paying the first cost, but who might be dragged down by an undue expense account following the operation of the car. A casual inspection of the customary items of maintenance will show that fuel and lubricating oil are within reason, although it is to be expected that something can be done to trim these items down, partly by harmonizing the relations of the power plant to the chassis, and to quite an extent, when users learn to be moderate, paying some attention to the road conditions, adjusting the speed accordingly.

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THE preponderance of maintenance cost is chargeable to the tires. Automobilists have in this item a serious problem to cope with, and the struggle they are experiencing could scarcely be more effective were they bent upon making the tire bill as large as possible. In the leading article this week in THE AUTOMOBILE the problems of maintenance are taken up broadly, with the expectation that the whole subject will be treated, taking, perhaps, several weeks. It is there pointed out, among other things, that by actual count the automobiles which are driven by chauffeurs are subjected to tire abuse by the wholesale, and it does seem strange that owners of automobiles will pay a fat lazy lubber real money for no better purpose than to permit him to collect commissions on the tires which will have to be purchased to replace those that are not given a chance to wear out.

* * *

BUT even the owners who drive their own automobiles stand in their own light, since they fail to grasp the significance of rubber in the structure of pneumatic tires; the popular belief is that this substance is put into tires for the same reason that it is employed in rubber balls, *i. e.*, to make them bounce. This belief is a good even mile distant from the true situation; rubber is used in tires for the same reason that paint is put upon a house. The class of people who labor under the impression that houses are painted to make them look well belong in the same category as the man who accepts the rubber ball theory. Paint is made up of linseed oil and pigment. The pigment gives body to the oil, preventing it from streaking. It is not out of place to employ artistic colors, since they do not prevent the pigment from doing its work, but the linseed oil, having a close texture and elastic properties, coats over the wood, or rather material, sealing it up tightly, so that oxidation and the ravages of hungry fungus growths will not induce a condition of rapid deterioration. Linseed oil would scarcely serve as a coating for the fabric used in pneumatic tires, but rubber is used instead.

* * *

IN recounting the theory of the pneumatic tire, air is used as the resilient medium, the inner tube being made of rubber compound, the latter being impervious to the seepage of air under pressure, but the rubber itself, being incapable of resisting any great pressure, has to be backed up by something of greater strength. Cotton fabric is employed in the casing because of the resisting qualities of cotton, when it is new; but owing to the rapidity with which mildew and like fungi attack and destroy cotton, just as fungus attacks and destroys wood, a protecting coat of rubber is applied to the layers of cotton, and as long as this coat remains intact mildew is debarred; but if the cotton is exposed at any point its "wick-like" properties are at once brought into play; water is drawn in, and with it come myriads of mildew and like fungi. It remains for automobilists to repair wounds in the rubber coating of tires before mildew sets up its festering influence.

* * *

CONSIDERING the high first cost of pneumatic tires and the rapidity with which they wear out, even when they are well cared for, there is reason enough for encouraging automobilists to avoid the maluse of their cars, and to instruct their chauffeurs to ride in a trolley car, excepting when they are helping the owners to realize value for service. If tires are now being made as well as it is possible to do so, using the best grade of rubber, superior staple, and the utmost skill in the process, it certainly does remain for the automobilist to put his foot down upon all tire abuses, learn what the rubber is for, and take advantage of whatever little value there is in it.

15% Cut in Tires

MANUFACTURERS WILL SLASH PRICES HORIZONTALLY DECEMBER 1, THUS RELIEVING MOTORDOM OF A DAMPER ON THE TRADE CAUSED BY CORNER IN RUBBER MARKET

RUBBER tires, the most puzzling element of motoring, are to be sharply cut in price on December 1. A horizontal slash of 15 per cent. has been decreed and the new order of things will go into effect on that date.

The course of the raw rubber market has followed the inexorable laws of supply and demand and at present is in the neighborhood of $1.40 a pound. When The Automobile last Spring published the facts about the manipulated condition of the rubber market abroad, the price of Para rubber in the open market was over $3 a pound.

It was pointed out that the tire men hesitated to buy under those conditions as the prices paid for raw rubber would have made the price of tires prohibitory and would have exerted a deadening effect upon the automobile trade generally. Then came a conference of the A. L. A. M. at which a decision was reached not to force the tire men to buy in the manipulated market by insisting on entering contracts for their tire supplies.

The article in The Automobile was widely read and was cabled in its entirety to London and the news it contained caused the raw rubber market to waver and then fall about a dollar a pound when the holders of large blocks of rubber realized that they would have to take profits speedily or not at all.

Since then the course of the market has been downward, with a few little strong spurts when isolated manufacturers tried to secure their annual supply. The tire men say that the current level is still too high and no purchases of great importance will be made until they can be executed somewhere about $1.20 a pound.

Even under the improved conditions that have obtained so far this Fall the cost of tires has proved a big obstacle to motoring and the general reduction will be particularly gratifying to the automobile public.

The understanding of the tire men and the makers is still in force and the manufacture of tires has been conducted conservatively. Outside supplies of raw rubber have been called upon rather more extensively than ever before and in the exact measure that the demand has been released from the central rubber market, prices have sagged off.

Tire men are somewhat apprehensive lest the announcement of the cut will have the effect of stiffening the demand for the finished product and have taken precautions not to stimulate the raw rubber market by heavy purchases.

They say that the market is in a nervous condition and shows signs of a "corner" whenever a big buying order is shown.

1911 A. L. A. M.'s Last Show

AUTOMOBILE EXHIBITS IN NEW YORK WILL BE CONDUCTED IN FUTURE BY THE LICENSED DEALERS' ASSOCIATION, BEGINNING WITH 1912

WHEN the doors of Madison Square Garden close upon the automobile show to be conducted by the A. L. A. M. next January, they will have closed upon the last show ever to be held by that organization in New York. In 1912 the display of automobiles in the metropolis will be handled by the licensed dealers' association and the show will be in the same class as that held annually in Boston.

Naturally, such a show will have considerably more weight and volume than the New England show, but it will not be a manufacturers' exhibition. The reasons for this action are two fold. In the first place the holding of a manufacturers' show is an appreciable element of expense that can be taken care of in another way. In the second place, the real reason is that the dealers in motor cars object to a manufacturers' show in their territory. This objection rises not so much from the fact that the makers sell some cars in the dealers' territory as from the tangles that have arisen in the past and are feared in the future in spoiling sales for the dealers.

The situation eliminating the national manufacturers' show will leave the Chicago show as the only simon-pure makers exhibition in the United States.

While plans so far in the future are still rather nebulous, the announcement as above will be received with much favor by the trade.

Johnson Company to Show at Palace

Space to exhibit its line of automobiles, in the Palace show, has been contracted for by the Johnson Service Co., of Milwaukee, Wis., according to statements coming from the company itself. Herbert Longendyke, one of the promoters of the show, entertained the press at luncheon at the Automobile Club of America last Thursday and explained the scope of the show enterprise.

Mr. Longendyke announced that he would establish headquarters at the Palace within a short time and would conduct a vigorous campaign. So far, his visits to New York have been periodical. He has not yet authorized the publication of his list of exhibitors.

San Francisco Auto Show Planned

San Francisco, Oct. 3—Plans are now being laid for an automobile show to be held in this city during December or January. Behind the movement is the San Francisco Motor Club. The Coliseum, in which two of the previous shows were held, has been rebuilt, and it is probable that the exhibition will be held in this spacious structure.

The automobile dealers of Oakland are also getting ready for a show. Their exhibition will be held in November, according to the present plans. Most of the large number of cars that are represented in San Francisco also have their agents or sub-agents in Oakland. It is understood that harmony now reigns and that there will be a complete representation in the show.

Little Space Left at the Boston Dealers' Show

Manager Chester I. Campbell of the Boston show has allotted the space to the accessory men, the latter taking nearly all that was left after the Boston dealers had been supplied. There is still a little here and there held as a sort of reserve and from these places some of the applicants among the dealers who were unable to get anything when the allotment was made to agencies and branches will be supplied.

Reeves Addresses Students

GENERAL MANAGER A. L. A. M. TELLS Y. M. C. A. CLASS ABOUT THE OPPORTUNITIES AFFORDED BY THE AUTOMOBILE INDUSTRY TO LIVE MEN

ALFRED REEVES, general manager of the A. L. A. M., was the chief speaker at the exercises held in connection with the opening of the seventh year of the automobile school at the Y. M. C. A. last night. Mr. Reeves' address in part was as follows:

"Ten years ago there were about 3,500 machines in America—now there are 400,000.

"Ten years ago there were 27 factories (200 cars being a record production for any one of them)—now we have almost 100 producing factories, to say nothing of a like number of experimentors, involved in the making of motor cars, while an annual production of 15,000 and even 25,000 cars in one factory is not unusual.

"In a decade the capital of the automobile and accessory makers has increased from approximately $6,200,000 to $450,000,000, of which $275,000,000 is in motor car factories alone.

"Ten years ago the number of persons employed in making automobiles and accessories was estimated at 2,000; now there are 278,000 individuals including those in salesrooms and garages.

"Ten years ago there were probably 800 chauffeurs in New York State, which now boasts of almost 25,000 registered drivers.

"Automobile Row in New York in 1900 showed 14 different makes of cars; now there are 84 for you to select from.

"Ten years ago the average price of cars was $1,100, then it ran up to $2,137 in 1907, after which, with the increase in the number of moderate priced machines, it has come down to $1,545, although the very high-grade cars are selling at even higher prices than they were two years ago.

"When the fundamental patent covering the modern gasoline automobile was issued to George B. Selden in 1895, even the greatest dreamer had no idea of what 1910 would show in the motor car industry, and it has been all the result of work by able men with ideas. Money has had comparatively little to do with it. Although a wealthy man to-day, as a result of his invention, under which 83 manufacturers pay royalties, George B. Selden was a poor man ten years ago. Most of our cars of today came not so much from capital as from brains and mechanical genius in men who began at the bottom of the ladder.

"Great credit for the present position of the motor car industry is due those pioneers like Winton, Ford, Haynes, Apperson, Maxwell, Buick, Olds, Duryea, Packard and a dozen others whose names are now household words.

"At the same time, however, I would not take credit from the business men of the industry who have financed the manufacture and marketed the products. They are a mighty important part of the success, for it was the enterprise, the faith in the industry and the ability to manufacture and market on the part of the captains of industry that supplied the world with the concrete and developed ideas of the engineers and mechanical men.

"The future is your problem, however. Are all the chances gone?

"Will automobiles continue to be used?

"How many people can maintain them?

"Will they take the place of the horse?

"What is the best branch of the industry for me to enter?

"These are among the important questions that confront you gentlemen.

"Perfect as our cars appear, with their silent, powerful motors nd excellent design and construction, the automobile of ten ears hence will show radical changes. The present general deign may continue, but think of the improvements that can be made. Improvements in transmission, in greater simplicity and easier control, in increased power and in economy of fuel consumption, to say nothing of the ever increasing need of something to improve, to cheapen or to supplant the pneumatic tire, which, like the perpetual motion problem, has thus far seemed impossible of solution. It is the general opinion that the pneumatic tire will always be with us except for very heavy vehicles, and while greatly improved in the past few years, it offers a fine opportunity for betterment.

"Now as to the use of motor cars. They are certain to increase in number, solely on account of their utility, without regard to pleasure use. Every farmer needs one, and the Government reports show more than 5,000,000 farms in this country. We know that every doctor must have one and there are 7,700 in New York City alone, and 140,000 in the country.

"Every contractor, every suburban real estate agent, and if the truth be really told, every man, if not an owner now, hopes at some time to operate his own motor car.

"Constantly decreasing maintenance expense is making it possible for more and more people to own machines, even if for pleasure use alone. Moreover, in this great country of ours there are 997,000 families with an annual income of $3,000 or more. It is believed that America will continue to buy annually 200,000 motor cars of all types, approximately that number having been sold during the past twelve months.

"Naturally the greatest field for motors in the future is for the freight carrying vehicle, which offers the solution of those many problems involved in our present wasteful method of transferring merchandise by horse-drawn vehicles.

"Using a motor car which will carry twice the load, at twice the speed, and requiring only half the space, will be like increasing the width of our streets six times. It must always be borne in mind that there are at present 7,000,000 horse-drawn vehicles in use in this country, and an average of 900,000 horse-drawn vehicles being made every year, almost all of which must be supplanted by motor cars.

"The industry, new as it is, requires new men. Some of those in it now have lived on the overflow, simply because no better men were obtainable. Many salesmen in our local trade know little or nothing about the cars they sell. There are scores of chauffeurs in New York who should be in jail instead of driving motor cars. They should bar from driving those men, owners or chauffeurs, who run with mufflers open, that whirl round corners, hog the center of the road, and disregard pedestrians (of whom there are still a few).

"Those makers who turn out badly designed cars, those promoters who would sell you stock in an automobile company on the promise that you will get rich over night are passing and the automobile industry is on a more substantial foundation than ever before.

"The 83 factories in the Association which I have the honor to represent are looking for men of ideas. Opportunities are coming up every day. The reward is not alone money, but a stnading in the business world; a reputation for your friends and family to be proud of, and the always enjoyable sensation of having accomplished something worth while. Energetic and loyal work in the automobile industry assures a future for every man here to-night. The business, with its almost unlimited field, is one of the most substantial in America, and the rantings of dyspeptic pessimists who have viewed its rapid strides with alarm cannot halt its growth in this blessed country where every man has the opportunity to prove his worth and to receive the just reward of his efforts."

Detroit Motor News

STEAM NAVIGATION COMPANY PREPARES TO EMBARK IN TRANSPORTATION THROUGH AIR—OWEN MERGER CONFORMED—FORD TO INVADE NEW YORK

DETROIT, Oct. 24—Anticipating the time when aerial navigation will to some extent supplant the means of travel now in vogue, the Detroit & Cleveland Aerial Navigation Co., of Detroit, has been incorporated, with a nominal capital stock of $50,000. The new organization, which by the way, so far as can be learned, is the first company to be chartered for carrying passengers through the air, is made up of stockholders in the Detroit & Cleveland Navigation Co., and is much more far-reaching than the name would indicate. The company operates side-wheel passenger fleets between Detroit, Cleveland, Buffalo and Mackinac, and it is the intention as soon as aerial navigation has been rendered practical to supplement this service with a full line of airships for the accommodation of those desirous of traveling in that manner.

"We will not do any experimenting," says Vice-President and General Manager A. A. Schantz. "Our business is purely transporting passengers and freight. The minute airships become sufficiently practical we will add service of this nature. The capital stock mentioned in our articles of incorporation is merely nominal, and will be increased when the occasion requires. Personally I believe it will be a long time before any man succeeds in crossing the ocean in an airship of any sort. But with the rapid advancement in the development of aeroplanes there is no reason that I can see why flights of two or three hundred miles should not be common within a few years, at the most. When that time arrives we want to be prepared for it."

Details have been completed for the taking over of the Owen Motor Car Company, of this city, by the Reo Company, of Lansing, as announced in THE AUTOMOBILE. Holders of Owen stock will receive stock in the Reo Company on an equitable basis, and some of the Owen officers will be given executive positions in Lansing. All the equipment and stock in the Detroit plant is being removed to Lansing, and the Reo will be managed on a more comprehensive scale than the rather limited manner in which affairs had been conducted since its organization.

The Ford Motor Company is to invade New York in a manufacturing way, announcement being made of the purchase of a tract of land at Jackson and Honeywell avenues, Long Island City, upon which a four-story concrete structure, 75 x 265 feet will be erected. This building will be equipped with every manufacturing facility, and will be at the disposal of dealers and subdealers in the vicinity of New York who handle Ford cars, and their customers. There will also be a fine display room and convention hall for branch managers of the Atlantic seaboard. It is the intention to have this factory ready for business by the middle of March.

Atlanta Speedway Meet

MORE THAN HALF A HUNDRED CARS ENTERED FOR THE SECOND ANNUAL FALL MEETING—PUTTING THE TRACK IN SHAPE

ATLANTA, GA., Oct. 24—One week from next Thursday afternoon, on the Atlanta Speedway, the second annual fall meeting of the Atlanta Automobile Association will get under way, with fifty or more cars taking part. Ten days before the meet forty-seven were entered and a half dozen promised.

As most of these machines are strictly stock chassis affairs this race meet should be the best stock chassis event ever held here.

The Atlanta association will give away nearly $12,000 to the cars that take part and there should be enough entries in every event to make it exceptionally interesting. The list follows:

Thursday, November 3.—Time trials, free-for-all, 1 mile; 161-230 cubic inches, 12 miles; free-for-all, 20 miles; 231-300, 10 miles; free-for-all, Southern amateur championship, 10 miles; free-for-all, 10 miles; 451-600, 20 miles; Coca Cola trophy, 301-450, 100 miles.

Friday, November 4.—161-230 cubic inches, 10 miles; free-for-all, 10 miles; 231-300 cubic inches, 12 miles; free-for-all, 20 miles; 301-450 cubic inches, 14 miles; amateur free-for-all, 20 miles; free-for-all handicap, 10 miles; City of Atlanta trophy, 451-600 cubic inches, 200 miles.

Saturday, Nov. 5.—Event 18, Australian pursuit race; event 19, amateur free-for-all, 20 miles; event 20, Atlanta Speedway Grand Prize race, free-for-all, 250 miles.

The entries to date include: E-M-F, 2; Fiat "60"; Pope-Hartford, 3; Cole "30," 2; Cole 1911; National "60"; National "40," 2; Falcar, 3; Staver, 3; Knox "60"; Benz "200"; Darracq; Lozier "40"; Westcott; Parry, 2; Firestone-Columbus, 3; Renault; MacFarlan, 2; Halladay; Lozier; Simplex, 2; Marmon, 5; Stearns; Abbott-Detroit, 2; Marquette-Buick.

Ironing out and oiling Atlanta speedway for the fall meeting

Filling the soft spots and making the surface hard and level

Flyers Breaking Records

ENTRANTS AT BELMONT PARK INTERNATIONAL AVIATION TOURNAMENT GIVE EXCELLENT DEMONSTRATION OF AEROPLANES' STATUS

WITHOUT doubt the first international aviation meet on American soil, which is now being held at Belmont Park, L. I., has proved an immense success so far as it has progressed. The tournament opened last Saturday and will continue through next Sunday. Air experts from all the nations that have made considerable progress in the art of flying are present.

Saturday was very cloudy and foggy and the exhibition was not markedly unique save for the atmosphere of mystery that was cast about by the heavy air.

Sunday had been too windy for safe flight, and when the breeze died down to 15 miles an hour and held steady, the crowds poured out to see the flights.

At one time during the hourly distance race, there were ten aeroplanes circling the course.

Some very high speed was made. Aubrun in a Bleriot turned one round of the course at the rate of 62 miles an hour and his performance was equalled by the Antoinette, a giant monoplane, driven by Latham. J. Armstrong Drexel in a Bleriot mounted to the height of 7105 feet.

Tuesday was another favorable day for flying and the spectacle of the preceding day was repeated. On Thursday the flight from the course to and around the Statue of Liberty will be tried, weather permitting.

As a sporting event, one of the Monday races was delightful. Grahame-White in a Farman and Ralph Johnstone in a Wright were leading neck and neck until within two minutes of the conclusion of the hour, with Aubrun and Drexel in Bleriots and Latham in the Antoinette trailing. Suddenly the crowd noticed that the monoplane division was closing on the biplanes and entering the final round, the five flyers were bunched. Flying high, the Antoinette shot ahead, making the last turn with the Farman second and Aubrun's Bleriot, third. It was a finish like that of an automobile cup race or a fierce drive of thoroughbred horses as far as interest was concerned.

The patronage of the tournament has been excellent. Following is a summary of the events:

Saturday

First Hourly Distance: Grahame-White (Farman), 30 m.; 51:44 1-5.
Second Hourly Distance: Grahame-White (Farman), 30 m.; 59:23 1-5.
First Hourly Altitude: Hoxsey (Wright), 742 feet.
Second Hourly Altitude: Hoxsey (Wright), 673 feet.
Totalization of distance: Grahame-White, 2 hours; Moisant, 1:42:10 4-5; Drexel, 19:41 4-5; Hoxsey, 8:05 2-5.
Cross-Country: Moisant, 20 miles, 39:41 4-5.

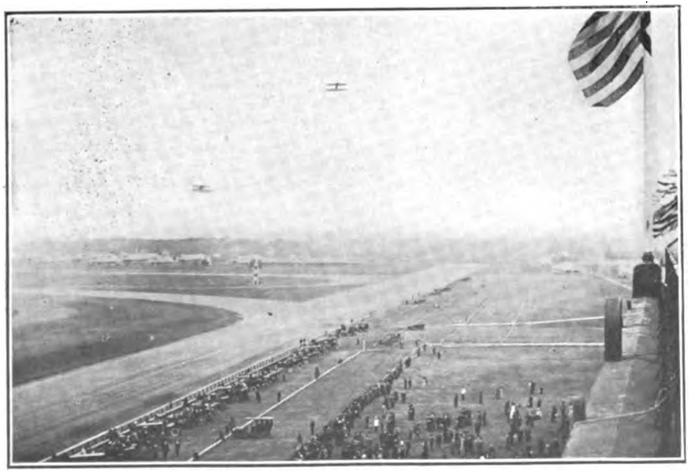
Sunday (weather prevented flights)

Monday

First Hourly Distance: Drexel (Bleriot), 42 miles; 54:33 3-5.
Second Hourly Distance: Latham (Antoinette), 31 1-2, 48:41 4-5.
First Hourly Altitude: Drexel (Bleriot), 5,615 feet.
Second Hourly Altitude: Drexel (Bleriot), 7,105 feet.
Speed Contest: McCurdy (Curtiss), ten laps in 19:49 1-5.
Daily total of duration: Hoxsey, 1:57:13 1-5; Grahame-White, 1:55:17 4-5; Johnstone, 1:49:28 2-5.

Tuesday

First Hourly Distance: Latham, 28 1-2 miles in 54:36 4-5.
Second Hourly Distance: Grahame-White, 21 miles in 34:16 4-5.
First Hourly Altitude: De Lesseps, 6,391 feet.
Second Hourly Altitude: Johnstone, 7,303 feet.
Cross-Country: Radley, 20 miles; 19:48 4-5.
Total of duration: Hoxsey and Johnstone, 2 hours; Latham, 1 hour.



View from Grand Stand at Belmont Park Aviation Meet

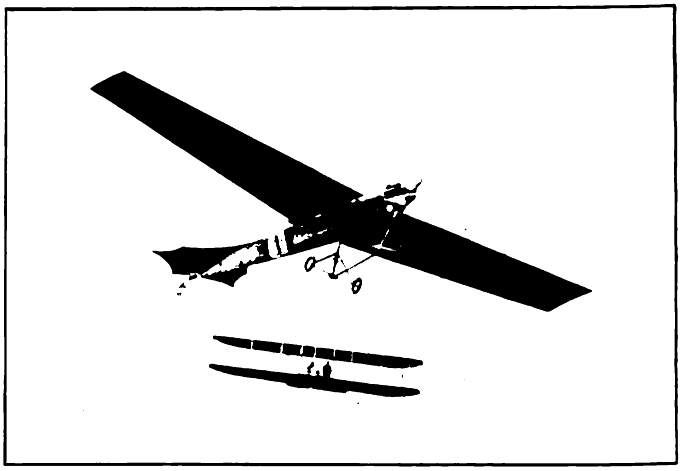
Auto Show Attracts Much Attention

While the aircraft center attention out-doors at the Belmont Park Tournament, the big betting ring under the grandstand is the scene of an attractive display of automobiles and accessories. On the right in coming from the track is the exhibit of the Peerless Motor Car Co. Two handsome limousines are shown. They are of 1911 model and represent in appearance the height of motor luxury.

Next to the Peerless is the exhibit of the Cadillac Motor Car Co. Three 1911 models are shown—a demi-tonneau, touring car and limousine. This exhibit is the most complete and comprehensive at the show and is constantly attended.

The Cole "30" is stationed next in line, showing a close-coupled car and a torpedo speedster. Prominent in this exhibit is the Massapequa Trophy which was won October 1 on the Vanderbilt Cup course by a Cole.

The Mitchell-Lewis Motor Co. shows a Mitchell equipped with a demi-tonneau of graceful lines and business-like appearance.



Latham in Antoinette and Johnson in Wright

Next in line is a Stevens-Duryea limousine.

A Chalmers demi-tonneau completes the show on the west side of the ring.

Across the main aisle is the exhibit of the West Side Y. M. C. A. school. This includes a Lozier engine in operation.

The American Propeller Co., showing a line of aero propellers, is next to the left and then come the booths of the Hartford and Goodyear tire companies, showing aero tires chifly.

The exhibit of Marburg Brothers is popular. The line on show is the Mea magneto, S. R. O. bearings and Duralumin, an alloyed aluminum which has several of the properties of steel and which is said to be important as to the future development of the aeroplane.

The Bosch Magneto has the next booth with its well-known line.

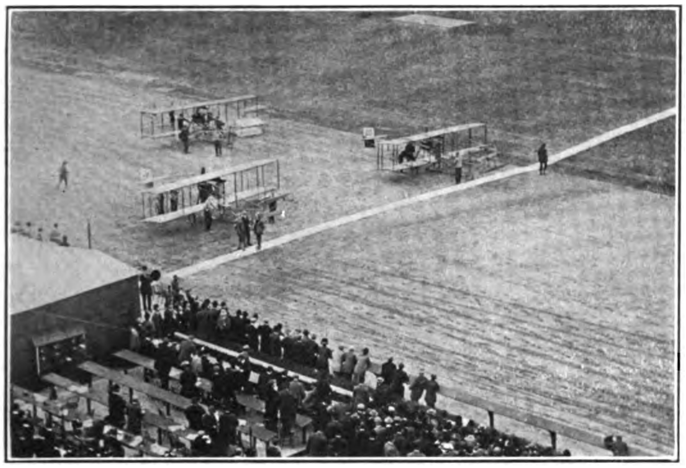
Peter A. Frasse & Co. show steel tubing and cast and turned balls for bearings.

Bliven & Carrington exhibit motor greases, steel bases and the Poldhuite line.

John A. Roebling's Sons Co. shows bare and insulated cables of all sorts, wire cloths, and drop-forged tools.

The Aerial Navigation Company exhibits a line of propellers. The Simms Magneto, Century Rubber, Livingston Radiator, showing radiators, and Booth Demountable Rims, fill up the space to the section devoted to the Aerial Equipment Co., which is showing the Anzani motor.

In the middle of the big inclosure the Metz Co., of Waltham, Mass., has the most prominent station. Two Metz automobiles are shown, a runabout and the other a special delivery package car, equipped with a drum-like receptacle for carrying packages. The cars have two 3.5 bore cylinders. The company also shows a completely equipped monoplane.



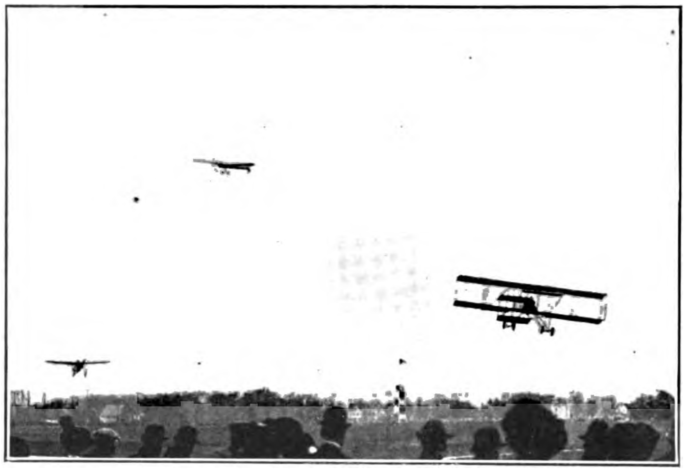
Start of One-hour Flight at Belmont Park Aviation Meet

Alongside the Metz exhibit is that of the "Ever Ready" automatic motor starter. This device is shown in action attached to an automobile. Pressure on a pedal from the driver's seat spins the engine and starts the car. The device is attached at the lower end of the radiator, secured to the crankshaft and supported upon a metal bracket. It appears like an inverted headlight and is cased in brass. The device is composed of two springs which are wound up in the first place by hand, but after the first winding, the motor itself takes care of that part of its operation. The springs are released by a trigger that is worked by the pedal. The starter is shown by the Auto Improvement Co.

The Stewart Automobile Academy completes the list of exhibitors.

Aeroplane Stresses Not Yet to Be Calculated

In view of recent fatalities and near-fatalities as well as the unimpressive ending of the aeroplane race from Chicago to New York, a technical contemporary has issued a warning to airmen coupled with the advice to go about the construction of aeroplanes armed with a full complement of stress sheets, and the daily press, in some instances, speeds the advice as sound and needful. The stress calculations used for bridge construction should be taken as a model, according to this advice, and it is the opinion of the esteemed contemporaries that many fatal accidents of the air will be averted if the advice is followed. By inference it is suggested that improved stability and equilibrium, greater reliabilty of motor power and increased efficiency in the application of power against the atmosphere are less urgently needed than stress sheets. In this connection it may be worth remembering that the load and wind stresses in bridges are calculated with a view to a very large factor of safety in the actual construction, that they relate to materials of well-established properties, that neither rapid motion nor elastic reaction nor violent shocks affecting the whole structure as a unit are of primary interest in bridges and that, despite all these elements in favor of stress calculation as against empiric data, bridges are not infrequently found to be deficient, as witness the accident to the Quebec bridge during its construction and the reinforcements which it was deemed necessary to incorporate in the Blackwell Island bridge connecting New York city with Brooklyn. Some comical incidents of the automobile industry also throw light on the subject. A prominent Belgian engineer, quite scientific, conceived the idea that stress sheets were the first requirements for making an automobile "stand up" in the days when automobiles generally didn't. The car he produced weighed about seven times as much as other cars and, while hard to move with much speed, managed to pound itself to pieces. A scientist of New York city started on the same lines, but before he and his staff were through calculating the empiric world had produced a car that was good enough for him. Even to-day many of the formulas employed for calculating dimensions for automobile parts have at some point in the chain of mathematics upon which they are founded a factor representing average dimensions of the corresponding part in a number of different and reputable automobiles, and this factor, almost needless to say, is essentially empiric as well as empirically essential. To find a substitute for this factor in the construction of aeroplanes would at the present moment be impossible for want of suitable examples for imitation The aeroplane constructor will have to do as the automobile constructor did; that is, devise a use of materials for which there is no exactly parallel precedent, while applying as best he may those after all not very complicated laws of mechanics upon which all stress calculations will be based, as soon as a sufficient mass of data shall have been gathered.



Grahame-White in foreground and the Antoinette highest in the air

A really fundamental difficulty about the working out and applying of stress sheets lies furthermore in the very contrary, almost cantankerous fact that the stresses to which an aeroplane is subject in flight depend wholly upon the action of air against surfaces, and the action of air against surfaces constitutes in itself the whole question of aeroplane construction. If it were understood well enough for admitting the calculation of stresses, such knowledge would be applied first of all to the improvement of the surfaces by which stress is brought to bear against the air for the purposes of sustentation; it would be applied for the improvement of the propeller by which stress is brought to bear against the atmosphere for purposes of propulsion, and it would be applied to all the neutral parts in order to reduce the stress of the air resistance which they encounter.

Boston Trucks in Contest

THIRTY-FIVE COMMERCIAL GASOLINE VEHICLES TAKE PART IN ROAD RUN FROM BOSTON—120 MILES UNDER SERVICE CONDITIONS

BOSTON, Oct. 22—After two days of running, covering a distance of approximately 120 miles, the different trucks entered in the Boston *American's* contest reached the Back Bay late this afternoon and were checked in. It proved quite a success, all things considered. The caravan of trucks and official cars that made the trip from Boston to Newburyport and return numbered about 50 and as the machines passed through the different cities they attracted a lot of attention.

The first day's run was 58 miles to Newburyport by way of Lowell and Haverhill. At these places checking stations were established and this allowed the trucks to be inspected. It was the same story on the return trip of 62 miles through Gloucester, Salem, Lynn, etc.

The trucks were divided into five classes according to their capacity and a sixth division was added for private owners. All the classes filled pretty well considering that it was not a club affair. The machines were started off from Boston by Mayor Fitzgerald at nine Friday morning with the heavy trucks getting the right of way. They were allowed a speed of six miles an hour. The others were given varying time limits according to loads and capacity. On the return it was found that the big trucks did so well that a speed of eight miles an hour might be made without trouble and so this was ordered. It was an instructive object lesson in commercial vehicle transportation to watch the machines touring along carrying loads of furniture, wire, coal, lumber, flour and a lot of other such stuff on the long hauls.

One of the gasoline stations in Boston commercial run

Many of the Boston dealers took a hand in it to help make the run a success by doing the official work and loaning cars to convey interested persons.

One of the most notable features of the test was the few accidents to the trucks entered in the run. In each instance where accidents happened there was not an occasion when the trucks meeting with mishaps could have been found at fault in any way. The first truck in trouble was a five-ton Reliance which when entering Billerica, on the first day's run, skidded while passing through a bed of soft sand and was ditched. The truck was disabled to an extent that the repairs necessary to continue could not have been made.

The Johnson truck was next to meet with an accident which was brought about by the slippery street car rails on which the truck skidded and smashed into a telegraph pole. The force of the impact was so great that both of the front wheels of the truck were demolished.

The final awards will not be made until the cost of operation has been computed. Following is the record of the test:

CLASS A

3 Hart Kraft, clean.
11 Warren Detroit, clean.
18 Metz, 10 points.
19 Metz, 38 points.
20 Metz, withdrawn.
44 Reliance, 164 points.
47 I. H. C., clean.

CLASS B

4 Atterbury, clean.
5 Gramme, withdrawn.
2 Rapid, clean.
8 Rapid, clean.
9 McIntyre, clean.
10 McIntyre, withdrawn.
13 Franklin, clean.
23 Victor, clean.
30 Randolph, withdrawn.
21 Wilcox, clean.

CLASS C

28 Garford, clean.
29 Garford, clean.
30 Alco, clean.
34 Frayer-Miller, 6 points.

CLASS D

6 Knox, clean.
32 Frayer-Miller, clean.
33 Frayer-Miller, clean.
35 Johnson, clean.
36 Johnson, withdrawn.

CLASS E

24 Sampson, clean.
26 Morgan, clean.
48 Reliance, withdrawn.

PRIVATE OWNERS

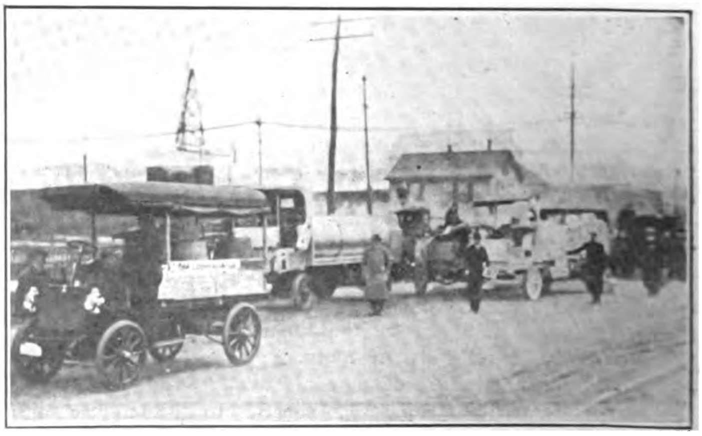
17 Rapid, clean.
1 Autocar, clean.
40 Gramme, clean.
41 Autocar, clean.
43 Frayer-Miller, clean.
49 Mack, clean.

Many Penalties in Washington Reliability

WASHINGTON, D. C., Oct. 25—At the end of the fourth day of the Washington *Post* run from Washington to Richmond and return the score stood as follows: No. 5 Washington, clean; No. 11 Parry, 1 point; No. 6 Washington, 2 points; No. 9 Maxwell, 3 points; No. 8 Maxwell, 8 points; No. 14 Buick, 9 points; No. 7 Columbia, 22 points; No. 3 Buick, 64 points, and No. 12 Washington, 928 points. The most serious accident of the first day was sustained by Griffin Halstead's Washington car. While negotiating a rough piece of road near Purcellville the car dropped into a hole, breaking the front axle. He telephoned to Washington for a new axle and expects to check out in the morning. Arrison's Washington car was close behind Halstead and in endeavoring to avoid hitting it, Arrison stalled his motor, and suffered a loss of one point. Mortimer's Buick "10" had trouble with a loose oil sight feed and lost five points, while the Buick "Bug" lost one point for similar trouble.

Upon arrival at Washington it was announced that there were no remaining clean scores.

A Buick "17," with Willis Cronkite at the wheel, is acting as pilot car, while a Washington, driven by H. F. Baughmann, serves as the referee's car.



Contestants lining up at a control

Twenty-one Enter Grand Prize

LIST, NOT YET COMPLETE, IS IMPRESSIVE, AND EXPERT SAYS AMERICAN ROAD RECORD WILL BE BROKEN IN

SAVANNAH, Oct. 24—The course over which the Grand Prize race for the international trophy of the Automobile Club of America will be run November 12 will be 17.2 miles long. This shortening of the route was effected by cutting off the Thunderbolt Road protuberance, thus leaving the course in the shape of a rough quadrilateral, with two stretches of practically straight, flat, superlatively smooth roadway, five and eight miles in length. Massage work on the course is being prosecuted by 250 men and already it appears to be in almost perfect condition, some of the cracks who have been over it recently predicting a general shattering of records next month.

The actual list of paid-up entrants includes two Marquette-Buicks, two Marmons, three Fiats, three Benz cars, one Roebling-Planche. two Loziers, the double Vanderbilt Cup winner, the black Alco, three Nationals, Simplex, two Lorraine-De Dietrichs, and a Renault.

To date the entry list for the two light car events to be run off November 11 includes three Falcars, one Marmon, one Marquette-Buick, three Maxwells, two Coles, two Abbott-Detroits and two Cartercars.

In writing exclusively to THE AUTOMOBILE, C. A. Emise, of the Lozier Co., says:

"I went over the course yesterday with Mulford and he did not hesitate to say that it was the best ever laid out on American soil. He expressed the opinion that the American road racing record would be broken and that the possibility existed that the world's mark would be set at a new level. Our car can average better than 70 miles an hour on this course and if that is good enough to win, we will be there or thereabouts.

"There are only three turns that have to be taken at less than 50 miles an hour and the surface is lightning fast throughout. The Ferguson avenue boulevard, some seven miles straightaway, will give an opportunity for the big racing machines to let themselves out to the extreme limit of motor car speed.

"Mulford figures that if the Lozier can do in excess of 70 miles an hour the special racing machines ought to do better. if they stand up. He looks for some of the rounds to be made at the rate of 90 miles an hour.

"In 1908 the course was practically new and, as every one who was here remembers, the surface was perfect. Since then two years have elapsed and the roads have had a chance to settle. The traffic has never been heavy and when the racers start the course will be marvelously fast.

"The Savannah Automobile Club is taking hold of the work of preparation with its accustomed vim and energy."

Group of officials at a checking station—Boston truck run

Entries Stream in for "American's" Truck Test

Following is the list of entries in the New York *American's* Commercial vehicle contest, to be run next Friday and Saturday:

Entrant	Truck ..	Capacity, lbs.
GASOLINE TRUCKS. Div. 1—1,000 lbs. and less		
Hart-Kraft Motor Co	Hart-Kraft	1,000
Veerac Sales Co	Veerac	1,000
Chase Motor Truck Co	Chase	1,000
Hadfield Company	Hatfield	1,000
Hadfield Company	Hatfield	1,000
John Moore & Co	Brush	600
John Moore & Co	Brush	600
Division 2—1,001 to 3,000 lbs.		
Victor Motor Truck Co	Victor	3,000
Ladue Carmer Co	Atterbury	3,000
John Wanamaker	Autocar	2,000
Commercial Maintenance Co	Grabowsky	2,000
Motor Car Maintenance Co	Grabowsky	2,000
Grabowsky Power Wagon Co	Grabowsky	2,000
Torbensen Motor Car Co	Torbensen	2,000
Cass Motor Truck Co	Cass	2,000
Flanagan Motor Car Co	Monitor	2,000
Alden Sampson Mfg. Co	Alden Sampson	1,500
Chase Motor Truck Co	Chase	1,500

Johnson clean score truck, No. 35, in Boston commercial run

Entrant	Truck	Capacity, lbs.
Division 3—3,001 to 5,000 lbs.		
Walter Auto Truck Mfg. Co	Walter	4,000
Kelly Motor Truck Co	Kelly	5,000
Renault Frères Selling Branch	Renault	3,500
Division 4—5,001 to 8,000 lbs.		
Schleicher Motor Vehicle Co	Schleicher	6,000
Knox Automobile Co	Knox	8,000
Alden Sampson Mfg. Co	Alden Sampson	8,000
W. A. Wood Auto Mfg. Co	Commer Car	8,000
Standard Gas & Electric Power Co	Standard	8,000
Carlson Motor & Truck Co	Carlson	6,000
General Acoustic Co	British Atlas	6,000
Kelly Motor Truck Co	Kelly	7,000
Motor Car Maintenance Co	Grabowsky	6,000
American Locomotive Co	Alco	6,000
Walter Auto Truck Mfg. Co	Walter	6,000
Division 5—10,000 lb. and Over		
Metzger Motor Car Co	Hewitt	20,000
Benz Auto Import Co	Gaggenau	14,000
R. L. Morgan Co	Morgan	10,000
Alden Sampson Mfg. Co	Alden Sampson	10,000
ELECTRIC TRUCKS		
Abraham & Straus	Lansden	2,000
General Electric Co	General Vehicle Co.	2,000
General Vehicle Co	General Vehicle Co.	3,000
P. Daussa & Co	General Vehicle Co.	6,000
General Vehicle Co	General Vehicle Co.	1,000
General Vehicle Co	General Vehicle Co.	2,000
General Vehicle Co	General Vehicle Co.	4,000
General Vehicle Co	General Vehicle Co.	7,000
General Vehicle Co	General Vehicle Co.	10,000
The Lansden Co	Lansden	3,000
The Lansden Co	Lansden	3,000
R. H. Macy & Co	Lansden	2,000
John Wanamaker	Commer Car	2,000
Edison Co. of Brooklyn	General Vehicle Co.	10,000
Central Brewing Co	General Vehicle Co.	10,000
Central Brewing Co	General Vehicle Co.	6,000
Borden Condensed Milk Co	General Vehicle Co.	7,000
Alex D. Shaw	General Vehicle Co.	7,000
Apmann & Meyer	General Vehicle Co.	2,000
Edison Brooklyn Co	Auto Maintenance Co.	3,000

Automobile Notes at Hoosier Capital

INDIANAPOLIS, IND., Oct. 24—The Circuit Court has held invalid the ordinance requiring all drivers of automobiles and riders of motorcycles to register with the Board of Public Safety and pay a license fee of $1. There have been 4,224 licenses issued under the ordinance, and it is improbable the fees collected will be returned as they were not paid under protest. Objection was raised to the ordinance because it required no qualifications to obtain license, yet left it to the discretion of the board to issue or decline to issue licenses. Objection was also raised to the feature permitting the police judge to revoke licenses for violation of any automobile law or ordinance.

About 200 automobiles were in the industrial parade given by the Indianapolis Trade Association last Tuesday night, eighty-eight of the number being automobile trucks carrying special exhibits of manufacturers and wholesalers of the city. The exhibits of the automobile concerns were elaborate, many having 1911 models in line. The Willys-Overland Company had a special display representing the evolution of transportation. This consisted of an Indian drag, a horse-drawn vehicle and an automobile. The Waverley company, among other things, displayed a coupè on a brilliantly illuminated and beautifully decorated electric truck. The parade was seven miles long, 179 business concerns participating.

The Cole Motor Car Company has recently increased its capital and will build approximately 2,000 cars next season.

Two New Michigan Companies Formed

DETROIT, Oct. 24.—From Lansing comes the announcement of the formation there of a million dollar company which will manufacture motor trucks designed under the direction of R. E. Olds, president of the Reo Motor Car Company.

The Brady-Nagel Manufacturing Company has been organized here, and is negotiating with several concerns making automobile parts and doing special machine work, with a view to consolidating them into one big organization. James J. Brady, formerly vice-president and superintendent of the Chalmers Motor Company, is president of the new concern; William J. Nagel, formerly deputy city controller, is secretary and treasurer, and George Henderson, formerly assistant superintendent of the Chalmers plant, is superintendent.

Richmond Auto Club Elects Officers

RICHMOND, VA., Oct. 24.—The Richmond Automobile Club at a recent meeting elected officers as follows: Horace S. Hawes, president; E. C. Pelouze, vice-president; Melville C. Peck, secretary and treasurer. Preston Belvin, W. B. Nelson, Dr. M. D. Hodge, Jr., John B. Swartout and Rufus C. Williams, executive committee.

Six new members were elected: Dr. A. G. Franklin, Dr. H. B. Sanford, Dr. Charles R. Robins, Joseph Sorg, H. W. Rountree and John C. Easley.

Short News of Interest

—W. J. Connell, Boston representative of the Wheeler and Schebler carbureter factory, of Indianapolis, has changed his location to 555 Boylston street.

—The Halladay Motor Car Company, of 1224 South Olive street, Los Angeles, Cal., has just been organized to handle Halladay cars in California.

—The Heaney Automobile Company, of Minneapolis, Minn., northwestern distributors of Halladay cars, have just completed an additional two-story building.

—The Superior Motor Sales Company has been incorporated in St. Louis for $75,000, to effect a reorganization of the recently established business of M. M. Baker & Company, 2007 Locust street.

—Stephen Holt has been appointed Eastern selling representative of the Abbott Motor Company, of Detroit, and will have New York, Pennsylvania, New Jersey and Maryland, with headquarters at Philadelphia.

—Announcement is made of the increase in capital stock of the Phoenix Auto Supply Company, of St. Louis, from $12,000 to $50,000, fully paid. The assets of the company are scheduled at $105,421, the liabilities $44,365.

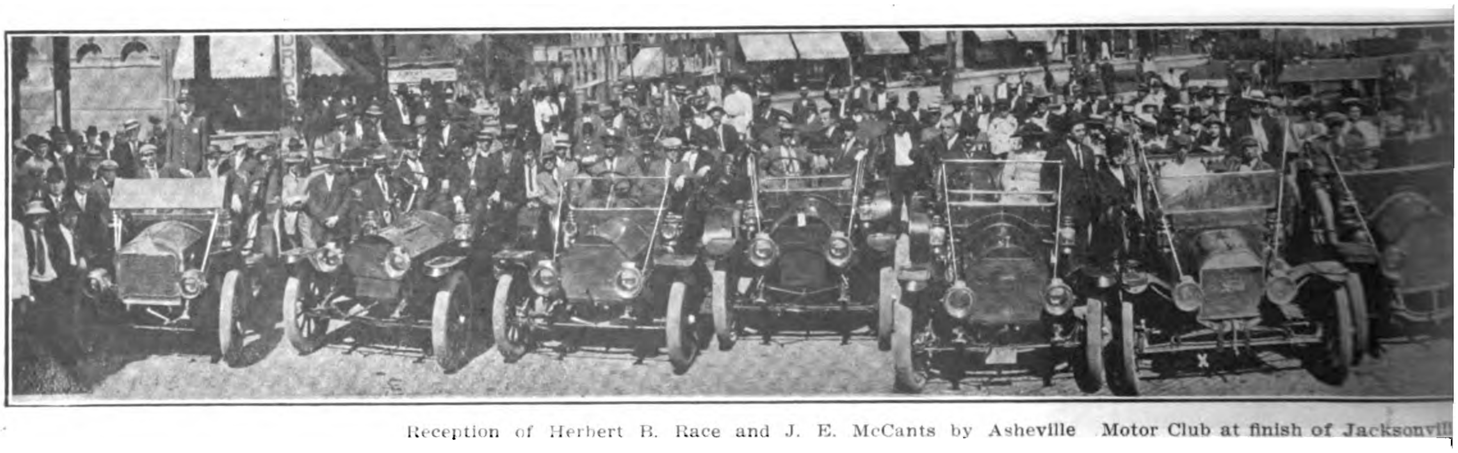
—W. H. Marble, formerly connected with the purchasing department of the Chalmers Motor Company and the Pullman Motor Car Company, has joined the sales force of the Abbott-Detroit Motor Company in the Middle West.

—Berne Nadall, member of the contest board (technical committee) of the A. A. A. and also one of the original Chicago Motor Club (technical committee), has joined forces with the Rayfield carbureter, as special factory representative.

—J. S. Bradfield, for eight years connected with New York and Boston newspapers, is now a member of the salesforce of the Cole "30" in Boston. He was one of the first men in Boston to get the taxi service started through consultations with Police Commissioner O'Meara.

—The Stephenson Motor Car Company, of Milwaukee, Wis., builder of the Utility truck, has opened its new plant at South Milwaukee, which was leased for one year with a three-year option in addition. The plant, formerly occupied by a wrench and tool concern, has been entirely remodeled and a new equipment installed. Thirty to forty men are now being employed. Two types are built, a one-ton car at $2,000 and a three-ton truck at $3,500. George L. Stephenson is president of the company.

—While the principal object of the newly formed Western Automobile Association is to get a broad and speedy highway built between British Columbia and the Northern border of Mexi-



Reception of Herbert B. Race and J. E. McCants by Asheville Motor Club at finish of Jacksonvill

IEF ITEMS CULLED HERE AND THERE FOR ICK READING—INTERESTING ALIKE TO MAKER D USER

co, it will first take up the improvement of roads in the West, particularly the road between Portland and Seattle. With good roads the trip between Seattle and Portland would be an ideal twelve hours' drive.

—The usual Fall shifts are taking place in Atlanta's automobile colony. The Henderson Motor Co. of Atlanta has opened headquarters to sell Cole and Westcott cars. F. J. Long, formerly of the Olds-Oakland Co., has taken charge as manager. The Warren Motor Car Co. has had a representative in Atlanta looking for some man to take charge of a local agency. The Stearns Co. has opened a local branch with John Toole in charge.

—The new plant of the Ford Motor Company in Highland Park, Detroit, has been opened in all its departments. Operations have been conducted there on a liberal scale, although much of the work was done in the old Piquette avenue plant while the power house for the new plant was being put in commission. Now the scene has shifted, and henceforth the new plant will be the real center of activity. The plant will employ 4,500 men, and has a daily capacity of 240 complete cars.

—Three additional agencies were opened in Boston during the past few days. I. Ross Lippard, general manager of the Victor Motor Truck Company, of Buffalo, placed an agency for his line with the Curtis-Hawkins Company, handlers of the Speedwell in the Hub. Fisher and Allison, of the Prestolite Company, formed the Empire Motor Car Company to handle the Empire "20" in Massachusetts, with headquarters at 94 Massachusetts avenue, and the Kline agency was opened with salesrooms in the Motor Mart, Park square, with N. L. Rush as manager.

—Arrangements have been made for exhibiting Overland cars at the Paris and London auto shows this winter. S. Krauss, manager of the foreign department of the Willys-Overland Company, has just returned from a trip of 7,000 miles by motor car, through England, France, Germany, Belgium, Holland, Denmark, Norway, Sweden, Russia, Austria and Hungary. He had the distinction of being the first American tourist to take advantage of the Tryptique system. In many sections traversed it was the pioneer invasion of the American car and attracted much attention.

—At the adjourned meeting of the Wisconsin State Automobile Association in Milwaukee the following additional directors were elected: R. D. Gorham, Monroe; J. E. Plum, Manitowoc; P. C. Avery, Milwaukee; C. H. Moore, Oakfield; John W. Tufts, Milwaukee; C. D. Dickinson, Appleton; Emil Schandein, Milwaukee; A. P. Cheek, Baraboo; H. O. Deysonroth, Columbus; Dr. R. W. Edden, Janesville. The board is now made up of 25 members, and each local club is represented.

Will Sell Drop Forgings and Die Castings

Incorporation papers are being put through this week for a large selling company that will handle the entire output and be the sole representative of the Billings & Spencer Company, of Hartford, Conn., large producers of drop forgings and tools, and the E. B. Van Wagner Manufacturing Company, of Syracuse, N. Y. Negotiations are under way with two or three other companies.

The name of the corporation will be Claire L. Barnes & Company, and the capital stock is $30,000. Claire L. Barnes will be president and general manager. The general offices will be in Chicago, with branches in Detroit and New York.

Mr. Barnes remains an official of the Billings & Spencer Company, and will also become an official of the E. B. Van Wagner Manufacturing Company. He was secretary of the Detroit Steel Products Company until he resigned to become sales manager of the Billings & Spencer Company. He is director in the Motor & Accessory Manufacturers' Association.

American Fiat Factory's First Cars

The Fiat Company, of Turin, Italy, has just attained the realization of a project which they had determined upon nearly three years ago, namely, the operation of a factory in the United States for the simultaneous production here of such of its models as are in greatest demand in America.

The demonstrating cars of the 35-horsepower 1911 model will be shown to the public in Turin and in New York at the same relative hour.

Like all Fiat models, this new car is built entirely in the Fiat works, many of the more vital parts, especially those composed of special alloy steels, being furnished by this company's Turin shops. The American factory is at Poughkeepsie, N. Y.

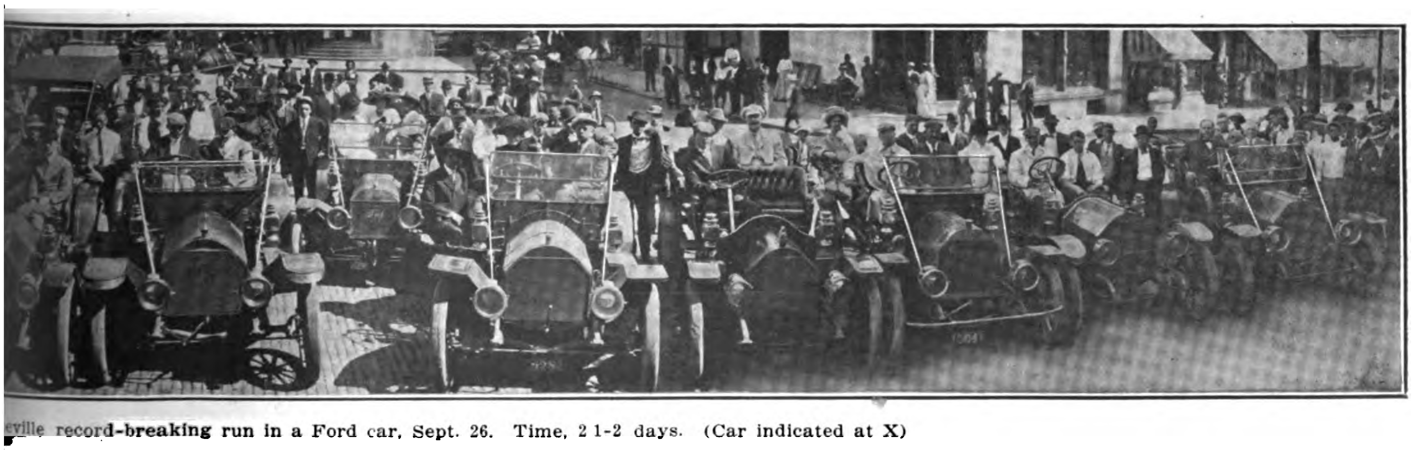
Worcester Club Leases Old Quarters

WORCESTER, MASS., Oct. 24—The governors of the Worcester Automobile Club held a special meeting at their temporary headquarters in the Bay State House, Friday night, and voted in thirty-four new candidates for membership, twenty-nine of which were formerly members of the Hancock Club, which recently voted to merge with the local automobile club.

The plan of taking over the Hancock club house at Lincoln Square, which was talked of by the officers and board of governors of the Worcester Automobile Club, has been dropped and the old quarters re-leased with several more rooms.

The new rooms of the club or the old ones which were destroyed by fire will be completed by the first of the year and will be far superior to the old suite in every way.

Included in the new headquarters will be two dining rooms, two card rooms, ladies' reception room, ladies' dining room, reading room, billiard room, Dutch room, library and office, besides a large general reception room.



ville record-breaking run in a Ford car, Sept. 26. Time, 2 1-2 days. (Car indicated at X)

Prominent Automobile Accessories

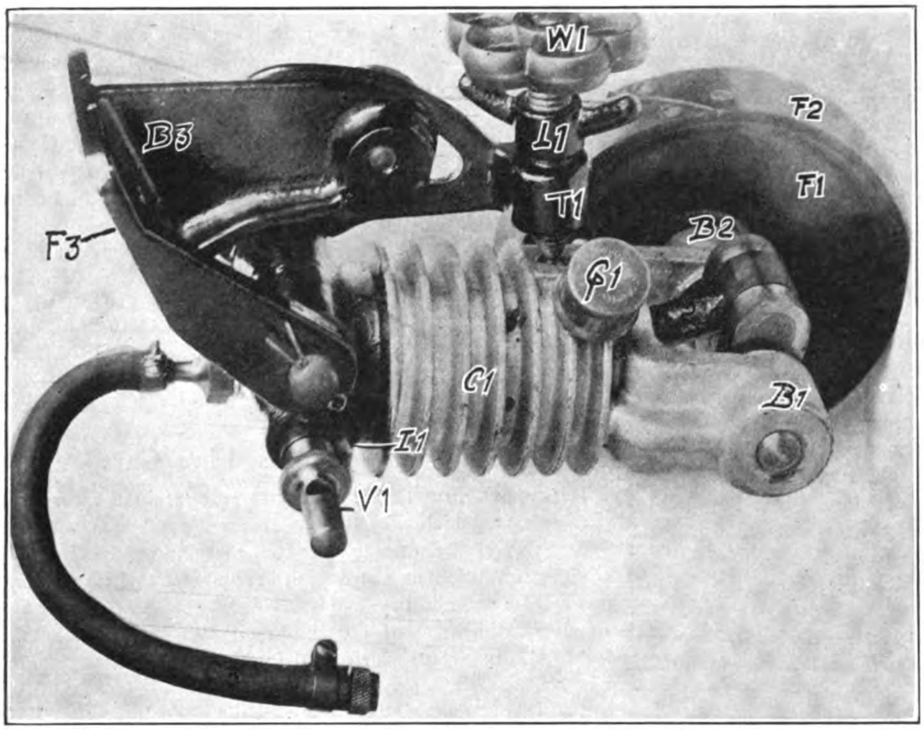


Fig. 1—Tryon tire pump made to take its power from the flywheel of the motor of the automobile and whistle when the tire is inflated

FOR INFLATING AUTOMOBILE TIRES

Next to maintaining tires in good condition, free from open wounds, it is necessary to maintain the tire pressure so high that flexure will be avoided, otherwise the life of the fabric will be reduced below the point of economy, even to the level of the commercially impossible. The tire pump as illustrated in Fig. 1 offers a fine opportunity to keep the tires properly inflated, which is more than can be expected from a motorist on a hot Summer day using a hand pump of no great pretension.

This pump is comprised of a cylinder C1 of cast gray iron, fastened to the bracket B3 of bronze, and air is sucked into the cylinder, due to reciprocation, when the flywheel F1 is brought into contact with the flywheel of the motor, the face F2 of the flywheel F1 being covered with leather, so that the friction will be adequate for the intended purpose when the tightening screw T1 is screwed up by turning on the wheel W1, after which it is locked by the wing-nut L1. The crankshaft rotates in bearings B1 and B2, and the connecting rod C2, of bronze, is provided with liberal bearings at pin and cross head so that the whole structure is substantial and well made.

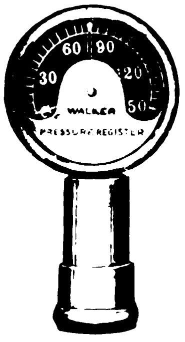


Fig. 2—A device to register tire pressure

The device is fastened to the chassis frame at a point opposite the flywheel of the motor, and the face F3 of the bracket B3 is wide, and finished accurately, to accommodate itself to the rest it is given on the web of the chassis frame. Air, under proper pressure, leaves the pump through the hose connection C3. When the air is pumped into the tire to be inflated up to the desired pressure, a whistle in the valve V1 makes a shrill sound, warning the automobilist of the fact, and an indicator I1 on the side of the valve V1 tells how much pressure is in the tire. This pump is made by the Tryon Auto Pump Co., with headquarters at 1733 Broadway (Room 205), New York City. Thos. Jacobs is president of the company, and the inventor, E. E. Tryon, is vice-president; Arthur W. Leonard is secretary.

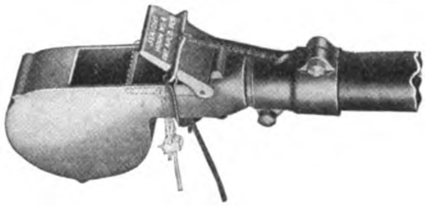


Fig. 3—Signal operated by the exhaust

JERICHO MOTOR CAR SIGNAL

As will be seen from Fig. 3 this instrument or whistle is placed on the outlet of the exhaust pipe and secured to it by a double clamp coupling. Made from aluminum and compact in size, the attachment adds but little extra weight to the car. As all the necessary fittings are supplied, occasional lubrication and cleaning is all that is required. This horn is manufactured by the Randall-Faichney Company, Boston, Mass.

TO SAVE THE HANDS IN WINTER

To prevent the hands from chafing and protect them from the cold in Winter the "Eze-Grip" removable wheel cover (Figs. 4 and 5) should fill a long-felt want. It is considerably more elegant than binding twine round the wheel and in the event of wet can be unlaced and speedily removed. It is made of soft, pliable leather either in black or tan and lined with soft wool felt. It is made by the Hayne Surridge Commission Co., Lucas avenue, St. Louis, Mo.

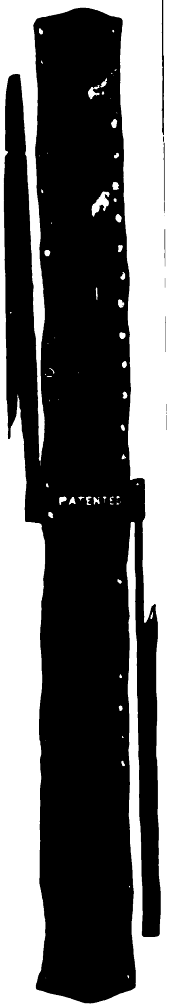


Fig. 4 — "Eze-Grip" unwrapped

PRESSURE REGISTER

The latest tire gauge to be marketed by H. W. Walker, of Syracuse, N. Y., is known as the Walker Tire Pressure Register, No. 2 (Fig. 2). This is a small register, three inches long and designed so as to be easily carried in the vest pocket. This gauge is fully guaranteed to be accurate and reliable by the manufacturer.

Fig. 5—"Eze-Grip" applied to steering whee

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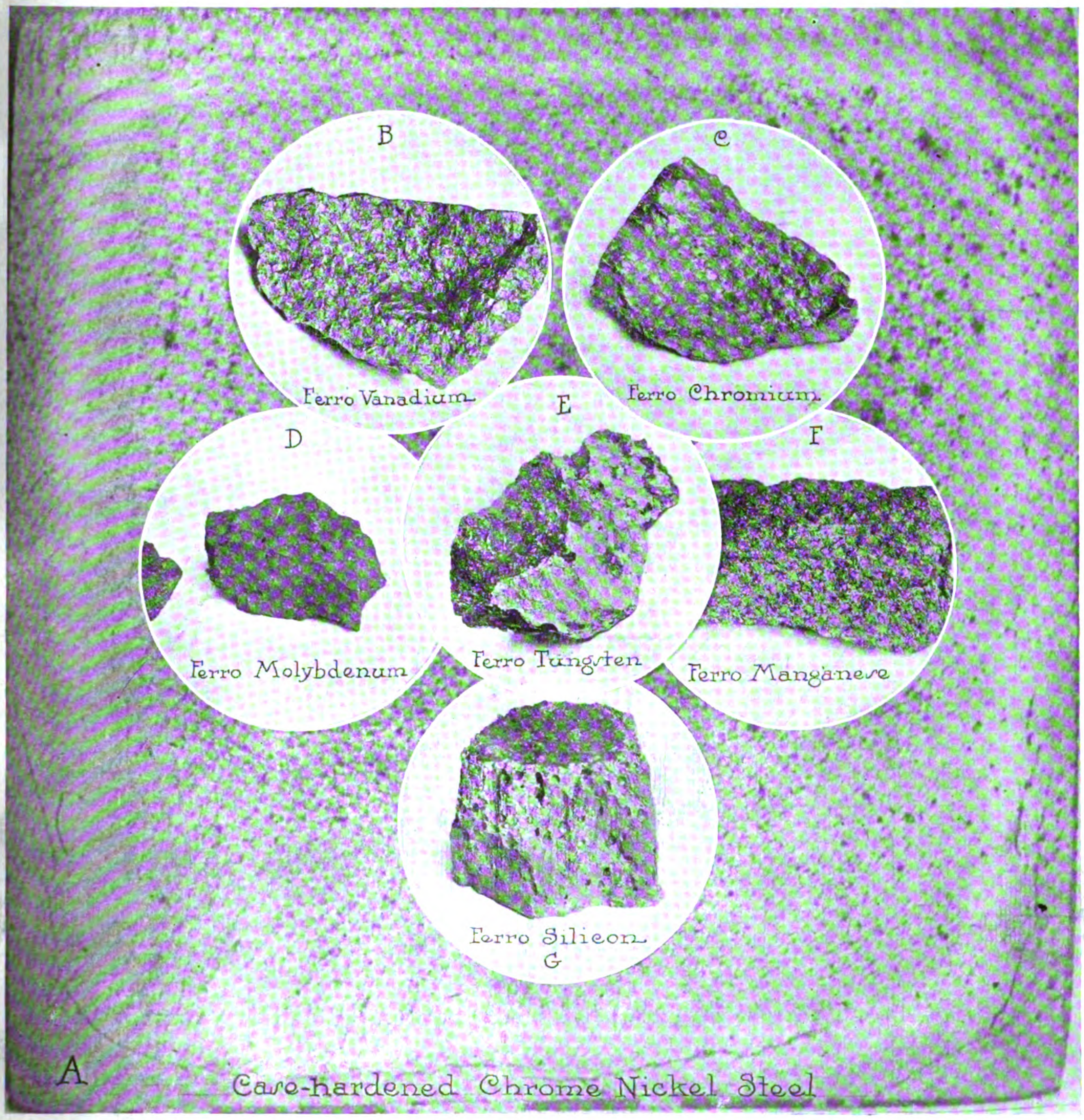
THE AUTOMOBILE

PROBLEMS OF STANDARDIZATION



PROGRESS in the automobile art has been so rapid that the questions of standardization have been handled as the natural result of practical effort without any attempt to direct the issue. In some ways it has proven to be advantageous to "cut and try" rather than to fix upon a standard only to find as the result of practice that the standard itself was cramped. Within the year the leading engineers, realizing the short-comings of a too rapid growth, took the time to assemble at Detroit,

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under the auspices of the Society of Automobile Engineers, devoting themselves to the good of the industry, with particular reference to the questions of standardization. Excellent headway was made and a plan of campaign was mapped out such as should resound in the building of better automobiles, with a two-fold direct advantage, *i. e.,* (a) the elimination of extravagances in the various manufacturing processes, and (b) the purchase and use of more appropriate and regular grades of raw material.

Many of the problems that have to be coped with are almost beyond the province of the automobile engineer. Take steel as an illustration of the point to be made; if the policy of any given maker of automobiles is such that the engineering department of the same company is compelled to use steel from a mill that is devoted to "quantity production," the probability of obtaining a good automobile out of quantity steel is in the ratio of 1 to 1,000,000. The fact remains that the engineer in charge will not be able to outshine his Board of Directors, so, that no matter how skillful the design may be, it will become

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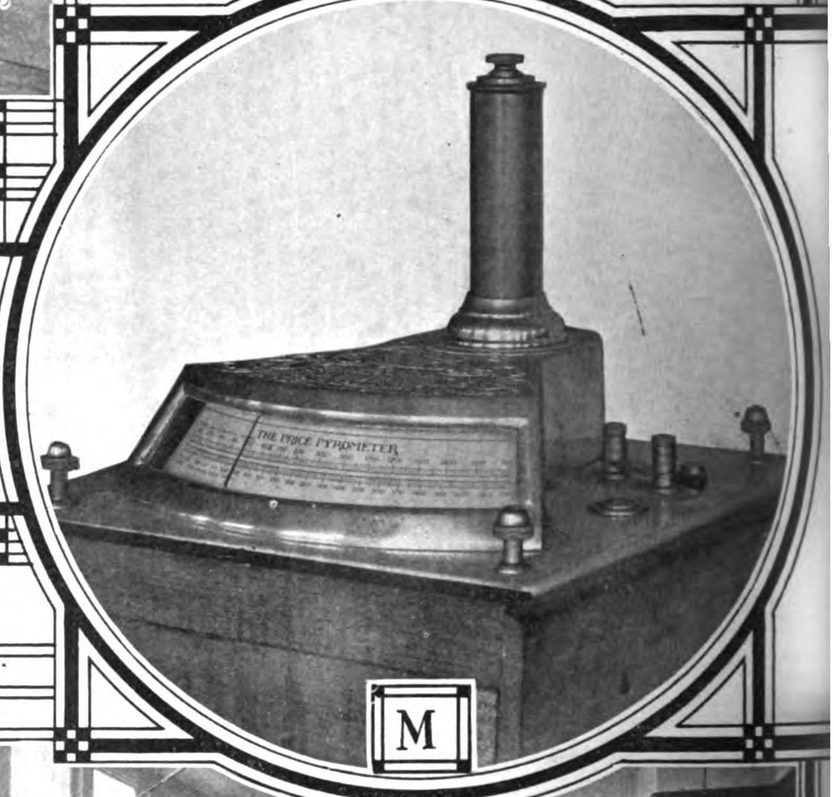

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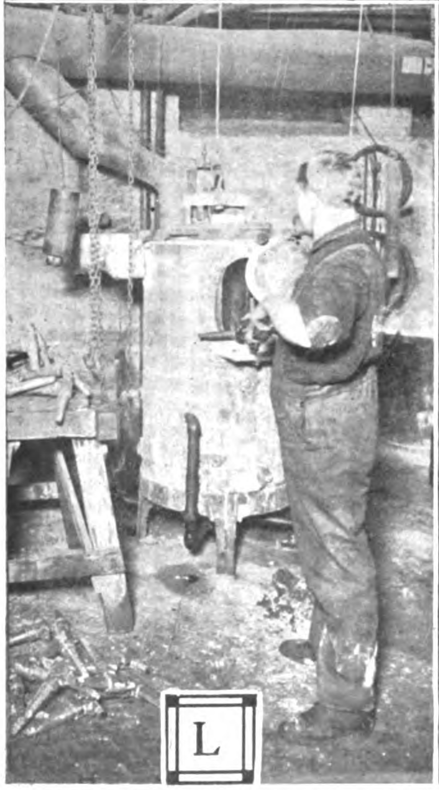

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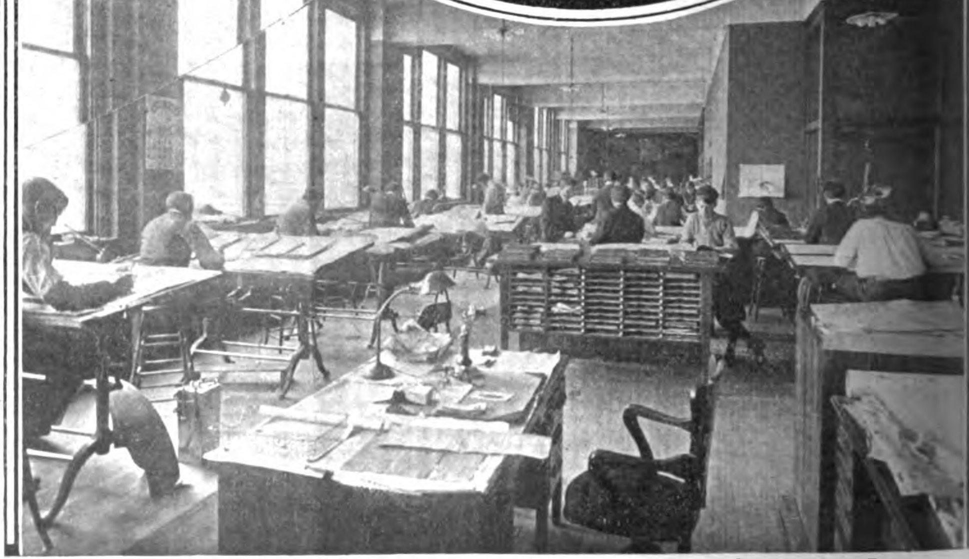
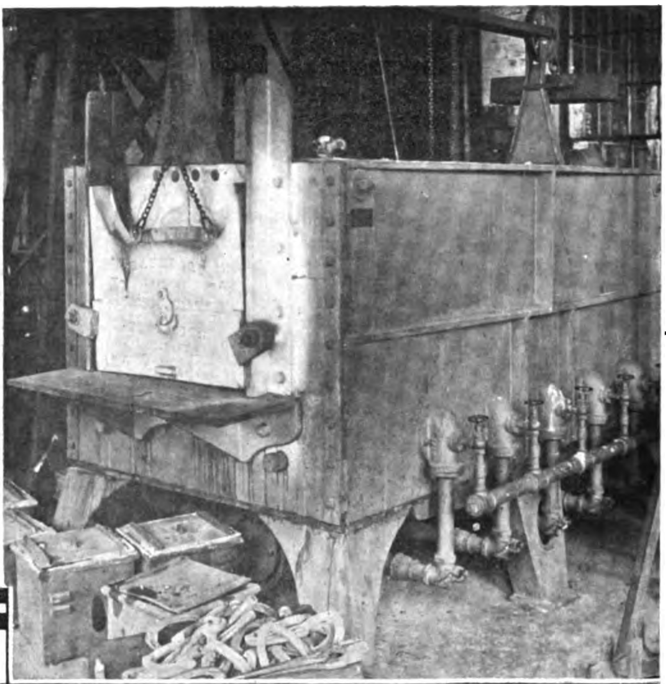


a monument to the stupidity of the concern that inflicts it upon an unsuspecting clientele.

The illustrations here afforded are offered as suggesting a line of thought, and referring to Fig. N of a commodious, well-lighted, and altogether comfortable designing establishment, the thought occurs that such a fine place devoted to the methods of giving concrete expression to the official thoughts of an official engineering corps could be of no lasting value in the face of commercial domination of the character that would compel the use of quantity-produced steel in the building of the product.

Every designer, when he starts out to fashion a part, must decide as to the strength and appropriateness of the material he proposes to use in order that he will be able to fix upon the percentage of the ultimate strength that is safe to preempt, taking into account the kinetic qualities of the material if the work is of a kinetic character, or the static ability of the steel if the load is quiescent. What a waste of time, then, to discover that the purchasing officer of the company is instructed by its Board of Directors to patronize a quantity mill.



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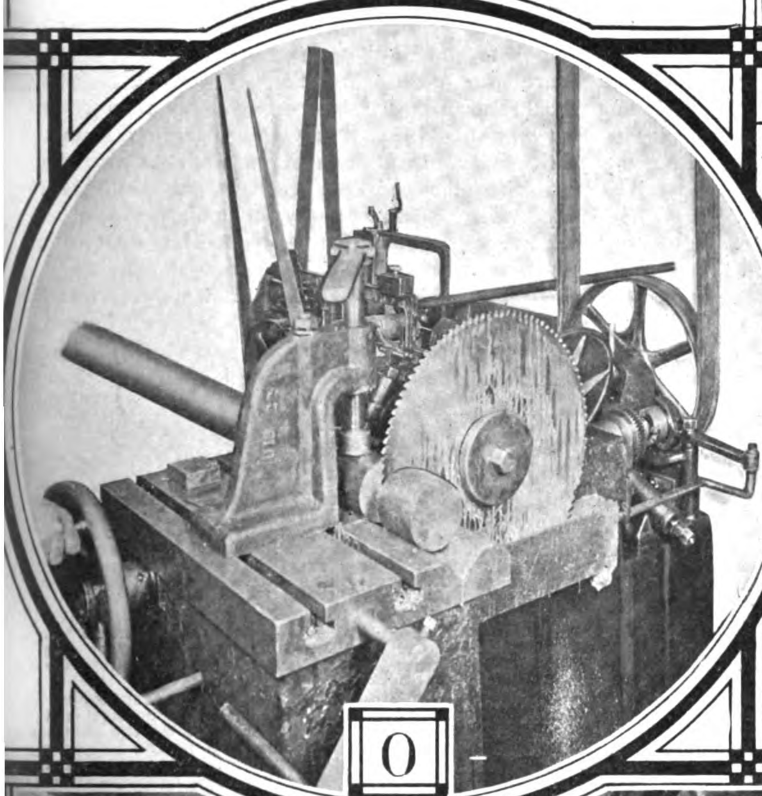

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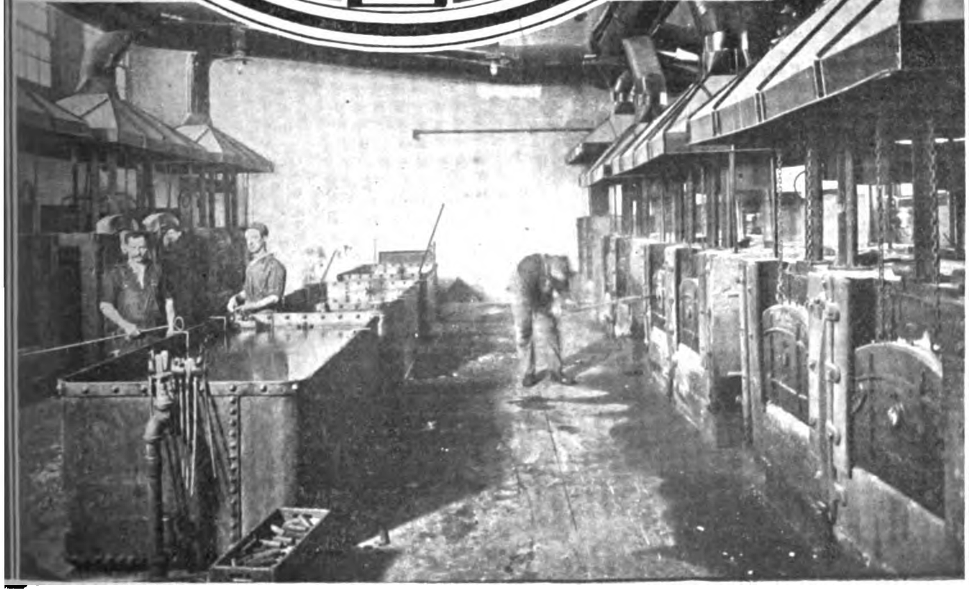

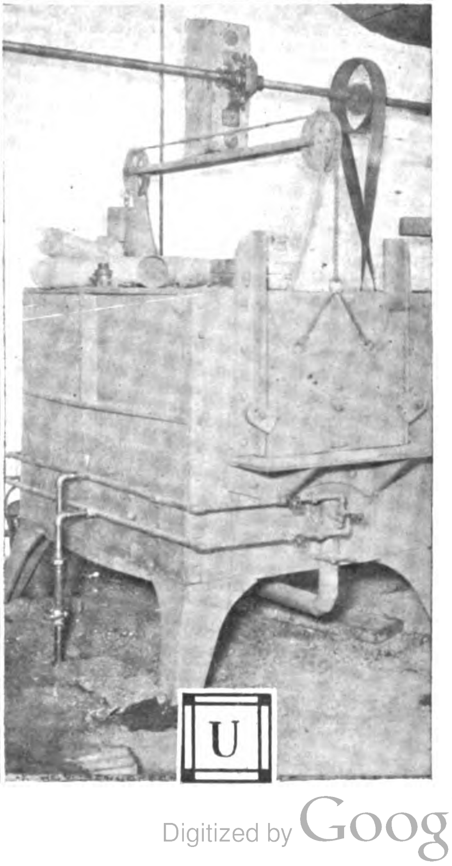

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Electric Refining of Steel Promises a Future

Of what possible avail will it be to claim that automobiles are up to the highest obtainable standard if the material used therein does not check up with the high claim? In the October issue of *Metallurgical and Chemical Engineering,* Joseph W. Richards reviewed the conditions as they obtain in Germany, taking cognizance of the refinements there made in the production of steel, utilizing electric furnaces, and he states on page 563: "A prominent American mechanical engineer, on returning from Germany, declared that the Germans were fifteen years ahead of the United States." The article deals with the electric production of steel at the Stahlwerke Rich. Lindenberg, Aktien Gesellschaft at Remscheid-Hasten; and in concluding Mr. Richards says: "Americans, wake up!"

In describing the qualities of electrically refined steel in THE AUTOMOBILE of September 15, it was pointed out that the quality of the fabric is better, considering a given grade of ores, that the metalloids are less deleterious in their action, and that the process is one that offers wide possibilities beyond the realization of the present time in so far as production is tied down to old and less efficacious methods.

Alloy steel has been developed to a high state in response to automobile requirements, and yet many automobile engineers have had but poor experience with the alloyed fabrics. It is not uncommon to find that an inferior grade of steel is rendered even less fit, due to the mingling of alloying elements, but those of the fabricators of steel who are mostly concerned about the size of their dividends take advantage of high-sounding phraseology, wasting good alloying elements in a poor field, and make up for lack of quality by loudness of talk long enough to inflict an impossible product onto the attention of an unfortunate engineer, making the same charge as if the very quality they talk about were present.

It seems to be the habit to charge a minimum of about 12 cents per pound for a fabric carrying chromium and nickel. An inferior grade of relatively high carbon steel that is doped with these elements is as easy to machine as a hunk of flint. Paying 12 cents per pound for this impossible material is a mere detail; it costs $12.00 per pound to machine it. On the other hand, there are grades of chrome-nickel steel that are marvelously strong, and their kinetic qualities are pronounced, notwithstanding which fact tooling is not difficult, considering, of course, the use of modern machinery equipment and the use of tungsten steel for the cutters.

In the same way, alloying with vanadium in conjunction with nickel or chromium, or both, or using vanadium alone, brings home to the ambitious designer the fullest compensation for his effort, if, perchance, the vanadium is used under proper conditions in a suitable grade of steel; but if the vanadium becomes a mere means for an advertising end, the steel is as unruly as a mad elephant in the hands of the machinists who do the work, and as irresponsible as a fire bug in the hands of the purchaser of the automobile.

From the point of view of the progressive engineer who is not swayed from his intelligent course by a blind Board of Directors, there is work to be done on the problems of standardization far beyond that as ordinarily outlined, and it is a question as to whether or not the agents of the fabricators of steel should be permitted to participate in the deliberations, it being the case that steel mills should furnish what is ordered rather than to tell engineers what they should use. Every effort, thus far, to bring about a condition of standardization of material has proven to be futile, due to the influence of the agents of the steel makers who give a wide variety of reasons why the mills should be permitted to work to a specification that has had its legs or its arms amputated and charge a price that is surely enough to pay for the fullest measure of extremities. What the automobile man wants is the best grade of steel that can be had in France, Germany, or Hongkong, at a price that should not exceed half of the 12-cent level that seems to be so fashionable in quotation circles

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Descriptive Captions of the Illustrations Accompanying This Article

A—Specimen of Lindenberg chrome nickel steel known as brand C N S-2 in the case-hardened state, enlarged to show the thickness of the shell, with the soft core Bendayed to bring out in relief the shell proper. The strength of this material in this state is 285,000 pounds per square inch tensility, with an elastic limit of 280,000 pounds per square inch, and at contraction of 8 per cent. in 2 inches on a ½-inch diameter test proof, with a reduction of area of 30 per cent. The chemical composition of this metal is 4.5 per cent. nickel, 2 per cent. chromium, and 0.10 carbon. The metalloids run, phosphorus 0.015, and sulphur 0.015, the manganese was 0.3, and the silicon 0.2.

B—Specimen of ferro-vanadium containing 25 per cent. vanadium. This material has a melting point of 3,055 degrees Fahrenheit and a specific weight of 5.5. Vanadium is used in certain types of automobile steel, sometimes with carbon alone, and in other cases with chromium.

C—Specimen of ferro-chromium containing 66 per cent. chromium, 2.3 per cent. carbon, and 31.7 per cent. iron. The melting point of chromium is 2,910 degrees Fahrenheit, and the specific weight is 6.8.

D—Specimen of ferro-molybdenum containing 88 per cent. molybdenum. The melting point of this element is 5,600 degrees Fahrenheit, and the specific weight is 10. Molybdenum is used with tungsten and chromium in the production of tool steel, but owing to its high melting point the success of its use has been retarded, excepting in the electric furnace. The presence of molybdenum in tool steel makes it possible to hold a cutting edge at a dark red heat.

E—Ferro-tungsten containing 85 per cent. tungsten, 1.3 per cent. carbon and 13.7 per cent. iron. Tungsten is used up to 25 per cent. in tool steel, and is employed up to 7 per cent. in magnet steel. It is finding a use in structural materials.

F—Specimen of ferro-manganese containing 80 per cent. manganese. This element has a melting point of 3,450 degrees Fahrenheit, and a specific weight of 7.2. It is used to a limited extent in carbon steel, is present in all forms of alloy steel, and takes rank as an alloying element in certain forms of spring steel, and chassis frame materials.

G—Specimen of ferro-silicon containing 50 per cent. silicon.

H—Special form of annealing oven used at the Maxwell plant arranged with a tier of drawers by means of which the work is stored in the oven and promptly removed therefrom at will, in which the front panel of the respective drawers serves as the air-tight cover.

I—Specimen of ferro-silicon containing 90 per cent. silicon. Melting point of silicon is 2,650 degrees Fahrenheit, and the specific weight is 2.5. Silicon is used up to 5 per cent. in steel for special purposes.

J—Specimen of ferro-titanium containing 25 per cent. of the latter. This metal is not known in the pure state; its melting point is 5,600 degrees Fahrenheit, and its specific weight is 4.2. This alloy is being used to some extent in conjunction with chromium and nickel in the production of alloy steel.

K—Specimen of ferro-chromium containing 80 per cent. chromium, 1 per cent. carbon and 12 per cent. iron. The melting point of chromium is 2,910 degrees Fahrenheit; the specific weight is 6.8. Chromium is used with carbon alone in tool steel and for ball bearing work; it is used with carbon and nickel in alloy steel for structural purposes and with vanadium as an alternative in structural work.

L—Example of barium chloride heat-treatment work, using a bath of this salt in the molten state at a pre-determined temperature for the purpose of correcting the structure of drop-forged front wheel knuckles and other important parts used in automobiles.

M—A simple form of milli-volt meter with the scale rearranged to read in both degrees Fahrenheit and Centigrade connected up to a pyrometer unit in an annealing furnace at the Elmore plant, by means of which the temperature of the annealing furnace is observed, and through suitable means of regulation it is maintained at any desired temperature consistent with the character of the work that is being done.

N—Taken at the Packard plant, showing a well-appointed drawing office with a surfeit of light, proper methods of heating, good ventilation, and such other facilities as will facilitate accuracy of engineering expression.

O—Type of cold saw used in cutting off steel in the production of gear blanks and other parts, presenting a real problem when alloy steel is used, owing to the short life of the saw blades and the slow rate of cutting.

P—In the hardening shop at the Packard plant, showing two rows of hardening furnaces with quenching baths between, and a system of ventilation by means of which the health of the operators is conserved, it being the case that some of the cementing materials, as potassium cyanide, are poisonous.

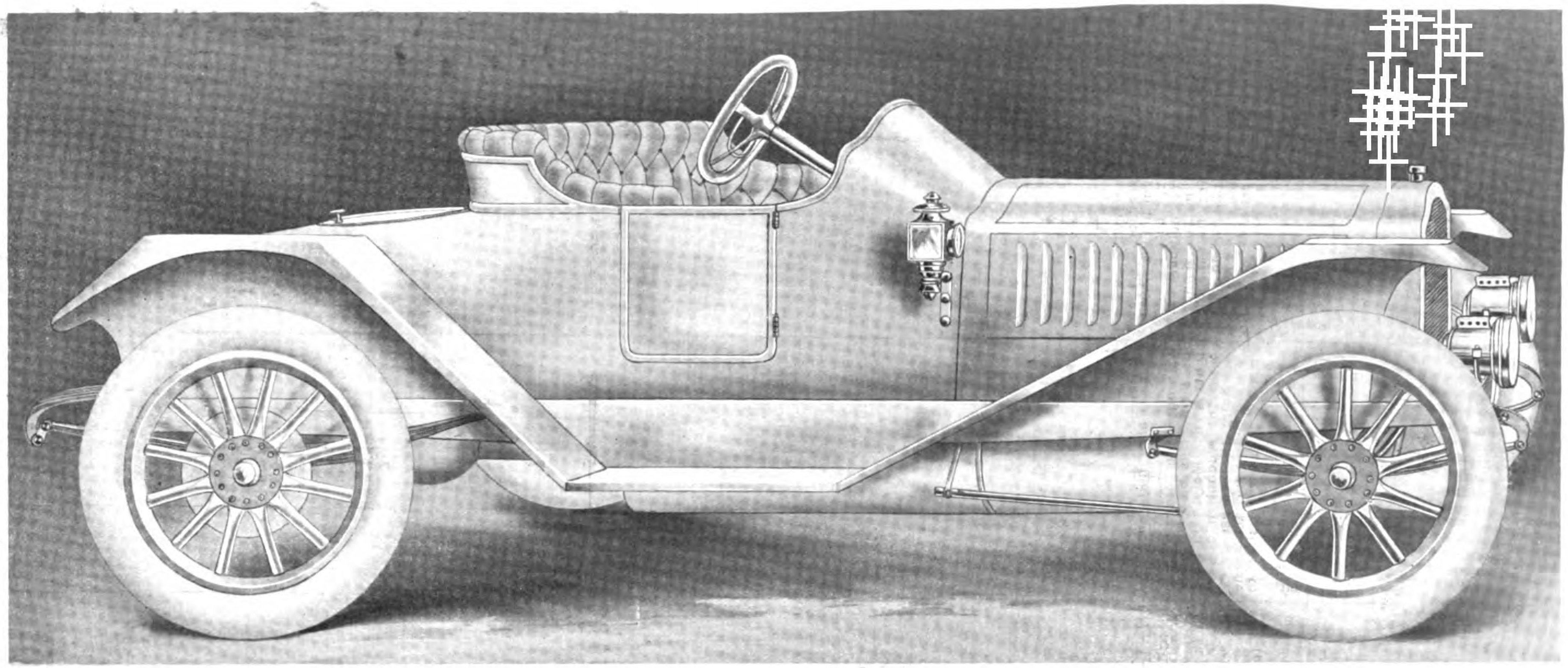
Q—A Frankfort annealing furnace which is self-contained, with precise means of regulating the temperatures—used at the Elmore plant.

R—Specimen of ferro-tungsten holding 85 per cent. tungsten, 0.75 per cent. carbon and 14.25 per cent. iron. The melting point of tungsten depends upon the purity, being 3,450 degrees Fahrenheit for high carbon ferro-tungsten up to 5,575 degrees Fahrenheit for chemically pure tungsten. The specific heat of tungsten is 17.5 to 19, and even higher for the tungsten wire used in incandescent lamps.

S—Specimen of nickel 99 per cent. pure, with a melting point of 2,690 degrees Fahrenheit, and a specific weight of 9.05. Nickel is the most used alloying element of all, serving in nickel steel, which is in common use, chrome nickel steel, and for other purposes as well.

T—Specimen of silico manganese holding 50 per cent. silicon and an equal amount of manganese. This compound is used in the production of spring and other equivalent grades of steel.

U—Simple form of heat-treatment furnace available for use with gas or oil as the source of heat and with a balanced sliding door and means for maintaining a constant temperature.



Among the Makers—Suggesting a Single-Seated Automobile for the Retired Gentleman

SUPPLANTING the horse is the problem that confronts the automobile; the task is half completed, but there still remain some 7,000,000 horse-drawn vehicles to be replaced, among which mention may be made of the little side-bar roadster, with its seat for one, drawn by a $10,000 horse with a pedigree as long as the arm of the exclusive fastidious gentleman who is done with the hurly-burly of the world, and prefers to enjoy life in his own self-contained way, taking great pride in his horse and trappings, with perhaps a well-bred dog to whom it is possible to look with safety for advice. It will be an undertaking to so design an automobile that it will be a fitting substitute for the graceful bit of equestrian animation which enters into the life of the man who is through with money only in so far as it will afford to him the means of living in his own way.

Of course the time will come when the almost entire absence of horse-drawn vehicles will have a marked bearing upon the equanimity of the man; there will be a mental struggle, and a few heart pangs, but the horse will have to go, making way for the nearest equivalent, which will probably be in the shape of a powerful, noiseless, elegant automobile. First cost will have no bearing upon the situation, nor will there be any requirements beyond those as mentioned, provided the car will accomplish precisely the work that is now being done by the horse-drawn equivalent. There is no reason why the coming of this type of automobile should be deferred; certainly the chassis may be had for the asking, and all that remains is to design a suitable body, and introduce this type of patron to the future source of the only enjoyment that he will consider worth while.

Cunningham Automobile

ANNOUNCING THE LATEST EFFORT OF A CARRIAGE COMPANY THAT MADE ITS DEBUT IN 1838, CHANGING OVER TO AUTOMOBILES IN 1911

THE early part of the year 1838 witnessed the modest beginning of a company that was destined to see the rise and fall of the carriage business, a company, in fact, that became a dominant factor, making the carriage business what it was and by its conservative and far-seeing policy produced the kind of carriages that were pleasure giving and profitable to its large clientele, but now that automobiles are rapidly eating into the progressive users' field, the policy of the company has been sufficiently modified to permit it to respond to the requirements of its customers, and in doing so place before its users a type of automobile that will appeal not only to the artistic side of the man who is accustomed to first-class carriage work, but to the mechanical keenness of the automobile expert as well.

The general appearance of the new car is brought out in Fig. 1, showing straight line design of body of the fore-door type, the same being of aluminum construction, seating seven passengers with ample room on a luxurious basis and a certain elegance of appearance and aspect that is accentuated to the utmost degree by the use of that character of upholstery that suggests permanence under severe conditions of service without becoming shabby.

In a mechanical way, James Cunnningham, Son & Company, of Rochester, N. Y., takes advantage of the latest and most approved methods in automobile designing, and the main features of the mechanical equipment are as set down in the table as here given; it being the case that the power plant and other mechanical features are identical in the five models, including touring car, close-couple roadster, limousine and landaulette. The price is the same for all the body options. The mechanical arrangement will best be appreciated by examining Fig. 4 of the stripped chassis, showing the radiator R1 on the center line of the front axle and the motor M1 as a self-contained unit, including the clutch C1 and the transmission gear G1, leading back to the live rear axle A1, through a propeller shaft S1, torsion being taken by the torsion member M2, and two universal joints U1 and U2 being used between the transmission gear and the live rear axle, notwithstanding the fact that the angularity of the power plant with respect to the live rear axle is reduced to a minimum under normal conditions of operation. The chassis frame has widened flanges at the point of narrowing N1, and is provided with three cross bars B1, B2 and B3 with integral flitch plates at points of fastening of the cross bars with the side bars.

The front spring suspension is half-elliptic, but the rear springs are three-quarter-elliptic, the idea being to take advantage of the fixed loading at the front, which is best handled by half-elliptic springs, and to afford soft riding in the tonneau by the use of properly contrived three-quarter-elliptic springs.

The power plant unit is shown in Fig. 2 of the right-hand side, with the motor case C1 in two halves, with the holding arms A1 and A2 integral with the upper half and the lower half C2 flanging on the center line, with an oil chamber in the bottom and an oil well W1 passing up and through the upper half to a filler through which the lubricating oil is spilled when it is desired to fill the oil well.

The flywheel is snugly encased in the housing H1, and the clutch C3 comes just at the point of flanging of the transmission gear case C4. The half-time gears are encased in the housing H2 and an extension E1 is provided with a bushed journal to support the cranking extension to which the starting crank C5 is attached. The magneto M1 is on a shelf S1 in a mid position and the centrifugal water pump W2 is in line with the magneto, both being driven by a suitably contrived shafting system that is driven by a pinion which meshes with

SPECIFICATIONS FOR CUNNINGHAM

MODELS	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		Lubrication
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	
Cunningham....	$3500	36.1	Tour'g..	7	4	4¾	5¼	Pairs..	Tubular.	Cent'f'l..	Bosch...	Storage..	Splash
Cunningham....	3500	36.1	Cl. Cp...	7	4	4¾	5¼	Pairs..	Tubular.	Cent'f'l..	Bosch...	Storage..	Splash
Cunningham....	3500	36.1	R'ster...	7	4	4¾	5¼	Pairs.	Tubular.	Cent'f'l..	Bosch..	Storage..	Splash
Cunningham....	3500	36.1	Limous.	7	4	4¾	5¼	Pairs..	Tubular.	Cent'f'l..	Bosch...	Storage..	Splash
Cunningham....	3500	36.1	Land't..	7	4	4¾	5¼	Pairs..	Tubular.	Cent'f'l..	Bosch...	Storage..	Splash

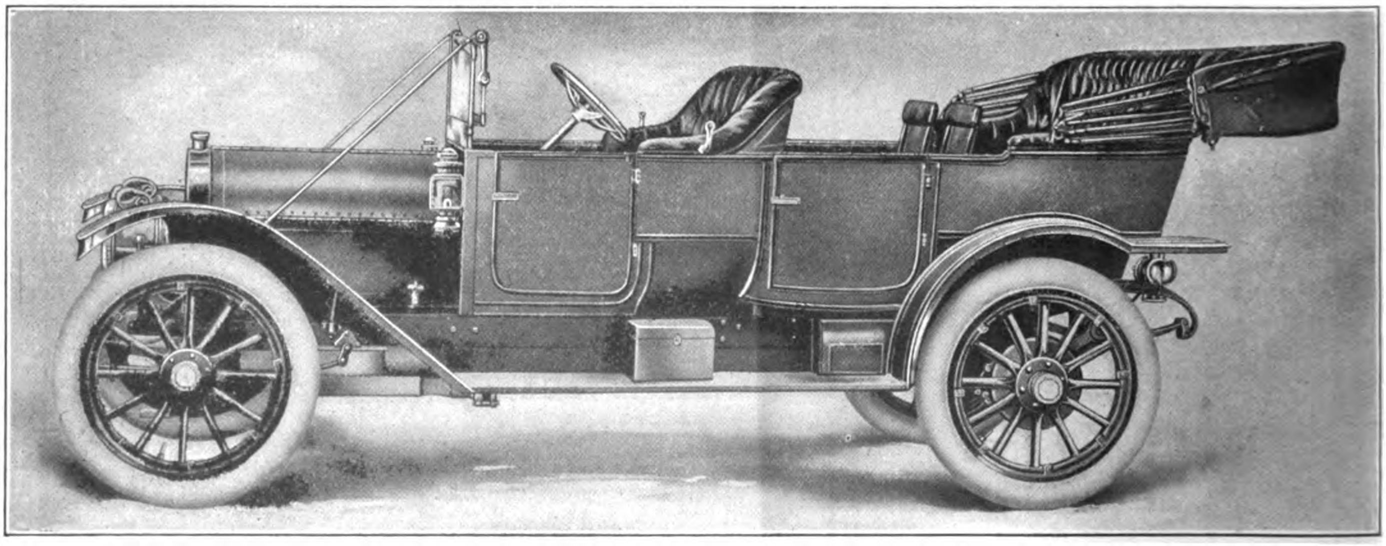


Fig. 1—Fore-Door Type of Cunningham Car with seven seats

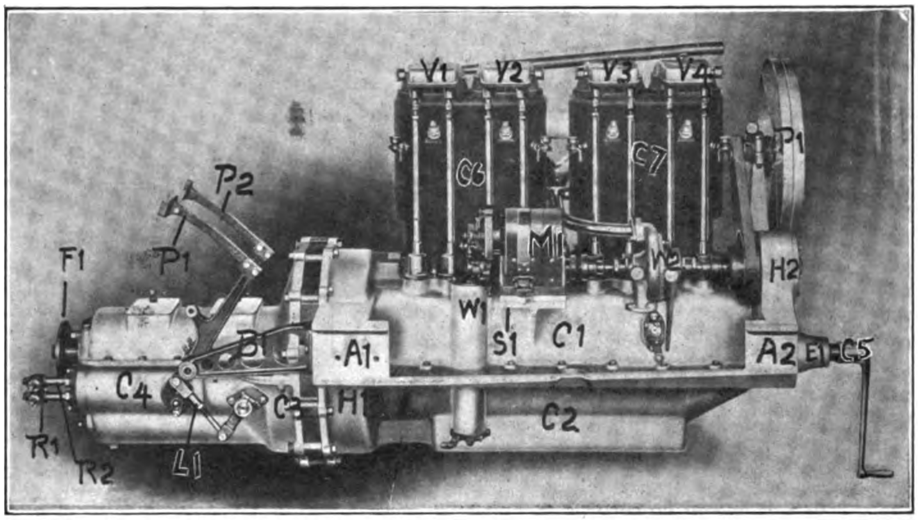


Fig. 2—Magneto side of the motor, also showing valves

the half-time train. The air propeller P1 is driven by a wide flat belt and the flanged driving pulley is on the same shaft driving the water pump and the magneto.

The cylinders C6 and C7 are cast in pairs, with an overhead-valve mechanism V1, V2, V3 and V4, with lifts passing up on the exterior of the cylinders from the camshaft, located on the right-hand side of the motor. The pedals P1 and P2 control the clutch and service brakes, respectively, but instead of fastening to cross bar at the chassis frame they are on a shaft which has its journals in the gearcase and are supported outside by two brackets, one of which is shown as B1. The linkage L1 is in an accessible position outside, with a means of adjustment whereby any wear that may creep in as a result of prolonged service may be compensated for. The extension of the power shaft through the back of the gearcase is flanged at F1, to which the universal joint is fastened and by means of which the torque of the motor is transmitted to the propeller shaft. The racks R1 and R2 are connected up with the side lever by means of which the gears are manipulated, utilizing a stout but much simplified linkage system with a liberal provision of bearing surfaces at every point and means for lubrication.

ARS AS OFFERED FOR 1911

	TRANSMISSION							BEARINGS				TIRES	
Clutch	Type	Speeds	Location	Drive	Wheelbase	Tread	Frame	Crankshaft	Trans-mis'n	Axle	Weight	Front	Rear
e....	Selecti'e.	3	Motor..	Shaft...	124	56	P. Steel..	Plain...	Ball....	Roller...	3800	36x4½	36x4½
e....	Selecti'e.	3	Motor..	Shaft...	124	56	P. Steel..	Plain...	Ball....	Roller..	3800	36x4½	36x4½
e....	Selecti'e.	3	Motor..	Shaft...	124	56	P. Steel..	Plain...	Ball....	Roller..	3800	36x4½	36x4½
e....	Selecti'e.	3	Motor..	Shaft...	124	56	P. Steel..	Plain...	Ball....	Roller...	3800	36x4½	36x4½
e ..	Selecti'e.	3	Motor	Shaft .	124	56	P. Steel..	Plain...	Ball....	Roller...	3800	36x4½	36x4½

The simplicity of the working side of the motor as shown in Fig. 2 is carried out only in a more marked degree on the opposite side of the same as shown in Fig. 3, but for purposes of safety, the carbureter C1 is located in a mid position on the side opposite to the magneto, with a simplified intake pipe P1, leading up with two branches B1 and B2, through which the mixture passes to respective pairs of cylinders C2 and C3. The water connections W1 at the top and W2 at the bottom lead the water from the cylinders to the radiator and back again; they are of neat design and light construction, properly flanged with secure water-tight joints at finished flanging faces, suitably placed on the two pairs of cylinders. The exhaust manifold M1 is of large diameter, and its four branches lead in an upward direction to the point of flanging on the cylinders, so that the holding bolts are in a perfectly accessible position. There is one new and commendable feature to be observed in this manifold; it has lugs L1 and L2 which extend downward and afford a means by which the mixture manifold is held in place through the use of studs that pass through the lugs on the exhaust manifold and bear against cupped bosses in juxtaposition on the mixture manifold.

The importance of good lubrication is recognized in this power plant not only from the point of view of long life and the close limiting of internal losses, but with the understanding that noise must be conspicuous by its absence in any event. In order that the operator may know whether or not the supply of oil is adequate, a tell-tale T1 extends up from the lower half, permitting the operator to see at a glance just how much oil there is in the container and to observe the rate of reduction of the same during service. At points of vantage hand-holes are located and suitable covers are provided for each, with a ready means for their removal, so that the operator is permitted to inspect the mechanisms, clean off the working parts and maintain a profuse state of lubrication or the lower half of the crankcase, and the cover of the transmission gearcase may be removed.

The ignition system is of the Bosch dual type, utilizing one set of spark plugs, they being located on the left-hand side of the motor somewhat below the top, spacing between the lifts and delivering the spark at a point in the combustion chamber that has been found to deliver unusually good results. The gasoline tank holds 20 gallons, of which three are held in reserve for emergency purposes, the tank being so constructed as to bring about this result. The steering column is of the irreversible nut type with an adjustment take-up wear, and an 18-inch mahogany grip is fastened to an aluminum spider, so arranged with respect to the driver's seat that his position is natural, and his control of the movements of the car is rendered precise. Attention is called to the length of the wheelbase, which is 124 inches, and the pressed steel channel frame is designed utilizing a fine grade of material and a liberal

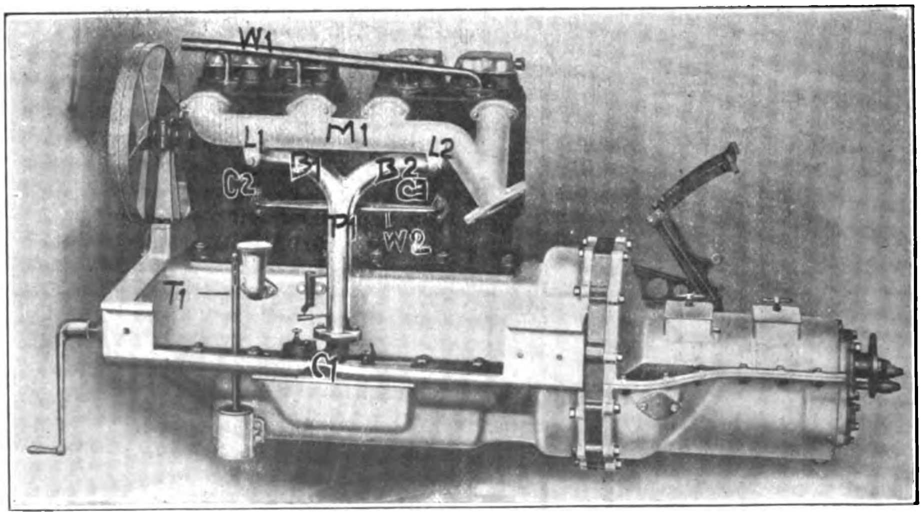


Fig. 3—Inlet and exhaust side of motor, also showing oil gauge

SPECIFICATIONS OF MATERIALS IN CUNNINGHAM CARS

Crankshaft—40 carbon steel, forged hydraulically under 100-ton press, heat treated and ground.

Connecting Rod—Special analysis high carbon auto steel, drop forged, I-beam section, heat treated.

Cylinders and Pistons—Finest grade of close-grained gray iron made in a foundry which produces nothing but gas-engine castings. Both are partially machined, then annealed to relieve internal strains and afterwards finished and ground.

Valves—3 1-2 per cent. nickel steel, heat treated and ground.

Valve Rocker Levers—Special auto steel, drop forged, heat treated and ground.

Crankshaft and Magneto Shaft Gears—Special auto steel, drop forged, teeth helical, heat treated.

Camshaft Gear—Cast iron, teeth helical.

Crankcase—Aluminum and copper alloy, of light weight and great strength.

Bearings—Parsons white brass, die cast under pressure, insuring a close grain and tough metal.

Piston Pin—Steel tubing, hardened and ground.

Camshaft—High carbon steel, heat treated and ground.

Clutch Facing—Oak tanned leather, with cork inserts.

Transmission Gears—Chrome nickel steel, drop forged and tempered.

Transmission Shafts—Chrome nickel steel, drop forged and tempered.

Transmission Bearings—Imported F. & S. annular ball bearings of very liberal proportions.

Auxiliary Gear and Fan Bearing—Imported F. & S. annular ball bearings.

Clutch Bearings—Timken roller bearings.

Wheel and All Rear Axle Bearings—Timken roller bearings.

Front Axle—3 1-2 per cent. nickel steel, drop forged, one piece, no weld, heat treated.

Rear Axle Housing—Pressed steel, autogenously welded horizontally.

Universal Joints—Spicer dust-proof.

Frame—High carbon pressed steel, heat treated.

Bearing Bushing—All small shaft bushings, such as camshaft, pumpshaft, oil pumpshaft, etc., are lined with Non-Gran bronze, which is conceded to be the best material for this purpose.

Cams—Drop forged, special case hardened steel, ground to shape and size. Case hardened face, soft collars, double pinned to shaft.

Cam Rollers—Case hardened and ground outside and inside.

Cam Roller Pins—Case hardened and ground.

GENERAL DIMENSIONS OF THE POWER PLANT

Bore	4 3-4"
Stroke	5 3-4"
Valve diameter	1 7-8"
Valve lift admission	5-16"
Valve lift exhaust	3-8"
Crankshaft diameter	2"
Front bearing length	3 1-2"
Center bearing length	4"
Rear bearing length	4 7-8"
Crank pin length	3 1-4"
Connecting rod length	12 9-16"
Camshaft diameter	1"
Timing gears, face 3 helical	1 1-8"
Cams—base dia. (harmonic motion)	2"
Cam roller diameter	1 1-2"
Cone clutch diameter	14 1-2"
Cone clutch face	3"
Flywheel diameter	17"
Main transmission shaft diameter	1 7-8"
Transmission jackshaft diameter	1.635"
Transmission gears, face	1" and 1 1-4"
Transmission gears, pitch	6-8 stub
Percentage of clearance space (compression space) to total cylinder volume	23%
Clutch spring	450 pounds

:tion with a view to safely spanning this wheelbase length. While this question of the quality of material is up, attention called to the use of chrome nickel steel I-section front axles, ile the rear axle is of the full floating type, with a pressed steel shell and roller bearings throughout. The brakes are of the external contracting band type for service use and internal expanding type for emergency use, both located on the rear road wheels, taking advantage of large diameter pressed steel drums.

Practical Considerations in Body Finishing

The great question is to be practical; make the most of every int; be sure that the materials are pure and appropriate for intended purpose—and be particular. A poor result always lows if the man who does the work has his heart in his ots.

For English purple lake use a ground of ivory black, for timuc lake a ground of English Indian red. Rose lake should ve a ground of English Tuscan red.

For a quick development of English scarlet lake, at the present ie popular with automobile folk, lay the lake over a ground deep orange chrome. Orange mineral makes a good ground the light lake. In the application and preparation of all lakes it is essential to understand that these pigments are, as a rule, rich in proportion to their depth. It is necessary, therefore, to avoid making the ground too light.

All the lakes, and all the grounds for the lakes, should be given ample time to perfectly harden before coating over them, otherwise they will lose in point of brilliancy and wearing capacity.

Furthermore, all grounds and preparatory surfaces should be brought out with a perfection of detail which admits of no surface defects. To repair a defect in the surface after the ground has been made ready for the lake is a very delicate, and in most cases unsuccessful, operation. If the lake is to be placed directly upon the old paint, the surface should first be touched up with some lead mixture, then puttied, and rubbed smooth.

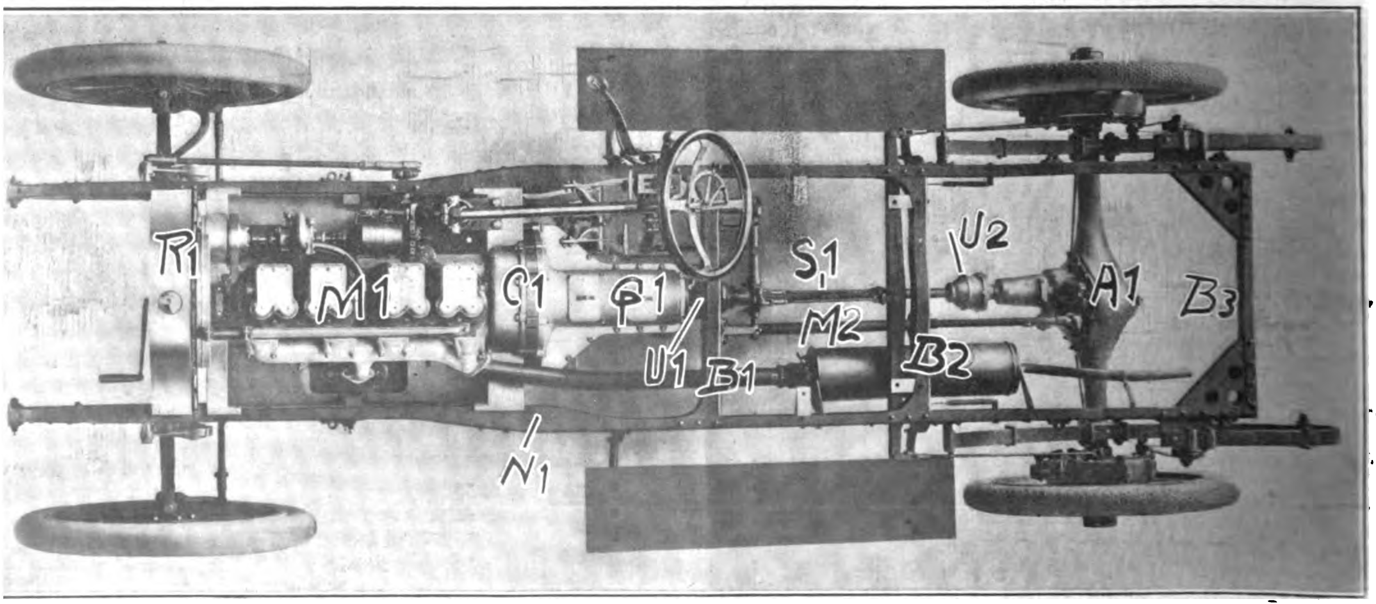
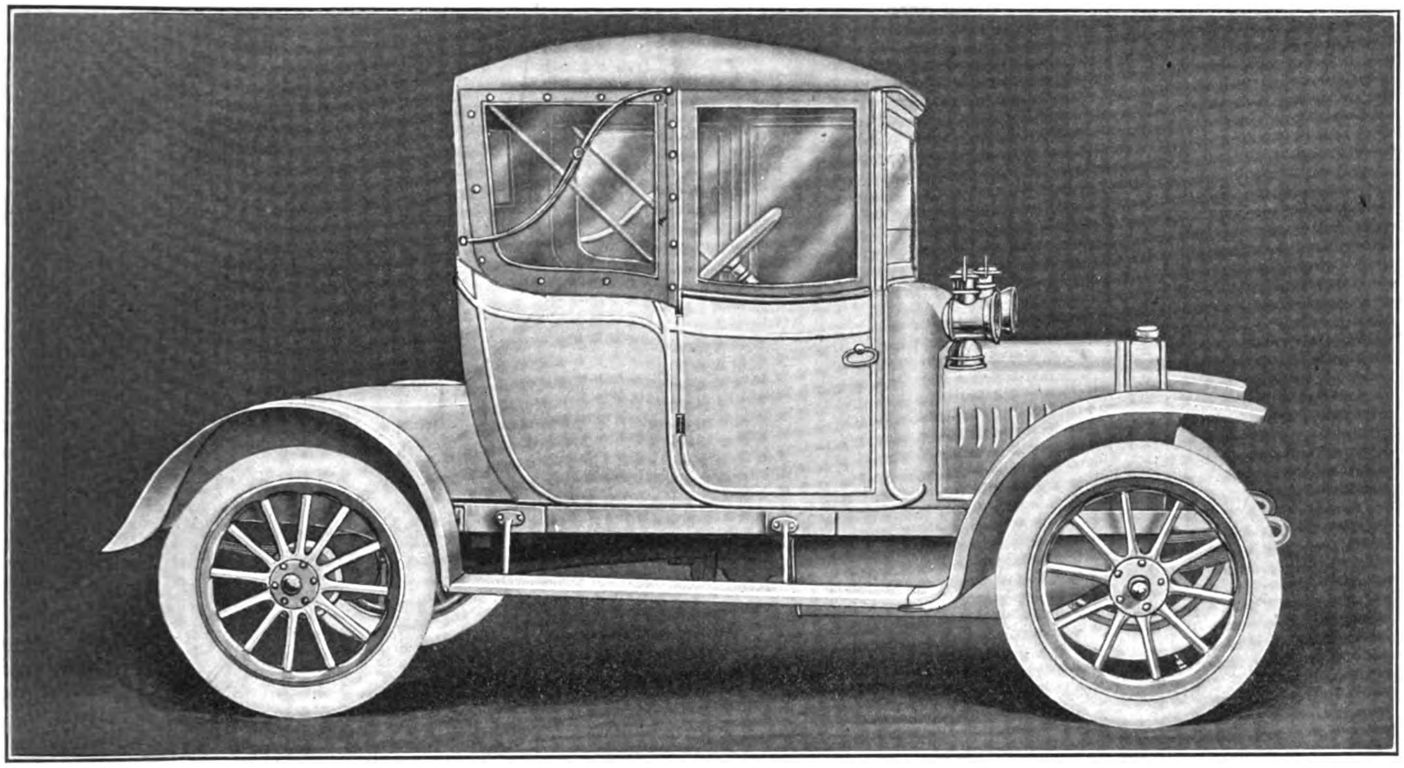


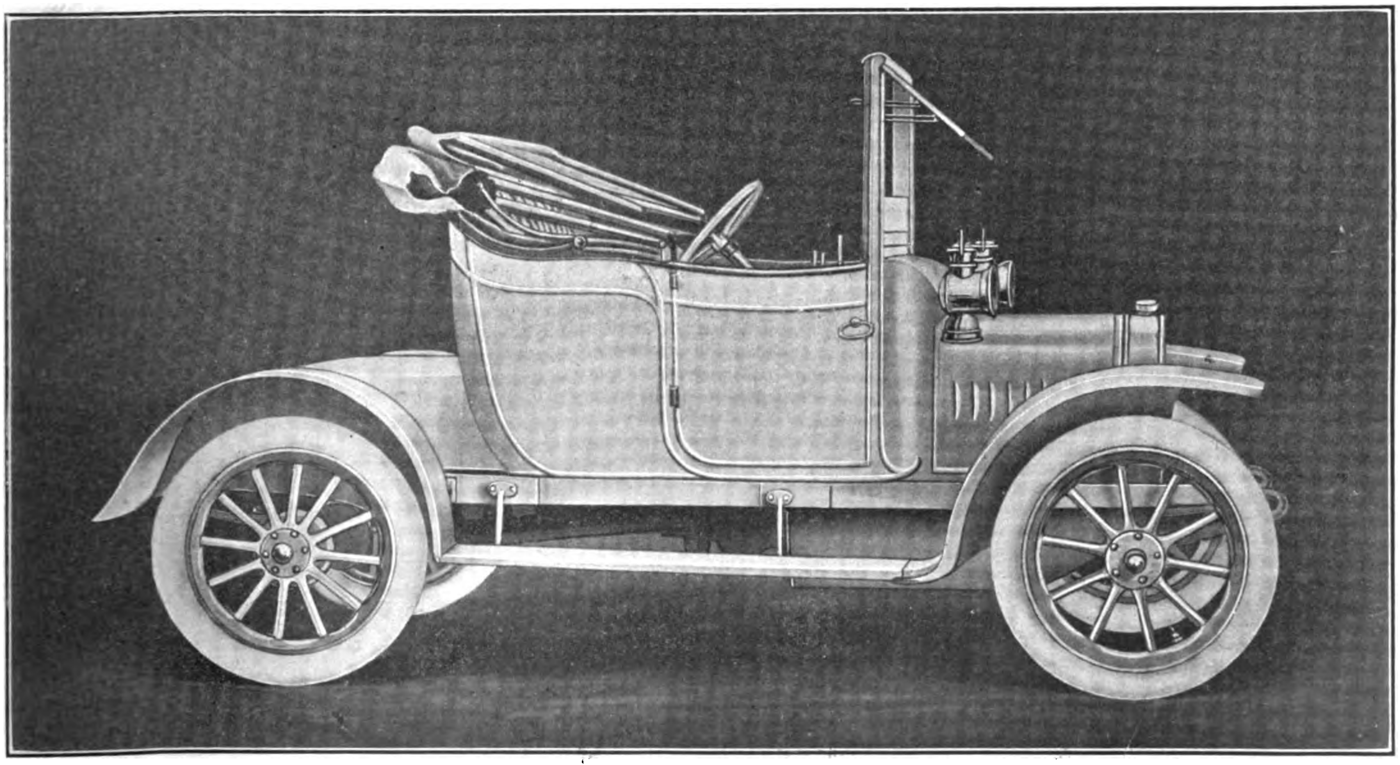
Fig. 4—Looking down on the Cunningham automobile with the body removed

Engineering Section

SUGGESTIONS FOR A DOCTOR'S CAR—NEW LIGHT-WEIGHT METAL—CARE AND REPAIR OF TIRES—BATTERY TROUBLES AND HOW TO REMEDY THEM—TIMING THE MOTOR, ETC.



SUGGESTION OF A BODY FOR DOCTOR'S SERVICE, SHOWING THE TOP AND CURTAINS UP



SHOWING THE DOCTOR'S RIG WITH THE TOP DOWN—THE FORE DOOR PROTECTS, BUT, BEING DESIGNED "DUTCH," MAY BE REMOVED

DOCTORS are sufficiently numerous and such good prospectives that some makers of automobiles get out special models of automobiles for them, but, considering their needs, it is believed that the subject will stand further consideration. The body work as shown on the title page of the "Engineering Section" of THE AUTOMOBILE this week, is offered as a good possibility. This body is so designed that it may be opened up for fine weather service, and when the conditions are inclement, it may be closed up. The control is "in-side." A body such as this, on a chassis that will stand continuous road work, should answer the purpose, but it is not recommended that a cheap makeshift will suffice for the intended work. Doctors must be taught to select good automobiles; they may know how to cure the sick and close the eyes of those who become wearied of the world, but when it comes to the selection of automobiles, it is believed that the skill of the doctor must give way to the practice of the mechanician.

There has been quite a little dissatisfaction in this field, and some doctors labor under the impression that automobiles are not quite up to the standard they recognize. This is due entirely to an attempt to make a small runabout accomplish the work of a full-fledged automobile.

New Light-Weight Metal

DURALUMIN IS THE NAME OF A NEW TYPE OF METAL THAT IS SAID TO HAVE THE STRENGTH OF STEEL AND THE LIGHTNESS OF ALUMINUM

DURALUMIN belongs in the aluminum alloy family, having over 90 per cent. aluminum in its composition, but the contents vary somewhat, there being two alloys known as Nos. 1 and 2, and the illustrations as here presented are of some of the forms of this metal. Fig. 1 shows sections, A being an odd-legged angle, B shows a T, and C is a channel section. The dimensions of these sections may be varied to suit the different requirements, it being the case that this alloy submits to rolling and has the strength and characteristics of rolled metal. As an indication of the ability of this material to stand the drawing process, it may be stated that it is used in the manufacture of cartridge shells. It will be remembered that this is one of the most difficult processes in the metal arts, and it takes an extremely good grade of material to accomplish this purpose. Duralumin may be had in the various thicknesses and widths to which sheet metal is rolled, and offers a fair measure of rigidity, coupled with an excellent showing of strength, together with lightness. Fig. 2 presents a round bar of this material, which is bent around until the two extremities contacted with each other without showing sign of distress at the point B. Fig. 3 depicts several diameters of rolled bars, and a series of strips of various widths and thicknesses, all of which are offered as a further indication of the fact that this metal lends itself to the several processes by which steel is rolled, flattened out, drawn, and otherwise manipulated for commercial purposes. In fact, there seems to be no limit to the classes of work that can be done with this material.

The inventor of this metal is A. Wilm, of Berlin, Germany, and he states that the general composition of the same approximates 90 per cent. aluminum, and the balance is mainly composed of copper and magnesia. It is pointed out that the weight of aluminum is in the preponderance, and that the 10 per cent. which represents the alloys is made up of metal that is heavier than aluminum, and for the rest by metal that is lighter than aluminum. The result is that the new metal has substantially the specific gravity of aluminum, varying a little above and below, depending upon the exact proportions of the alloys. The appearance of the new metal is substantially the same as that of aluminum, retaining the bright color, resisting oxidation, and other atmospheric influences.

Technically speaking, the new alloy shows a marked difference in its characteristics, depending upon the proportions of the admixtures, it being possible to vary the tensile strength all the way from 50,000 pounds per square inch minimum up to 85,000 pounds per square inch maximum, and it will appear that this is a very formidable strength, considering the fact that this metal weighs about one-third of the weight of steel, size for size. Since this metal is very much higher in price than steel, it of course follows that it is only available for special uses where a minimum of weight and an adequacy of strength are the ruling considerations. If weight is no criterion, since steel may be had in all degrees of strength, above and below the strength of this material, and at a very considerable reduction in the pound price, it follows that the steel would be given the preference. The fact remains, however, that there are a number of applications where light weight, accompanied by suitable strength, are the ruling factors and price is therefore almost a matter of no moment. It is for these classes of service that this metal is intended, and while it remains to be seen to what extent it will modify present practice in aeronautical endeavors, it nevertheless does prom-

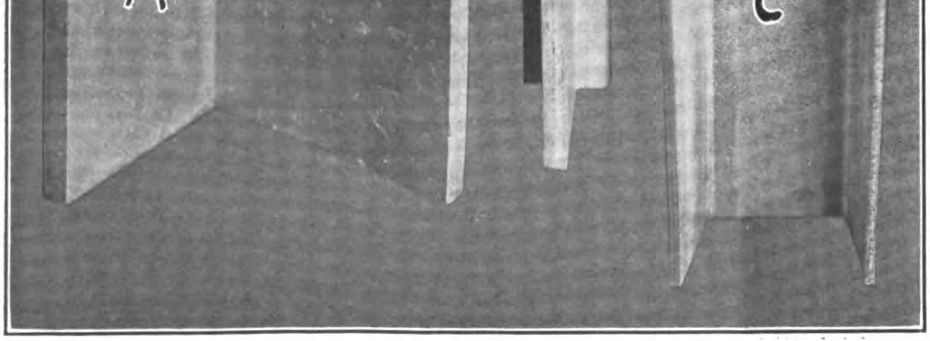


Fig. 1—A—Unequal-legged angle; B—T-section; C—Channel-section

ise more than a little, and it may be the ruling factor in this relatively new art.

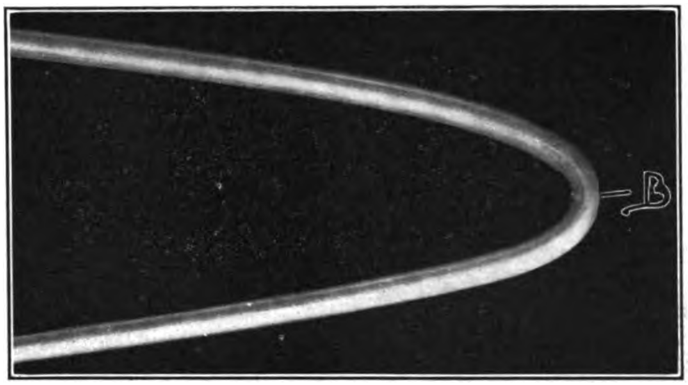


Fig. 2—Specimens of round bars and strips of this light, strong metal

It seems that this metal is being taken up abroad by the various military powers, and it is finding its way into many things where light weight and strength, coupled with endurance, take precedence over other considerations, as cost. The British government is reported as building a new large dirigible balloon, relying upon this metal for many of the important members in the structure thereof and among the well-known European firms that are producing Duralumin, Messrs. Vickers Sons & Maxim are mentioned. The specimens which were photographed for THE AUTOMOBILE were furnished by Marburg Brothers, the well-known engineers and importers, of 1777 Broadway, N. Y., and were exhibited by them at the Belmont Park Aviation Meet a few days ago for the first time in this country.

The approximate characteristics of Duralumin are set down as follows:

Specific weight. 2.77 to 2.84;

Melting point, 650° Centigrade;

Color, bright and silvery;

Not affected by sea water;

Not affected by atmospheric conditions;

May be rolled, drawn and lends itself to various processes.

Alloy No. 1 has physical properties as follows:

Specific gravity, 2.77;

Tensile strength, 50,000 pounds per square inch;

Elastic limit, 26,000 pounds per square inch;

Elongation 21 per cent. (length not stated);

Reduction of area 34 per cent.

The alloy No. 2 has physical properties as follows:

Specific gravity, 2.84:

Tensile strength, 65,000 pounds per square inch:

Elastic limit, 36,000 pounds per square inch;

Elongation, per cent. (length not stated). 18:

Reduction of area, 26 per cent.

Rolling has a marked effect on the physical properties of the alloy No. 2 as follows:

Tensile strength, 85,000 pounds per square inch:

Elongation (length not stated), 3 per cent:

Reduction of area, 10 per cent.

Heat Value of Fuel Gases

Gasoline and other available liquids and gases as used in internal combustion motors are measured for heat value in British thermal units, or in calories. The liquids, whatever they may be, have to be changed into gases to be available, and it is always well to keep in mind the heating value of these gases, for then it is possible to estimate the magnitude of losses when an exhaust analysis is available. The following are the values of the several gases:

ACCEPTED THERMAL VALUES OF GASES USED IN FUEL

Name	Compound Formulae	Thermal Value B.t.u. per pound	Thermal Value Calories per kilo
Hydrogen	H	62,100	34,500
Carbonic oxide	CO	4,476	2,487
Methane	CH^4	23,851	13,245
Acetylene	C^2H^2	21,465	11,925
Ethylene	C^2H^4	21,440	11,900

The heating value of carbonic acid is nil; it follows that it is necessary to burn each of the gases to carbonic acid or water (H^2O) in order to obtain all the heating value that there is in them respectively. Every compound that is composed of carbon and hydrogen will burn to carbonic acid, accompanied by the production of some water. For complete combustion under conditions that obtain in the combustion chambers of motors it is necessary to dilute the mixture with an excess of air in order that there will be a sufficient presence of oxygen to serve the practical end. It is not practically possible to get along with the theoretical right amount of oxygen when the same is mixed with over 80 per cent. of nitrogen, as it is in air; the trouble is that the oxygen is more or less covered up.

The British thermal unit, on which these calculations are based, is that quantity of heat which is required to raise the temperature of one pound of water 1 deg. Fahr. at 39.1 deg. Fahr.

Fig. 3—Depicting several sizes of rolled bars of Duralumin and some of the regularly made strip products

1910 Edison Storage Battery

THIRD INSTALLMENT—DEALING WITH WALTER E. HOLLAND'S PAPER AS PRESENTED BEFORE THE TWENTY-SIXTH ANNUAL MEETING OF THE ASSOCIATION OF EDISON ILLUMINATING COMPANIES, HELD AT FRONTENAC, THOUSAND ISLANDS, N. Y., SEPTEMBER 6, 7 AND 8, 1910

THE output of an Edison cell is determined by the capacity of the positive or nickel electrode, as the individual electrode curves of the Figs. 5 and 6 show. The company has found it best in every way to design the cell with a sufficient allowance of iron active material to give considerable excess capacity to the negative electrode.

Cells do not have as high capacity when new as after some weeks of use. The betterment comes from an improvement of conditions in the nickel electrode which is brought about by regular charging and discharging. Overcharging expedites this self-formation and is recommended by the company. Every cell manufactured is given three overcharge runs before leaving the factory, and this is always sufficient to bring the capacity up at least to the rating. The accretion of capacity continues for twenty, or more, runs, and no results can be considered typical which are obtained in tests made earlier than the twentieth run. The term "run" is used to mean a full charge and complete discharge.

The output and efficiency of a cell, working at ordinary temperature, depend upon three factors—the rate of charge, the amount of charge, and the rate of discharge. Figure 10 shows the relation of current output to current input when a cell is given different lengths of charge at 2-3, 1, and 1 1-3 times normal rate. It will be seen that for low inputs the efficiency is very high and practically the same for the different rates of charge. Further along the curves separate, the advantage being in favor of low-rate charging. Notice that the point taken as the normal input (210 ampere-hours for A4) comes pretty close to the sharpest part of the bend. Fig. 11 gives the characteristic curves with output and efficiency data for this normal input point.

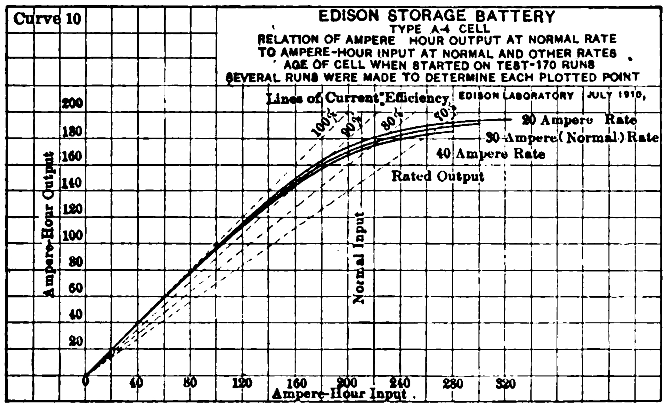
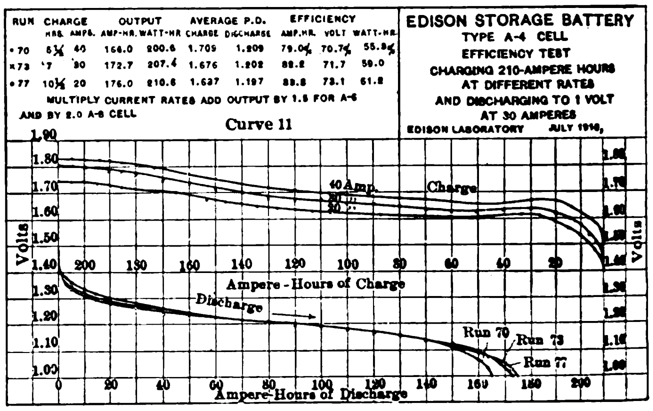


Fig. 10—Relation of ampere-hour output at normal rate to ampere-hour input at the same rate

The relations of current and energy output and of current and energy efficiency to the length of charge at normal rate are summarized in the curves of Figure 12. These curves show maximum efficiencies on short charge of practically 99 per cent. in ampere-hours and 75 per cent. in watt-hours, while on normal 7-hour charge the efficiencies are respectively 82 per cent. and 58 per cent. It is often found advantageous (and economical, too) to work the battery at the lower efficiencies of a 9 or 10-hour charge, thus realizing exceedingly high output results.

Watt-hour efficiency is the product of ampere-hour efficiency and "volt efficiency"—the latter term being used synonymously with the term "coefficient of drop" to express the relation of the average voltage of discharge to the average voltage of charge. The volt efficiency depends principally on the rates of charge and discharge and does not vary much under ordinary conditions. Charging and discharging at normal rate, its value will be close to 72 per cent. for any length of charge not extremely short or long; and this figure therefore represents the practical limit of watt-hour efficiency for normal-rate working. The watt-hour efficiency on any normal-rate test may be calculated accurately enough for all practical purposes by taking 72 per cent. of the easily determined ampere-hour efficiency. Decreasing the current rate increases the volt efficiency, thus raising the limit of possible watt-hour efficiency.

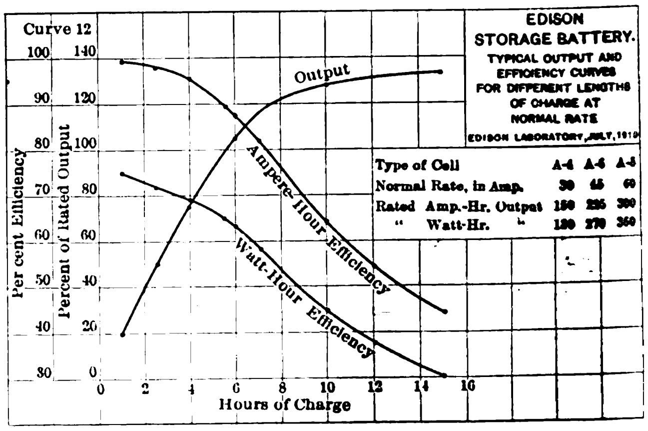


RUN	CHARGE HRS.	CHARGE AMPS.	OUTPUT AMP-HR.	OUTPUT WATT-HR.	AVERAGE P.D. CHARGE	AVERAGE P.D. DISCHARGE	EFFICIENCY AMP.HR.	EFFICIENCY VOLT	EFFICIENCY WATT-HR.
• 70	5¼	40	166.0	200.6	1.709	1.209	79.0%	70.7%	55.9%
× 73	7	30	172.7	207.4	1.676	1.202	82.2	71.7	59.0
• 77	10½	20	176.0	210.6	1.637	1.197	83.8	73.1	61.2

MULTIPLY CURRENT RATES AND OUTPUT BY 1.5 FOR A-6 AND BY 2.0 A-8 CELL

Fig. 11—Efficiency tests plotted to show results at different rates of discharge

The Edison cell has an air-tight cover, a valve being provided for the escape of gas. Practically no water is lost by evaporation, therefore, and the battery can be left idle for months without attention and there will be no danger of the solution getting low. Water is lost when a battery is working, however, and this results entirely from overcharging; for any current which is not used to effect the chemical changes at the electrodes goes



Type of Cell	A-4	A-6	A-8
Normal Rate, in Amp.	30	45	60
Rated Amp.-Hr. Output	150	225	300
" Watt-Hr. "	180	270	360

Fig. 12—Efficiency tests plotted at different lengths of charge at normal rate

to produce hydrogen and oxygen, the elements of water, which are emitted as gas. To replace this loss, pure water must from time to time be added. The figure of ampere-hour efficiency represents the proportion of a charge which goes to produce the desired chemical changes at the electrodes; therefore the balance is proportional to the loss of water. Thus from the curve, Fig. 12, we see that charging 7 hours at normal rate (210 ampere-hours input) the ampere-hour efficiency is 82 per cent. and charging 10 hours (300 ampere-hours input) it is 64 per cent. The loss of water therefore would be represented by 18 per cent. of 210 = 38 ampere-hours in the first case and by 36 per cent. of 300 = 108 ampere-hours in the second case—showing that a battery which is worked continually on 10-hour charges would require the addition of water about 3 times as often as one worked continually on 7-hour charges. This points to the possibility of reducing the amount of required filling to almost nothing in those cases where a battery can be worked on short frequent charges at high efficiency.

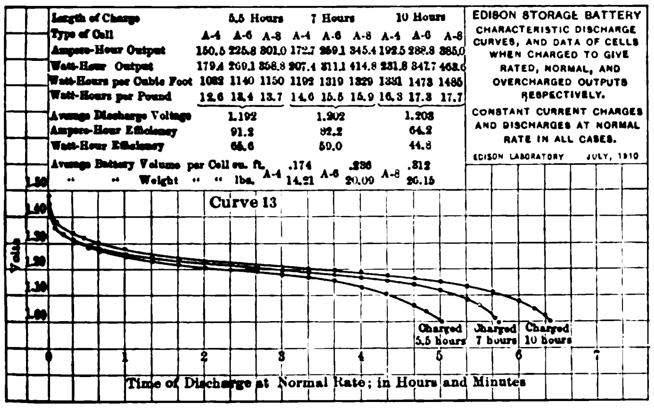


Fig. 13—Characteristic discharge curve of cells when charged to a given rate.

Fig. 13 shows characteristic discharge curves and data for a cell at its rated output, at its normal output and at its overcharge output. Note that only 5 1-2 hours' charge at normal rate is required to obtain the rated output, and the efficiency under these conditions is very high; while under the overcharge conditions exceedingly high output per unit-weight of battery is realized at a sacrifice of efficiency.

Although in most of the tests presented here the cells were charged at constant current, this was done only for the sake of convenience; and in practice it is really better to "taper" the rate in the familiar manner of charging lead batteries. This is of especial advantage where the time on hand for charging is limited.

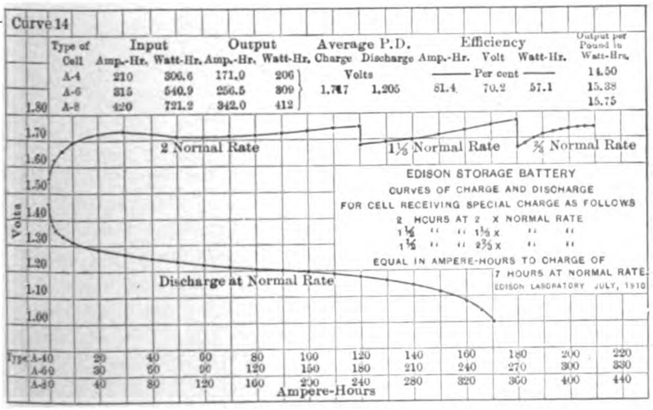


Fig. 14—Curve of charge and discharge for cells receiving special charges

Fig. 14 shows the result when the normal imput of a 7-hour charge is put in in 5 hours, by using higher rates early in the charge. The results are practically as good as in the case of the 7-hour charge. (See Fig. 11.)

Constant current discharges of the Edison battery at no matter what rate are found to give a quite constant output figure if carried to very low voltage (see Fig. 15), and differ only as to average voltage, this being higher or lower according as the I R drop in the cell (depending on the I valve) is little or much. The low voltage part of the curve cannot be considered useful, however; so the statement sometimes made that the ampere-hour output of the Edison battery is independent of the discharge rate is not strictly true. On the other hand, it would not be a fair test to terminate high-rate discharges at 1.0 volt or 0.9 volt, as is done usually in normal-rate tests, because this would not correspond to the same state of discharge; and the cell would start the next charge in a semi-charged condition, which would make the subsequent discharge abnormal. Also, it is possible to discharge at a rate so high that the very first volt reading will be lower in value than the above-mentioned regular terminating voltages. The author believes the fairest plan in this case is to discharge to successively lower voltage points as the rate is increased, each terminating voltage to be lower than the previous one by a valve corresponding to the average increase of I R drop in the cell resulting from the increase of current. Thus, if the "A-4" cell (whose average internal resistance, Fig. 9, shows to be .0037 ohm), is usually taken to 0.9 volt on a discharge at 30 amperes, the discharge should be carried 0.11 volt lower or to 0.79 volt when the rate is doubled to 60 amperes, because in that case the average increase of I R drop in the cell would be $30 \times .0037 = 0.11$ volt. If this plan be followed the amount of change of voltage from the beginning to the end of discharge will be practically equal at all rates, and the cell will be taken to a corresponding state of discharge each time.

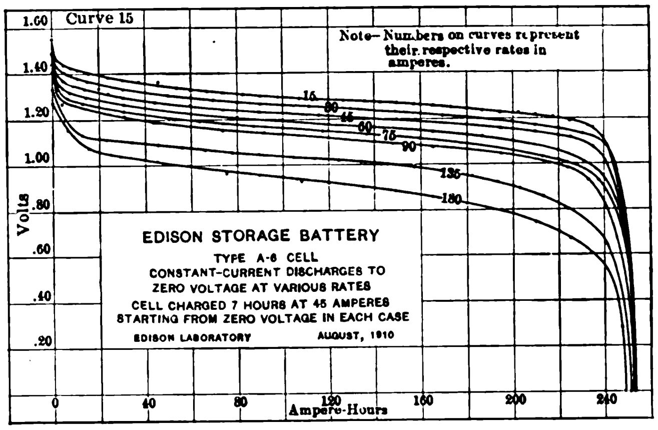


Fig. 15—Constant current discharge to zero voltage at various rates of discharge

Timely Tips for the Tyro. Remember—

That first and foremost comes the selection of the chassis. The easiest way to do this is for the purchaser to make up his mind what type of body he intends to have. The two parts are separate, and it is only a matter of a few bolts that fix the body to the frame that require changing. The next point is the topographical nature of the country that the car is mostly to be used in; for instance, it would be useless to have a heavy limousine on a light, low-powered chassis for hilly and indifferent roads, and equally unnecessary to have a 60-horsepower runabout for town work.

The length of one's pocket often determines the amount one is prepared to pay for the car, but where this is not a matter of moment a limitation of a few hundred dollars should not influence the choice. Experience of owners of cars is the best criterion, and if the buyer can come in touch with several of these direct he should be in a position to form an opinion that will enable him to secure the car that is in every way best fitted to the service for which it is intended.

Cantor Lectures on Motors

PROFESSOR W. WATSON, D.SC., F.R.S., DELIVERED A SERIES OF LECTURES ON THE GASOLINE MOTOR, OF WHICH THIS IS THE SECOND INSTALLMENT—BY PERMISSION OF THE ROYAL SOCIETY OF ARTS

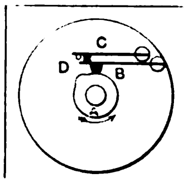


Fig. 6—Typical make - and - break system of contacts

PROFESSOR SPRINGER finds that the energy stored in a low-tension coil, such as is used for petrol engines with a maximum current of 1.3 amperes, is about 14 foot-pounds, *i. e.*, equal to the work done when 1 pound is lifted through 1.7 inches.

In order to illustrate the other system of ignition, namely, the high-tension system, I will make use of the same coil, but now only one set of windings will be connected to the battery, while the other set will be connected to the lamp. On making the battery circuit so as to cause a current to start in the coil, a current will be produced in the other set of windings, and the lamp will glow for an instant. On breaking the circuit containing the battery the lamp will again glow, but more brightly, indicating that an induced current is produced. If I break the current slowly, so that a visible spark is produced at the break, the lamp in the secondary hardly glows at all, showing that it is an advantage to get a rapid break of the current in the primary circuit. The reason why when one switch is opened slowly the current is only slowly reduced, is that even after the switch begins to open the current continues to flow, this flow being made evident by the spark. If, however, we connect a condenser to the two sides of the switch, when the switch begins to open, the condenser will commence to charge, and will thus, in a sense, absorb the current so that no spark is produced, and the decrease in the current in the coil will be very much more rapid, and hence the lamp in the secondary circuit will glow very brightly. The absence of the spark (at the point where the current is broken) produced by the condenser is also an advantage, in that the contacts will not be burned away in the way they are if a spark is produced.

In the case of the ignition of the charge in the engine, the break of the primary circuit may either be made by a cam, A, Fig. 6, which rotates at half the speed of the crankshaft or by a trembler.

In one form of make and break, as the cam rotates (Fig. 6) the spring D is lifted so that a platinum contact stud on the upper surface comes in contact with a stud on the lower surface of the spring C, thus completing the primary or battery circuit. When the cam rotates somewhat further the springs B and C both commence to descend and thus acquire a certain speed before the spring C strikes the pin D, when the circuit is broken. In this way a quick break is secured without the necessity for making the sides of the cam very steep, so that the wear of cam, and contact which it raises, is reduced to a minimum, thus insuring a maximum of efficiency.

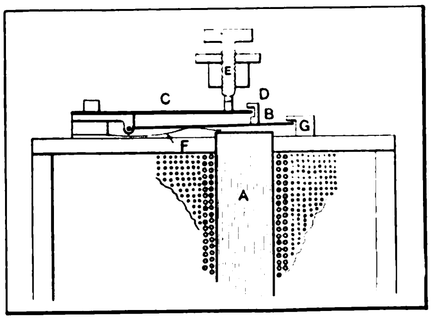


Fig. 7—Typical form of trembler mechanism

A diagrammatic section of a trembler contact breaker is illustrated very clearly in Fig. 7. The core of the coil A consists of a number of fine iron wires surrounded by a primary coil of thick wire of a comparatively few number of turns and a secondary coil consisting of a very large number of turns of fine wire. One end of the secondary coil is connected to the sparking plug and the other to the engine or frame of the car. The battery circuit is taken through some form of contact maker, usually called a commutator, to the screw E and thence through the spring to the other terminal of the battery. When the circuit is completed by the contact maker, which is rotated at half the crankshaft speed, the current passing through the primary of the coil magnetizes the core so that the soft iron plate B is attracted. This plate is normally kept up by a spring, F, but after it has moved a little way down and thus acquired some velocity the catch D strikes against the spring C and, pulling this latter down, breaks contact with E, so that the primary current is broken and a spark passes, due to the induced current in the secondary. The breaking of the primary circuit causes the core A to lose its magnetism so that it no longer attracts B, which being forced up by the spring F, allows the spring C again to touch E and thus completes the primary circuit, when the whole process is repeated.

The mean current consumed by a trembler coil as supplied with a motor car when the trembler is continuously buzzing may be anything up to 3 amperes, but a well-designed coil will work quite satisfactorily with .5 ampere or even less. A coil having a low-current consumption is a great advantage, since the batteries last so much longer, and the contact on the trembler does not burn away.

It will be noted that with the make and break first described we only get a single spark to fire the charge, while with the trembler we may get a succession of sparks, since the trembler continues to break and make the circuit as long as the contact is completed at the commutator. At slow speeds there is no doubt that we may in this way get a succession of sparks; at high engine speeds it is, however, very doubtful whether any trembler has more than time to give a single spark. I have in a great many instances carefully measured the speeds of the tremblers of a number of coils and find that a good trembler when well adjusted gives between 150 and 250 breaks per second. Taking as a mean 200 per second, the interval between successive sparks is .005 second. If the sector which makes contact on the commutator is 20 degrees, which corresponds to a rotation of the crankshaft of 40 degrees, the circuit is completed at the commutator for .0056 second when the engine is turning at 1,200 revolutions per minute. It is thus evident that for speeds greater than this there is only time for the trembler to break the circuit once and hence a single spark is produced just as in the case of a non-trembler coil. That this is a fact will be seen from some photographs which I shall show in a subsequent lecture. (Fig. 16.)

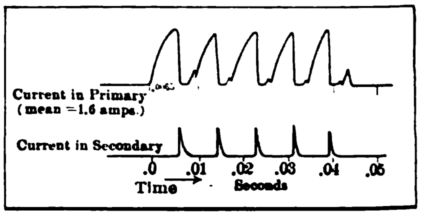


Fig. 8—Oscillographic record of current consumption

In Fig. 8 are shown the oscillograph records of the currents in the primary and secondary of a trembler coil, obtained by Professor Springer. The very rapid fall in the current in the primary when the trembler breaks the circuit and the correspondingly rapid rise in the current in the secondary when the spark passes in the spark gap will be noted. The spark gap was taken as a quarter of an inch, as it was in air, and would thus correspond to about the ordinary gap used in a spark plug when acting in the compressed gases in the engine.

There is one other system of coil ignition which has several points of interest about it. I refer to the Lodge system. The arrangement used in this system is indicated diagrammatically in Fig. 9. The terminals of the secondary of the coil, which is an ordinary high-tension coil, are connected to the inside coatings of two Leyden jars C and D. There are two spark gaps, one A between the inside coatings of the jars and the other B connected to the outside coatings, this latter is the gap in the spark plug inside the engine. When the trembler of the coil breaks the primary circuit the E.M.F. induced in the secondary causes the two jars to charge up, one with a positive charge inside and the other with a negative charge inside. At the same time the outside coatings become charged, one negative and the other positive. The charging of the jar continues till the rise in the potential of the ends of the secondary is sufficiently great to cause a spark to pass across the gap A. Now, when a spark has once passed through the air between the knobs forming the gap A this air becomes quite a good conductor of electricity and hence the two jars discharge through this conducting air, this discharge occurring extraordinarily quickly. The inside coatings having lost their charge, the outside coatings have their charges released and discharge across the spark gap B. Now, the peculiarity of the spark at B is that the release of the charges on the outside coatings is so rapid that the electricity will jump straight across from one point to the other of the spark gap B rather than go *round* even a low-resistance alternative path so long as it is longer and encloses a space so that a magnetic field would be set up if a current passed through the conductor. I can at once show this effect, for I will short-circuit the spark gap B by a piece of thick copper wire bent into a circle of about 8 inches diameter, when you notice that rather than go round this very low-resistance *détour*, the spark jumps the very high-resistance gap. This is the reason why, in the Lodge system, faulty insulation is less likely to put the plug out of action than in the ordinary system. Of course, if I short-circuit the spark gap A with the copper hoop, which corresponds to short-circuiting the sparking plug in the ordinary system, no spark occurs across the gap. The reason is that the discharge in the secondary of the coil is not sufficiently rapid, so that the current prefers to go round by the low-resistance path. If the spark gap B is short-circuited by a straight wire no spark will occur: the path along the wire being no longer than that along the gap, the discharge goes by the path of low resistance.

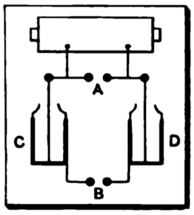


Fig. 9 — Lodge system of coil ignition shown by diagram

Having described at some length the principle on which coil and battery ignition systems work, I need only very briefly refer to magneto ignition. In the coil and battery system the current is derived from the battery; the magneto is simply an arrangement for replacing the battery by the E.M.F. induced in a coil of wire which is moved in a magnetic field. To show this effect I have a rough galvanometer on the table and a length of insulated wire connecting the terminals. If I take this wire and pass it between the poles of a magnet a small current is produced and a very slight momentary deflection of the galvanometer occurs. By suitably turning the passages of the wire I can get up a more noticeable swing. If I take two or three turns of the wire and slip them over one pole of the magnet I get a more noticeable deflection, while by taking a coil of about twenty turns the galvanometer is violently deflected.

A magneto for low-tension ignition consists essentially of a coil of wire wound on a soft iron spindle forming what is called the armature, which is rotated between the poles of a strong permanent magnet. The ends of the coil are connected to the make and break within the cylinder, just as in the case of the battery and coil, but here the coil acts as its own battery, owing to its motion in the magnetic field. When a high-tension system is used either a low-tension magneto may be employed to send the current through the primary of an ordinary trembler coil or the armature may contain both the primary and secondary windings so that no separate coil is required. The action in such a case is as follows: As the armature rotates a current is induced in the primary windings, the ends of which are short-circuited through a make and break. The direction in which the current induced in the primary of the armature circulates is such that it tends to keep the magnetic state of the iron core of the armature the same as it was when it stretched straight across between the poles of the magnet. When the core of the armature has got to a position about at right angles to the line joining the poles the current in the primary is suddenly interrupted by the make and break, which is opened by a cam rotated at half the crankshaft speed. As a result, the iron core suddenly loses its magnetism, for in the position it now occupies the magnet no longer tends to keep it magnetized and hence, just as in an ordinary coil, an induced E.M.F. is produced in the secondary, which causes a spark to pass at the sparking-plug points.

The performance of an engine is often tested by determining the amount of work it can do in a given time under certain given circumstances—as to speed, etc. Thus the engine may be put in a chassis, and the speed on the level and up certain hills may be noted and compared with the results given by similar engines, or those obtained with the same engine when some previous arrangement of valve setting or the like existed. The objection to this method lies in the fact that owing to variations in the road conditions, wind, and such like, the circumstances attending different trials on the road are never quite the same, and hence it is difficult to be certain that any change in the speed of the car obtained is not really due to such differences rather than to the alteration in the engine which is being tested.

If, in place of testing the engine in a car it is run on a test bed, much more reliable data can be obtained. There still remains the objection, however, that the brake horsepower thus determined depends on a large number of variables, such as the carburation spark advance, setting and size of valves, length of induction pipe, and the like, so that really to study the engine a very large number of separate tests have to be made in which each of these factors is varied, one at a time. Thus, to take the case of the timing of the valves, observations would have to be made at many different speeds, using different valve timing, which would involve making a number of different cam shafts. If, however, we were able to follow what goes on in the cylinder, noting the pressure on the induction, compression, firing and exhaust strokes, we could at once infer what would be the result of making, say, the exhaust valve open later, so that in place of making wild shots, more or less in the dark, we could alter the cam in the direction to get a better result. We thus see that any instrument which will enable us to determine the pressure in the cylinder at any point of the stroke will be of much assistance when we desire to study the performance of an engine. Such an instrument has been in use for many years with steam-engines, and is called an indicator. It is only, however, comparatively lately that it has been used to any great extent with petrol-engines,

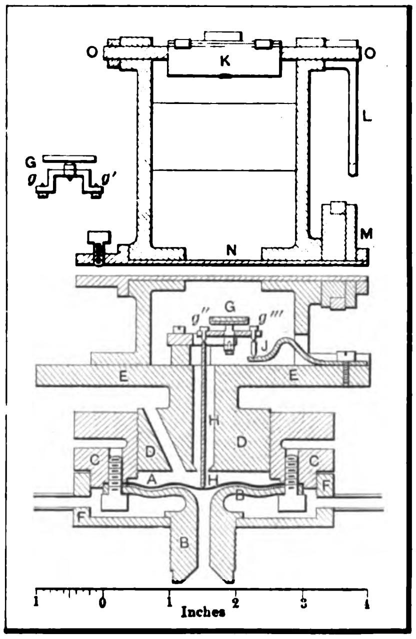


Fig. 10—Section of a manograph used for testing motors

the reasons being that the indicator, as used with a comparatively slow-running steam-engine, gave entirely unreliable results when used on a quick-running petrol-engine. This was due to the weight of the moving parts of a steam-engine indicator being so great that the tracing pencil was unable to follow the very rapid changes in pressure which take place in a petrol-engine. Thus, when an engine is running at 1,200 revolutions per minute, the whole working stroke only takes one-fortieth of a second, while with ordinary strengths of petrol-air mixtures the pressure rises 250 pounds per square inch in 0.003 of a second.

In order to obtain an indicator suitable for high speeds and rapid changes of pressure, the pointer of the ordinary steam-engine indicator is replaced by a beam of light reflected from a mirror, while the piston is replaced by a corrugated metal diaphragm, which plays the part of both piston and spring. The flexure of the diaphragm when acted upon by the pressure existing inside the cylinder is communicated to a very light pivoted mirror, and a spot of light reflected from this mirror by its movement indicates the pressure existing in the cylinder. Such an arrangement alone would give a spot of light which moved up and down along a straight line as the pressure in the cylinder varies throughout the cycle. In order to be able to obtain the pressure at any portion of the stroke, we require to give the spot of light a second movement, at right angles to the first, this movement to be an exact replica of the movement of the piston. In the indicator designed by the author this second movement is obtained by allowing the light, after reflection in the first mirror, to fall upon a second mirror, which is given a rocking movement, about an axis at right angles to the axis about which the first mirror can turn. The rocking movement of the second mirror is produced by a small crank and connecting rod, the crank being rotated at the same speed as the engine.

The actual construction of the indicator is shown in the sectional drawing (Fig. 10). The diaphragm, A, on which the pressure acts is made of steel, and for obtaining the whole diagram, including the working stroke, has a thickness of 0.65 mm. The diaphragm is clamped between two steel discs, B and C, the screwed portion of B being connected to the cylinder by means of a short water-jacketed pipe, the bore of which is 4 mm. A box, F, screws on to the ring, C, and cold water is kept circulating through the space enclosed, serving to keep the temperature of the diaphragm constant. It is of fundamental importance to keep the diaphragm cool in this way, since rise of temperature would decrease the stiffness of the diaphragm, and thus the deflection produced by a given pressure would increase so that the pressure scale of the instrument would be altered.

A concave mirror, G, is mounted on a small and light steel lever, which can rock on the points of two screws, g g', the movement of the diaphragm being transmitted to the lever by a light steel rod, H. The pointed screw, g'' is kept in contact with the rod, H, by the action of a strong spring on another rod, J, which presses against the point of a screw, g'''. By this construction the lever carrying the mirror, G, can rotate about an axis formed by the line joining the points of the screws, g, g', at right angles to the plane of the paper in Fig. 10.

Questions That Arise

CONCERNING THE BEST WAY TO STOP NOISES IN UNIVERSAL JOINTS DUE TO UNDER-LUBRICATION; DRIVING A SUPPLEMENTARY DYNAMO FOR ELECTRIC LIGHT

[261]—What is the best way to stop the noise of chattering universal joints?

The cause of noise in universal joints can usually be put down to under-lubrication, and this again through inaccessibility and getting oneself dirty in the operation. In cases where the cage does not revolve, a large grease cup might be fitted with advantage, so that it is connected to the cage by a flexible pipe and attached on the outside of the frame; then all that is required would be to give it a turn every day or so. When the cage, as is often the case, is made of leather it should be filled with soft grease every two weeks at least, if much driving is done, or say every 1,000 miles. Undue wear may result in a very bad accident if allowed to contine unchecked, as the parts become weak and may break. If the propeller shaft should drop out forward and sprag in the ground the result would be serious if it happened at any speed above 15 miles per hour. A method of guarding against such a thing happening is to fit to the car a device (Fig. 1) that would catch the shaft or torque rod should it become displaced.

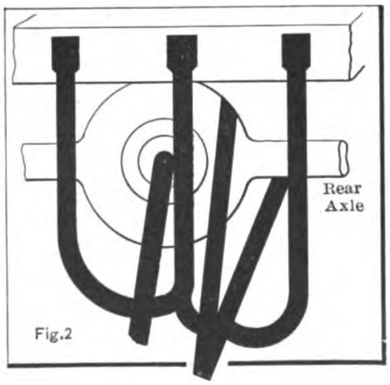


Fig. 1—Support to prevent propeller shaft and torque rod from dropping

[262]—How is it possible to drive a supplementary dynamo for electric light?

This is a question that often occurs to the autoist who would do away with oil lamps if he could find some means that would permit him to dispense with the perpetual charging of storage batteries. The dynamo naturally suggests itself but the method of attachment has to be considered. A method that can usually be employed on cars that have a fan belt drive will be seen in Fig. 2. Two belts can be carried on the car so that the fan can always operate and when the dynamo is required the short belt taken off and the longer one substituted. Before the installation is carried out the speed at which the dynamo should run must be taken into consideration and the pulley wheel for same made accordingly. It is necessary to have a storage battery fitted as well, as when the motor is stopped and the dynamo ceases to give off energy it is possible to switch over and keep the lights going till the motor is started again.

This is one of the plans that has been adopted with the Apple Dynamo for lighting, excepting that the belt is supplanted by a sproket chain. Properly installed the Apple idea works like a charm, but if an autoist undertakes to make the application after he gets his car, it is likely that poor workmanship will bring on a quota of noise, all of which can be avoided, however, by consulting the maker's plans and following them.

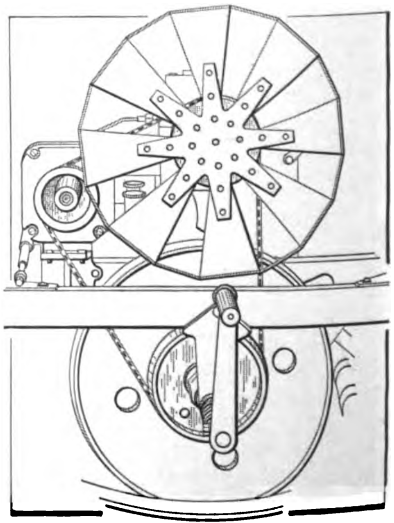


Fig. 2—Showing method of driving lighting dynamo

More Don'ts

A LITTLE COMMON SENSE; A BRIEF FOR SKILL; PRUNING SOME HANDICAPS, AND BRINGING THE MAKER AND THE USER INTO BETTER RELATIONS, ELIMINATING THE THINGS THAT ARE TOO TRANSPARENT TO BE TOLERATED

Don't undertake to be cook and steward of the club; other members may be willing to do some of the work.

Don't stay away just because the things that are being done are not after your suggestion; keep your ammunition in the locker until it is needed.

Don't shoot anyway unless the demand is pressing.

Don't use a pea-shooter when the time comes for action; get a gun.

Don't fall into the suggestion that new automobile legislation is desirable just because it is new; find out who is behind it and just why he wants you to help him pull chestnuts.

Don't forget who is responsible for undesirable automobile legislation when you go to the polls to vote—be sure and vote right.

Don't fail to support the legislation that is wise—vote for the man who is responsible for it.

Don't fail to advocate good roads; this is not to be construed as in favor of the expenditure of good money for bad roads.

Don't overlook the fact that some of the good money that went for roads was not expended as wisely as one would want.

Don't try to stop the building of good roads just because some of the work that has been done is not what you would want to directly pay for.

Don't fool yourself; you pay, if not directly, indirectly; put up a fight for what you pay for.

Don't overlook the fact that the fellow who is trying to "graft it" is a coward; scare him out; all that you have to say is boo!

Don't think that every patriotic citizen (?) is starving on the job; cut out the compensation (whatever it is), and the patriot (of a certain class) will abandon the work.

Don't forget that abandonment is not always a crime; it would be for the good of the service in some cases; try and find the cases.

Don't take it for granted that all public questions are being handled well; there are a few that might be in better hands; you may be able to help the situation along.

Don't go at it like a "bull at a gate or a cow in a china shop"; be practical.

Don't judge your possible buyer by the same standard that you set up for yourself; twins generally hail from the same family.

Don't imitate the rabbit who tried to imitate the roaring lion; the rabbit roared all right, but the coyote said that Br'er Rabbit was "good eating."

Don't suppose that there is no intrinsic merit to an institution that keeps on expanding despite the predictions of the croakers who key their voices to the point of cracking telling how a fact is not a fact.

Don't melt your jewels down to make a golden calf; just limit your purchase to a good automobile; one that can be procured with some of your small hoard; the cost of maintenance must also be considered.

Don't match wits with a man who desires to purchase an automobile; give him what he wants and let him go.

Don't chase after phantoms; land the customer who chases after you.

Don't copy the men who abandoned civilization and laid eggs that would not hatch; vitalize your business; deliver the goods.

Don't try to get the best of your customer; get his confidence; then hold it.

Don't throw your false teeth into a well and trust in the Lord to grow a new set of teeth; nor show your teeth to your customer after you get enough of his money to pay for one of your automobiles.

Don't pump on a tuneless organ; get some musician to key your argument up; sparkle; snap; pave the way with simplicity and decorate the scenery with truth.

Don't scald the hair off of a plain statement of fact; it looks better when it is protected from the Wintry blast.

Don't forget, if you want to catch fish, you must bait your hook; if you want to catch a particular kind of fish, you must tickle the fish's palate, not yours.

Don't fish for a customer for your kind of an automobile, using bait that would attract the discriminating notice of a skate; tell the prospect just what kind of an automobile you have to sell; it may be just what he wants; if you do not know how to tell him, engage some one who will be able to truthfully describe the car.

Don't pay a man to compile a "house organ" and let him palm off garbled material that he "crabs" from technical papers; your customers will have read the original and will know that you offer it second-hand; they might infer that your construction department has the same poor way of doing things.

Don't imagine that the customers whom you hope to entertain don't know the difference; if you think that they do not know anything, you do yourself the injustice of proving that they know more than you do.

Don't pay good money for a bad job; exact an equivalent; it may be had for the asking; be imperative.

Don't intrude on the privacy of a citizen; if a man does not ask you for anything, even a circular, there is no reason to believe that he wants it; if you thrust it upon him you gain his enmity; let him find out what you have; if it is what he wants you would have to put up a stiff argument to keep him from taking it away from you.

Don't despair of letting a man know what you have that he wants; put it under a plug hat on the sidewalk that he uses every day; when he comes along he will kick the hat and a swollen toe will do the rest.

Don't squander a plug hat that costs $10 trying to attract the notice of a buyer unless you have something worth while to sell.

Don't make the mistake of thinking that every one knows all about your business just because you think that you do; such a mistake merely proves that you are not well informed about your own affairs.

Don't get vexed if some one volunteers the truth; it may not sound good to you, but following it might pull you back off the road to ruin.

Don't overlook the fact that your argument may be a straightforward presentation of the facts as they appear to you and still be as one-sided as Patrick's financial prospects; send the argument to the carpet cleaner to be renovated and then try it on the dog.

Don't pay $2 a line for publicity and allow the publisher to make it appear in the paper as if it cost you nothing; the public will say, since it cost nothing, it is worth nothing, and the publisher will be getting you to pay for that which should be paid for by him.

Letters

DISCUSSING MATTERS OF INTEREST TO USERS OF AUTOMOBILES; INSERTING SPRINGS TO TAKE UP PLAY; SAFETY WHEN THE STEERING ROD DROPS; QUALITY OF LUBRICANT MUST SUIT THE SERVICE; TAKING OFF TIGHT WHEELS AND SPROCKETS, ETC.

Taking Up Play in a Propeller Shaft

Editor THE AUTOMOBILE:

[2,412]—I have a car fitted with live axle drive and the propeller shaft is fitted with double-ended cardan joints. It has lateral play back and front and now that the blocks are slightly worn there seems to be a clattering noise when running slow. Could you suggest a remedy to obviate this?

Albany, N. Y. PUZZLED.

We should suggest fitting new blocks and inserting springs as indicated in Fig. 1.

Gear Wheel Setting

Editor THE AUTOMOBILE:

[2,413]—I have an L-type motor with all the valves on one side and the magneto is driven by a gear off the front. While lubricating the timing case the other day—and to do this I have to remove the front plate—the magneto wheel came out. There are some center punch marks on the wheels. How should these be set for the magneto to fire properly? MAGNETO.

New York.

From the marks you should be able to retime the magneto, and to do this the condenser must be removed first in order to see when the armature leaves the magnets. Turn the magneto shaft so that the distance between armature and magnet after the break has occurred is 5-8-inch and the piston on top dead center; then insert timing wheel to mesh with the cam gear wheel.

Fig. 2 shows the gear wheels with the timing gear case removed; the center punch marks should mesh as indicated and as only the magneto wheel has been removed you should have no difficulty in properly replacing it.

To Prevent a Steering Rod From Dropping

Editor THE AUTOMOBILE:

[2,414]—While going over a bad piece of road the other day the steering rod of my car freed itself from the ball at the end of drop lever. Could you tell me the cause of this and what to do to prevent it occurring again? R. A. E.

Yonkers, N. Y.

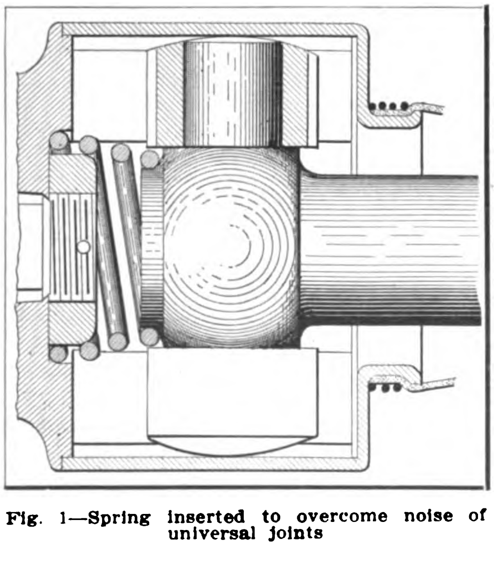


Fig. 1—Spring inserted to overcome noise of universal joints

The cause of your trouble is that the adjustment of the ball and socket joint is not tight enough and when a strong push is transmitted to the springs inside by an obstruction on the road's surface these springs allow the jaws of the socket to open and permit the rod to fall. The remedy is to adjust the springs tighter or have a small amount of the socket ends ground off to allow a better purchase of the ball, but sufficient clearance must be allowed so that when the arm works backwards and forwards it does not touch.

A strap placed in the manner indicated in Fig. 3 will keep the bar from dropping on the road and thereby damaging it and preventing the car from proceeding until the repairs have been made. It should also prevent the rod dropping.

Quality of Lubricant Must Suit the Service

Editor THE AUTOMOBILE:

[2,415]—Please advise what kind of oil you consider best for the motor; also please give me the address of some manufacturer of Panhard oil. FRED B. NEWINS.

Patchogue, N. Y.

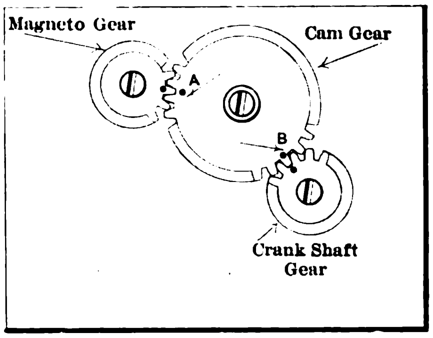


Fig. 2—Sketch showing marks on timing gear wheels

This question is sufficiently incomplete to make it desirable to comment upon the views as therein expressed. If the oil is to be used for cylinders of internal combustion motors, this fact should be taken into account; if the service demanded of the motor in a given case is in the summer time, the oil should be relatively viscous: but if the service is to be rendered during the cold winter months, a somewhat thinner lubricant should be selected. On the other hand, if the oil is to be employed in the transmission gear, some account should be taken of the character of the service it must render if satisfaction is to be realized. Likewise, it would be worth while taking into account the kind of oil that would best lubricate a live rear axle, and so on. But if the motor is of the air-cooled variety, rather than of the water-cooled type, surely this fact should be taken into account. And so it may be said all along the line. The first thing to fix upon is the duty that the oil must perform, and then select the kind of oil that is efficacious for that purpose. The idea of buying 80-cent cylinder oil to use in a 20-cent bearing should go extremely well with the type of automobilist who kicks about the cost of maintenance, but exhibits rare intelligence in making the cost as high as possible. There are probably a considerable variety of brands of lubricating oil that might even be purchased at from 20 to 30 cents per gallon, in barrel lots, that would be entirely satisfactory for the lubricating work that must be done in all the joints of an automobile, excepting in the cylinders. These relatively low-priced products, however, should be purchased from the oil vendors who make a specialty of dealing in automobile lubricants, in order that resinous products or other concoctions might be avoided. When it comes to the lubricating oil, tell a reliable oil house what kind of a motor it is that is to be lubricated, and reducing it to a question of cylinder oil, be careful to state definitely the actual facts as they are, and the chance of going wrong will then be reduced to one in a hundred, which is a sufficiently small chance to permit a man of intelligence to cope with it successfully. The address of the manufacturers of Panhard oil will be found by consulting the index to advertising pages of The Automobile, or The Automobile Trade Directory, but it should be possible to get any of the standards brands of lubricating oil at the nearest dealer in automobile supplies.

Baumé Degrees to Specific Gravity

Editor The Automobile:

[2,416]—Can you inform me how to turn Baumé to specific gravity? Metric.

Montreal, Canada.

$$\text{Specific gravity} = \frac{145}{145 - {}^\circ\,\text{Baumé}} \text{ at } 60^\circ \text{ Fahrenheit.}$$

e. g. 15.0 Baumé—1.115 specific gravity.

Length of Spark Plug Gap

Editor The Automobile:

[2,417]—Some time ago I set the points of my spark plugs at 1/64th inch and found that the engine did not run as well as when they were set at 1-32d inch. One or two of the cylinders seem to miss occasionally. Could you tell me the reason for this? H. L. Long.

Richmond, Va.

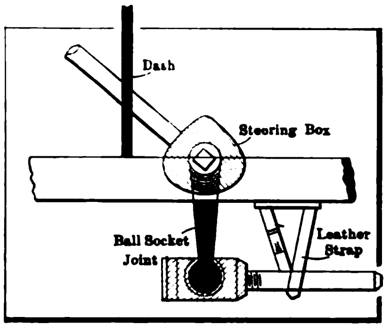


Fig. 3—Strap to support steering bar in case of accident

The cause of the misfire is not so much due to the plugs as the mixture. The spark that one sees when the plug is held outside the cylinder is much attenuated when under compression, and unless the mixture is good the current that bridges the gap is not sufficient to cause an explosion, whereas the 1-32d is. A slight variation of the mixture might prove the running of the motor.

How to Remove Tight Wheels and Sprockets

Editor The Automobile:

[2,418]—What is the best method of removing the rear wheels of my car? They are keyed to the shaft and I have no wheel remover. I have tried striking blows on the inside of the wheel with a hide hammer, but the action does not improve the paint and, furthermore, does not remove the wheel. A Subscriber.

Trenton, N. J.

A method of removing wheels is shown in Fig. 4, and the method of application is as follows: Remove the hub cap and fix some stout rope around four of the spokes as near the brake drums as possible. The lifting jack is then unscrewed to its smallest lift; place it with the head against the end of the axle, but if it does not touch owing to the size of the hub cap, insert a block of hard wood, as shown in illustration. Secure the rope round the base of the jack and unscrew, and the wheel should come off easily. The same method can be employed for removing chain sprockets.

Metal for Connecting Rod Bearings

Editor The Automobile:

[2,419]—I purchased a touring car in May, have run it 25,000 miles. About a month ago had to have the connecting rods on the crankshaft adjusted, I suppose on account of the bearings wearing and causing knocking in the crank case. the same trouble has come back and the machine is now at the agent's to be adjusted again. What is the best metal to be used for bearings on the connecting rods? They spoke of replacing with bronze. Which is the best make of bearing for this purpose? John P. Tull.

Philadelphia.

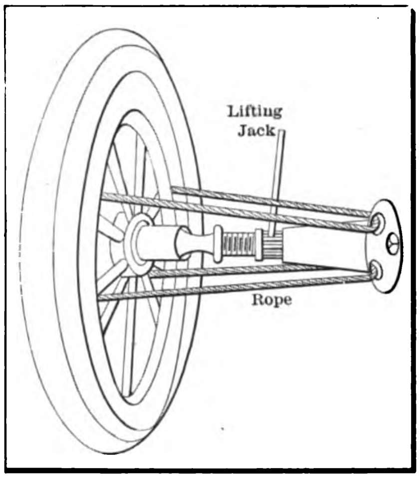


Fig. 4—Means of removing tight wheels and sprockets

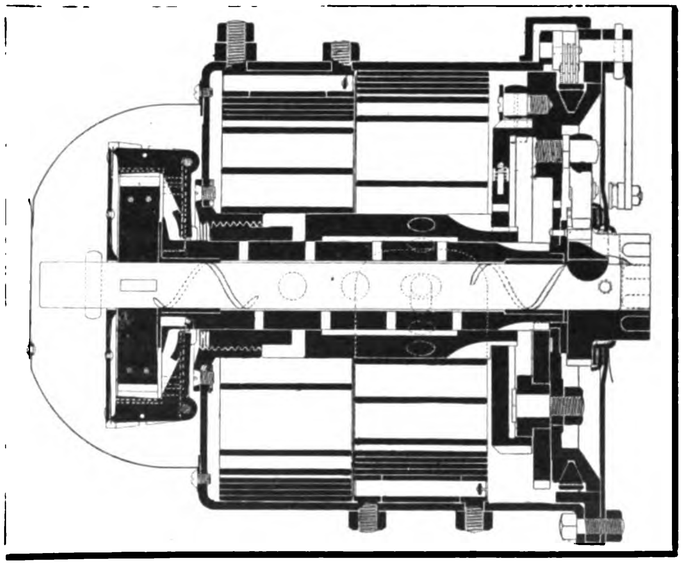
A very good metal for bearings, and one that should give satisfaction is Fahrig metal. The composition of this metal is substantially 90 per cent. tin and 10 per cent. copper. There is a very small amount of impurities in either metal, but not sufficient to materially alter these percentages. New metal must be used, otherwise the proportions cannot be correctly ascertained. This table shows some of the properties of Fahrig metal:

Crushing strength...........	38,500 pounds per square inch
Tensile strength.............	20,500 " " " "
Elastic limit..................	3,600 " " " "
Molecular temperature.......	1,000 degrees Fahrenheit
Anti-friction angle..........	77 degrees

In casting Fahrig metal it should be covered with charcoal and heated to a dull red before "teeming."

Automatic Starter Shown at Belmont Park

One of the devices that attracted unusual notice at the automobile exhibition at Belmont Park was the automatic starter which was being demonstrated by the Auto Improvement Company of New York. The starter belongs to the flux spring variety, and the details of the same are brought out in the cross-section here given, showing two flat steel springs of the coil variety, lying alongside of each other in a dust-proof case. The shaft takes the place of the ordinary starting crankshaft and does the work just as it would be accomplished by a chauffeur in the ordinary process of cranking. the only difference being that the effort is due to the energy stored in the flat springs, thus making it unnecessary for the driver to exert himself.



Cross-section of automatic starter shown at Belmont Park

Digest

BRAKING TRUCKS WITH THE EXHAUST—DETAILS ON CASEHARDENING—FATIGUE OF COLD-ROLLED MATERIAL—PENETRATION OF QUENCHING EFFECTS—WHEN IRON DOES NOT RUST—CAST ARMOR PLATE—ESTHETICS OF ENGINEERING—WRITING ON GLASS

A motor brake, recently patented, is employed on the trucks turned out by Gräf & Stift, A. G., a Vienna manufacturing concern. The principle is similar to that used for reversing the motor in several American marine power plants, the camshaft being adjustable longitudinally by means of a shifter fork, and the exhaust cams are arranged with truncated cone extensions at one side leading to a circular cam of the same radius as the non-eccentric portion of the main cam. At any point in the cycle the exhaust tappet roller may thus be let down so as to throttle or completely block the exhaust, accordingly as the shaft is shifted part of the width of the cone or its entire width. The device is said to work satisfactorily, offering the advantage that all organs transmitting the braking effort are engaged gradually.—*Der Motorwagen,* Oct. 1.

Strength of a casehardened shell, according to Leon Guillet, the well-known metallurgical specialist employed in the laboratory of De Dion et Bouton, is independent of the carbon content of the steel below the shell, the core. The best casehardening results he obtains in practice, however, from a steel not exceeding 12 points of carbon, 30 of manganese and 30 of silicon. A steel of this composition has a tensile strength, annealed, of less than 38 kilograms per square millimeter (about 39.596 pounds per square inch) and an elongation of 30 per cent. The best cementation compounds are at present (1) a mixture of 40 per cent. charcoal and 60 per cent. carbonate of barium, which operates through the carbon monoxide developed by the heat, (2) a mixture of ferrocyanide of potash and dichromate of potash, and (3) a mixture of 10 per cent. of common salt with 90 per cent. of charcoal. The latter is found very effective, though its chemical reactions are still obscure. It is important for the value of a compound that it does not cause concentration of carbon in the surface film of the work but penetrates well, so that brittleness of the surface and subsequent heat treatment may be avoided. Pieces intended for wear and impact may be hardened to a depth of 1-2 to 8-10 millimeters; those exposed to steady pressure should have no less than 1 millimeter to 1 1-4 millimeters thickness of the shell. In practice there is a distinction between casehardening at low temperature (850 degrees to 900 degrees Centigrade) and at high temperature (1,000 degrees to 1,050 degrees Centigrade, rarely 1,100 degrees), and the distinction is justified by the corresponding difference in the subsequent heat treatment. Steels cemented at 850 degrees are cooled to 750 degrees and then quenched. Those cemented at higher heat require two quenchings, first at 1,000 degrees in water, serving to give the core the finest possible grain and the toughness which goes with fine grain, secondly at 750 degrees to give hardness to the shell. These rules rest on the following principle: The brittleness of a steel grows with the temperature and the duration of the heating, provided this temperature is above that of the lowest transformation point. To remove the brittleness, the steel must be reheated to above the highest transformation point and then slowly cooled. But in the case of very mild steels cooling in water has the same effect. By the double quenching, all free cementite in the hardened shell disappears, if the latter is not thicker than 2 1-2 millimeters and, besides, the core becomes perfectly homogeneous. However, if the carbon of the steel is not at least 12 points (a "point" being 1 per cent. of 1 per cent.), the core becomes hard and brittle. On the other hand, the manganese must be less than 30 points, to keep the shell from getting too flinty. The grain of a fracture, which is often looked to for deciding the quality of the cementation, depends mostly on the manner of fracturing.—*Revue de la Métallurgie,* July.

When iron and steel are maintained at heats from 65 degrees to 800 degrees Centigrade the ferrite grains very rapidly develop a formation of coarse crystals, as observed by Stead. This fact is now supplemented by the observation that the formation of coarse crystals is particularly rapid if the material has been cold-rolled or drawn. One half of a bar of soft steel was drawn to a thin wire and then subjected to a temperature of 650 degrees to 800 degrees, at the same time as the unworked half of the bar. After both had cooled, the drawn material showed much larger crystals at fractures than the unworked piece, and microscopic examination corroborated the test. The effect of the crystalline formation is much less noticeable at tensile tests than at impact tests on nicked bars. Many heretofore mysterious fractures are explained through the facts mentioned. —G. Charpy in *Comptes Rendus de l'Académie,* Aug. 1.

Data on the penetration of the hardening effect with different quenching mediums formed the subject of a paper recently read by Mr. Grevet before the Society of Mineral Industry. The author started from the assumption that the action of a quenching liquid must depend on three factors, (1) the conductivity of the liquid, which decides the surface hardness produced in any given steel, (2) the size of the work, and, (3) the conductivity of the steel, which jointly decides the relations between surface and core hardness. He undertook experiments for determining by test the surface hardness and the core hardness reached in an assortment of bars of plain carbon steel varying in diameter from 12 to 60 millimeters, and quenched with cold water, oil, boiling saturated brine, and with air, and presents the results in tabulated form. He also gives diagrams of the penetration in chrome-nickel steels of different compositions.—*La Technique Moderne,* September.

Pure iron does not rust, hence almost pure iron (from electric furnaces) is used for tinplate by an American company whose claims to special merit on this ground met with skepticism in Europe until the Chemical Society in London had listened to a paper on the same subject from which it appeared that pure iron and pure water in combination gave rise to no oxidation.—*Proc. Chem. Soc.,* June 29.

To write on glass, use an aluminum pencil.—Chemical Notes in *La Technique Moderne,* September.

Considering the enormous cost of rolled armor plate, under all circumstances the heavy additional cost of establishing new producing plants when the armor plate must be of the caliber required for the Dreadnought type, the world will have to come to cast plate hardened on both sides, which can be made without new installations and is more readily turned out in the suitable shapes.—From article by Victor Tilschkert in *Oest. Z. f. Berg. und Hüttenwesen,* Aug. 6, 13 and 20.

"The real architect of this age is the engineer," says Joseph A. Lue, among other striking remarks with regard to buildings and bridges appearing in a recently published book entitled "Esthetics of Engineering" (*Ingenieur Aesthetik*). And, referring to the failure of modern architects in not producing works of artistic merit, embodying the spirit of the present age, but continuing to "rob the art treasuries of the past," he holds that this result is only natural when the architect or artist is not trained also as engineer and when the engineer has experienced no development of his artistic insight. "Modern civilization is not reflected in our architecture," he says, "but in our vehicles, automobiles, ships, trains. When the question is of the real style of this age, here is where it is found. There is need of bringing art and engineering nearer together, as they were once."—*Technik u. Wirtschaft,* September.

Troubles of Battery Ignition Systems	How to Fix Battery Ignition Troubles
(a) Run down battery.	(a) Charge four-volt batteries to 4.3 minimum.
(b) Broken plug.	(b) Fit new plug or if porcelain broken fit new one.
(c) Dirty plug.	(c) Clean with gasoline and tooth brush.
(d) Points of plug too far apart.	(d) Set to between 1-32 inch and 1-16 inch.
(e) Points too close.	(e) Open slightly with blade of penknife.
(f) Bad earth wire.	(f) Clean around both and scrape wires.
(g) Short-circuited wire.	(g) Replace wire by new piece at once.
(h) Short circuit in coil.	(h) Send coil to makers.
(i) Burnt condenser.	(i) Caused by batteries of too high voltage. Return to maker.
(j) Short circuit in timer.	(j) Clean out pitted oil and refill with fresh.
(k) Bitted contacts of platinum trembler blades.	(k) Clean with fine file, perfectly level.
(l) Timer roller jumping contacts.	(l) Due to worn fiber; take off timer and have it turned true.
(m) Weak spring on timer.	(m) Fit new and stronger spring or shorten.
(n) Loose connections.	(n) Go over all connections once a month and fit lock nuts.
(o) Chafed wire.	(o) Fit new wire and secure same with staple.
(p) Sulphated terminal of battery.	(p) Clean; finish with fine emery paper; when the battery is not in use cover terminals with vaseline.
(q) Battery will not hold charge.	(q) Plates buckled or loose paste causing short circuit; test specific gravity.
(r) Short circuit between coil and plug.	(r) Poor insulation or broken wire inside; fit new wire.
(s) Water or damp in coil.	(s) Put coil wrapped in flannel in slow oven; more a job for coil expert.
(t) Faulty windings.	(t) Beyond owner's controi; return to makers.
(u) Trembler contacts give off metal one to the other.	(u) Voltage too high for coil; change poles of battery.
(v) Faulty switch.	(v) See if it insulates properly; look for crack in vulcanite.
(w) Loose platinum points.	(w) Have them resoldered with silver.
(x) Unusual buzz inside coil.	(x) Probably due to faulty insulation of the windings.
(y) Wrong adjustment of platinum contact points.	(y) Adjust with least clearance to give a high-pitched tone.
(z) Broken terminal on coil.	(z) Buy a new coil.

Care and Repair of Tires

SECOND INSTALLMENT, ILLUSTRATING PROFESSIONAL METHODS OF REPAIRING; DISCUSSING THE BEST WAY TO OBTAIN THE MAXIMUM RESULT

TAKING further advantage of professional methods, Fig. L presents two operations, one of which, A, involves a sectional repair, and B shows the vulcanizing being done on a section of a tire. This illustration indicates that a section can be put into an outer casing, no matter how badly it is damaged, provided, only, that the fabric is in good condition. Fig. M shows the wrapping process. The tire is mounted on a shaft S, and is being wrapped by cotton fabric F, which is the final operation before placing the same in the vulcanizing kettle. The spindle S has a loose pulley P1, upon which the belt B1 runs, excepting when it is desired to rotate the shaft S, in which event the belt is slid over onto the pulley P2. The device is almost primitive in its simplicity, requiring nothing but the standards and a piece of cold rolled shaft with the spiders S2 and S3 upon which the tires are mounted when they are ready for the wrapping operation. It would almost pay the private owner of a car to provide such facilities in order that he might undertake his own repairs, but in the absence of such utensils, it is a question as to whether or not it would be feasible to try to do the work.

When the tires are wrapped they are then placed in the kettle K1, hanging on the hook H1, after which the cover C1 is put into place and bolted tight against the gasket G1, when steam is turned on and the vulcanizing process begins. The steam is generated in the boiler B1, maintaining the same at about 45 pounds per square inch, which corresponds to a

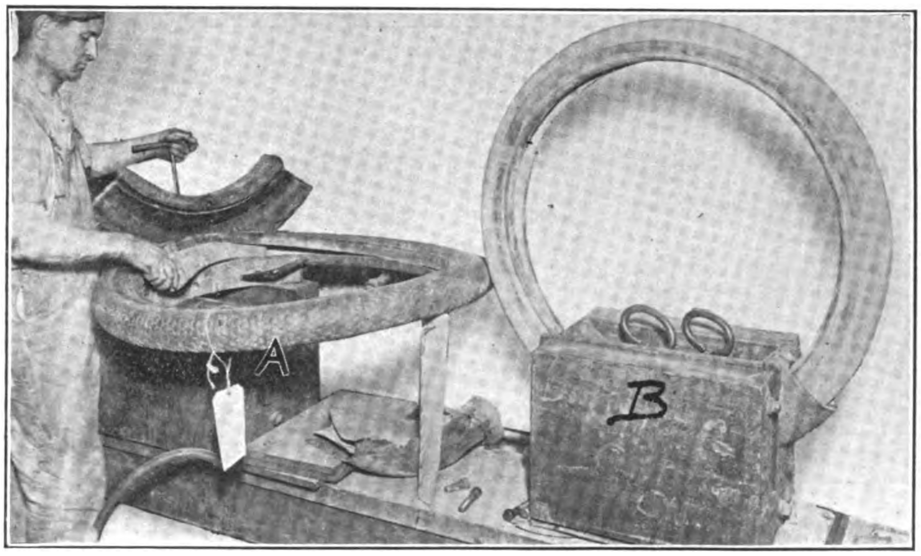


Fig. L—Depicting the Method of Curing an Outer Casing after a Sectional Repair; also Showing the Method of Procedure in Making the Repair

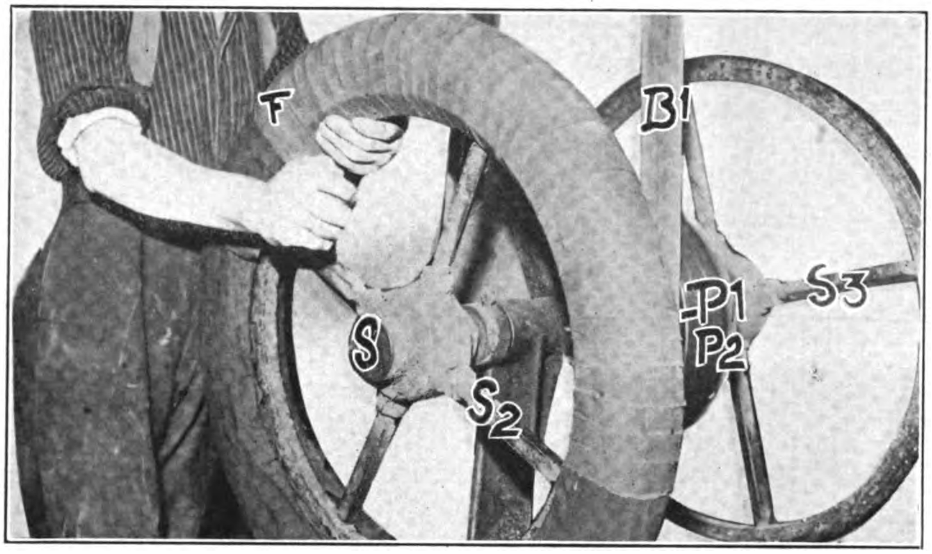


Fig. M—Wrapping the Outer Casing after the Repair Is Completed Prior to Placing the Same in the Vulcanizing Kettle

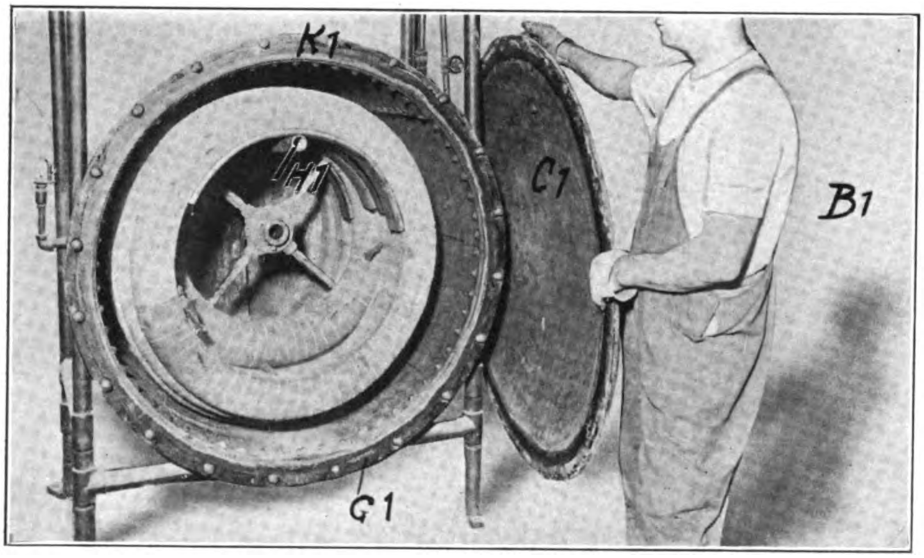


Fig. N—Showing the Vulcanizing Kettle Open and the Wrapped Outer Casings Resting on a Hook Within the Cover about to Be Bolted on

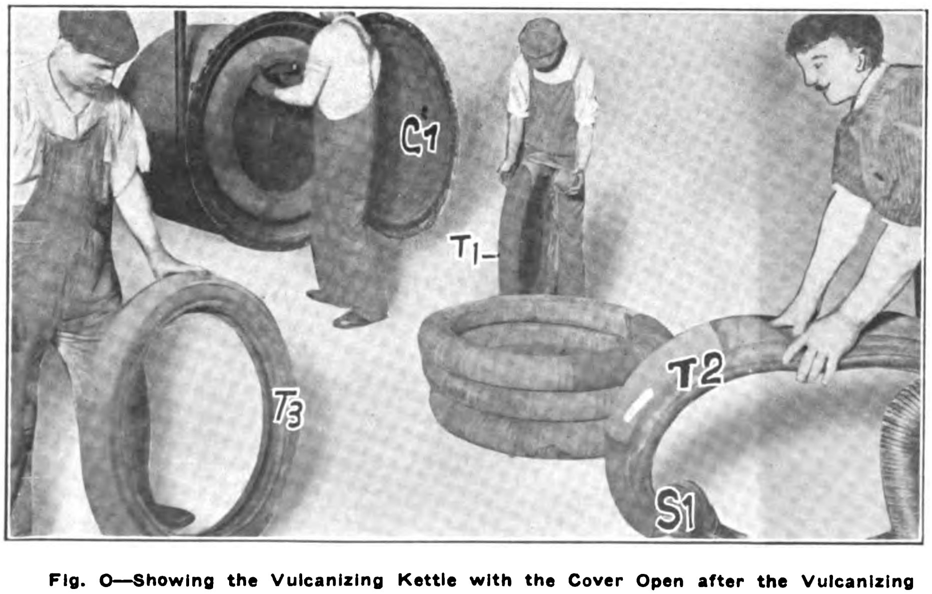


Fig. O—Showing the Vulcanizing Kettle with the Cover Open after the Vulcanizing Process Is Completed and the Wrapped Tires Being Removed Therefrom, Some of Which Are Being Unwrapped, the Spring Being Taken out and the Finished Job Ready to Go Back to the Owner

temperature of 274.3 degrees Fahrenheit, at which temperature a kettle cure is realized in 45 minutes, 20 minutes of which are allowed for the equalization of temperatures.

If a hard cure is desired the steam is raised to 55 pounds per square inch, which corresponds to a temperature of 286.9 degrees Fahrenheit, and the time allowance is increased to 1 1-4 hours, 25 minutes of which is the allowance for equalizing temperatures. If a semi-cure is desired with the steam pressure at 55 pounds per square inch the full time allowance is 45 minutes, 25 minutes of which is taken in the equalization of temperatures. It will be understood that vulcanization will take place over a wide range of temperatures; if the temperature is relatively low the time required to bring about a more or less complete state of vulcanization will be relatively long. In hastening the vulcanizing process it is necessary to avoid going beyond a certain temperature; 275 degrees Fahrenheit is an approximate safe maximum, and the novice in undertaking to make repairs, if he uses an electric vulcanizer, must so regulate the temperature that it will not rise beyond the safe point.

When steam is employed as the source of vulcanizing heat the steam pressure can be maintained at substantially 55 pounds per square inch without danger of serious fluctuation, and this will be particularly true if the steam boiler is large enough and the volume of water therein contained is sufficient to prevent rapid fluctuations in the pressure, it being the case that the greater the volume of water the longer it will take to vary the temperature of the same, hence the less marked will be the pressure changes in a given time.

But when an electric vulcanizer is used it is possible to raise and lower the temperature at a rapid rate, and in order to avoid these rapid changes in temperature it is necessary to watch the vulcanizing heater until it has attained its maximum temperature, regulating the flow of current from time to time until by the thermometer it can be shown that the heat condition has reached a stable level and will remain at that point throughout the balance of the process. There are two conditions that interfere and tend to cause heat fluctuations, one of which lies in the change in resistance of the electric heater for temperature variations: the resistance in ohms of the conducting wires in the heater increases considerably with increasing temperature, and the flow of current in amperes must be adjusted to suit this change in resistance, all of which takes a little time, because it takes time for the heater to rise to a stable level, and the inexperienced autoist is likely to overlook this condition and go away from the vulcanizer before it is safe to do so. The remaining factor lies in the inaccuracy that is inherent in the average thermometer. It is extremely important that the electric vulcanizer purchased and used for this class of work shall be provided with an accurate thermometer, by means of which the autoist will be able to determine the real temperature that exists during the vulcanizing process. It is not uncommon to find commercial thermometers that will give false readings of 10 or 15 degrees at this range in temperature, and it will be apparent to any one that if the safe temperature is 275 degrees Fahr, a difference of 10 or 15 degrees, or say 290 degrees Fahr., if made the working temperature, spells failure.

When the kettle is open, after the vulcanizing process is completed, the tires are removed therefrom as shown in Fig. O, with the cover C1 removed; one of the tires T1 is having the wrapping undone, another of the tires T2 is having the spring S1 removed and a third tire T3 is shown in the completed state. Fig. P shows a pair of tires after they were repaired, in which the case C1 has a patch P1 and the case C2 has a patch P2. The work is extremely well done, and a tire repaired in this way should give a good account of itself, but the amount of service to be expected depends absolutely upon the condition of the old fabric. There should be no question at all about the quality of the new patch; it will be good if the fabric used is of a good grade, and if the repair rubber is of the right quality. But the new patch depends for its utility upon the quality of the old fabric to which it is attached. If the new patch is to make good the ills of a blow-out, the first question is, What caused the blow-out? If it is on account of rotten fabric, and the condition of decay is general throughout the whole tire, the same rotten fabric will blow out again, perhaps in a new spot, but more likely at the junction of the new patch and the old fabric. If, on the other hand, the tire is relatively new and the fabric is in good condition, the repair will be dictated on account of damage done by some means, not assignable to tire rot. This patching process, under the circumstances, is really one to be applied to a tire that is in good condition excepting for the result of good usage, the assumption being that the tread may be damaged at one or more points by cutting or otherwise, but that the fabric in the remaining part of the tire will be stout and in fettle to do further work, so that the patch will have something to hang on to, in which event it is worth while to consider repair cost.

Inner tubes are legitimate subjects for repairing up to the time when the rubber compound shows a general condition of checking and a marked falling off in the elasticity of the rubber. Fig. Q shows a tube at A with the repair tissue T1 ready for the vulcanizing process; at B after the repair part is inserted and rolled

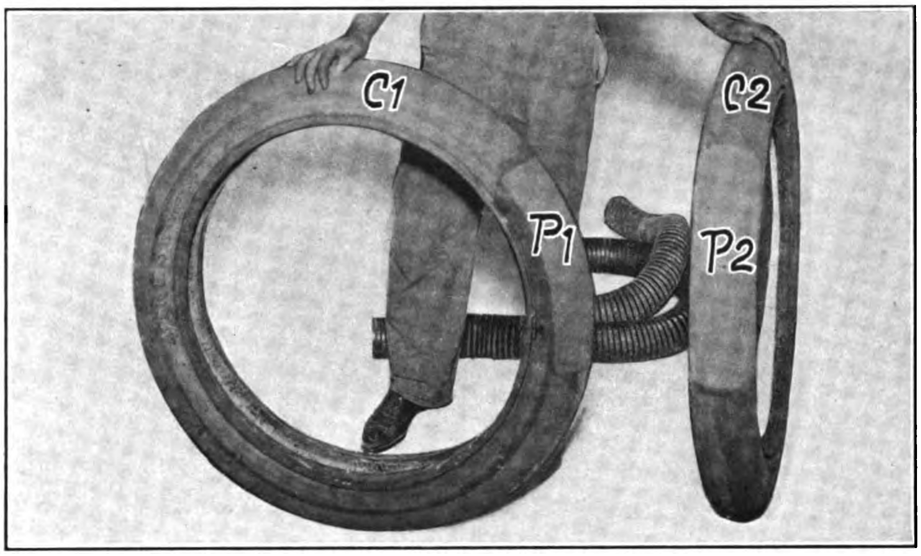


Fig. P—Presenting a Pair of Patched Tires, Showing How Well the Patches Are Made

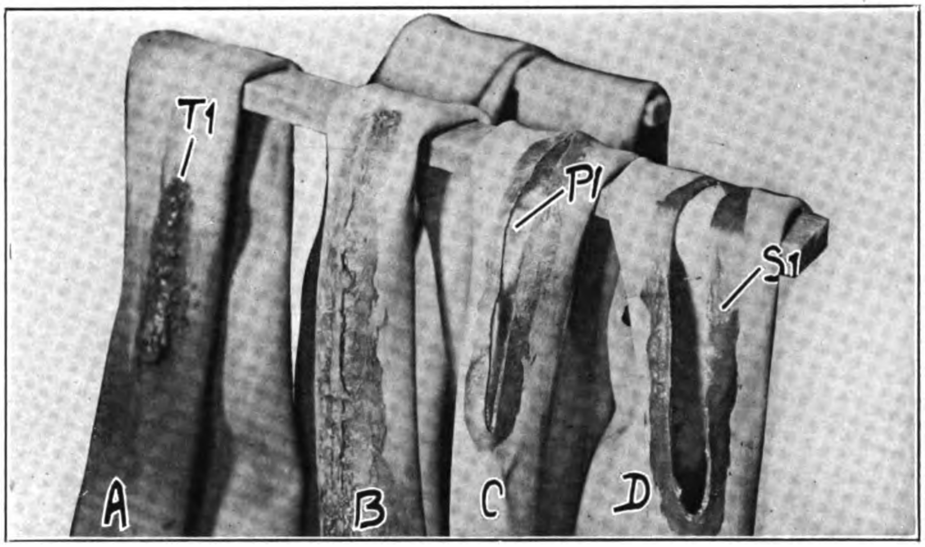


Fig. Q—Four Operations in the Patching of Inner Tubes. A—Ready for the Vulcanizer; B—The Tube Rolled Down; C—The Patch Inserted; D—Ready for the Patch

Fig. R—Working in Vulcanizing Gum in a Hole in an Inner Tube Undergoing Repair

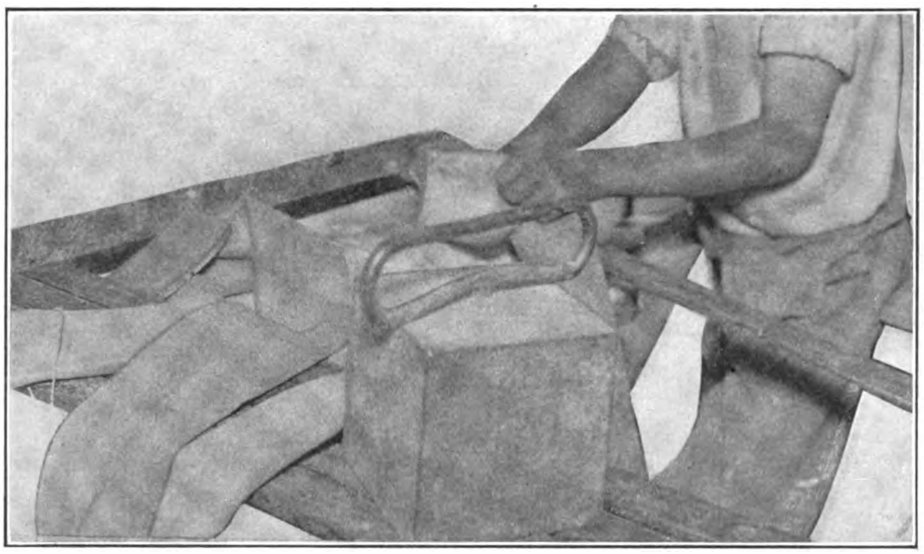


Fig. S—Inner Tube with Patching Completed Inspected and Ready to Go Into Vulcanizer

down; at C with the repair part P1 inserted and at D with the edges of the opening solutionized at S1 all around. Prior to solutionizing, it is necessary to cut away all the damaged rubber, making the opening as large as may be, provided the remaining rubber is sound. The surfaces are then sandpapered down, removing the exterior coat, and when the body of the rubber is in sight it is then roughened, after which it is cleaned, using benzine or other rubber solvent for the purpose, and it is then solutionized, and it is important that the solution employed be of a character of rubber gum that accords with the quality of the rubber of which the tubes are made. There is almost no limit to the extent to which inner tubes can be repaired provided they are in good condition from the point of view of the quality of the remaining parts of the tubes, assuming that the operations are performed with care and that the vulcanizing process, which must invariably follow, is properly done. Fig. R shows the operation of working vulcanizing gum into a hole in the tube. The average amateur does not take the necessary pains in performing these operations; with him it is enough to stick a piece onto the tube to be repaired, exerting a little hand pressure and clamping it down with a clothes pin, hoping, perchance, that a little dirt, some grease, a bit of a patch and a jab of gum will adhere to the tube and keep the wind in—it will not.

When the inner tubes are properly patched, and it can be seen by a careful inspection that the patch is well stuck to the surfaces all around, it may then be vulcanized, as shown in Fig. S.

Timing the Motor

DISCUSSING THE RANGE OF TIMING IN MOTORS AT VARIOUS SPEEDS; PRESENTING A CHART OF SETTINGS OF VALVES TAKEN FROM ACTUAL PRACTICE

It is proposed in a series of diagrams to explain the methods of timing employed in a number of well-known motors. The small dots indicate the positions in degrees to the dead center at which the different operations take place. The variations of the timing operations are primarily due, as the curves indicate, to the increased maximum speed of some motors compared to others, and while some motors can be made to run better by a different setting of the valves, allowing them to open or close earlier or later, as the case may be, nevertheless, the two primary considerations that the autoist has to consider are the opening of the exhaust and the opening of the inlet valves. The actual shape of the existing cams will not permit any variation of the settings once those mentioned have been determined.

From the charts a mean timing for all motors can be found, and this is represented by the following:

Lag of inlet valve opening	degrees, 12.16
Lag of inlet valve closing	degrees, 25.32
Lag of exhaust valve closing	degrees, 5.8
Lead of exhaust valve opening	degrees, 46.20
Advance of ignition in degrees	31.15

The point that varies more than any other is the lead given to the exhaust valve opening and, as above mentioned, the lag of closing of this valve is governed by the opening. One is immediately confronted with the question of overlapping of the exhaust closing and the inlet opening. The faster a motor turns it is logically to be expected that the exhaust will require a greater lead, but in practice this is not always the case, as the excess pressure caused by the greater speed is overcome by larger valves and larger ports in the original design. An example of this can be found in high-speed motors overcoming excessive back pressure by fitting two and sometimes three exhaust valves to each cylinder. The only type of valve that can be reckoned with other than the ordinary poppet valve is the sleeve type as fitted to the Knight motors. In this case the two valves are open at the same time for a period of 20 degrees. Inlet opens at dead center, exhaust closes at 20 degrees after dead center. Exhaust opens at 55 degrees before lower dead center on the firing stroke and the inlet closes 45 degrees up on the compression stroke.

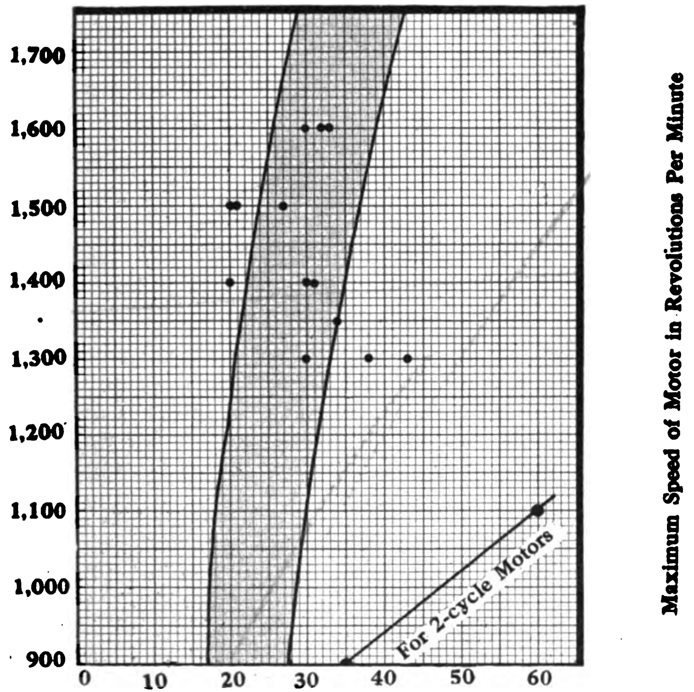
It would seem that it is advantageous to close the exhaust valve after the piston has arrived at the top dead center for the reason that there is bound to be some pressure, however small, left in the cylinder, and by leaving the valve open for a few degrees better scavenging will result. As an example of a motor in which the exhaust closes on dead center and the inlet opens almost immediately after, what takes place?

The entire pressure of the exhaust has not been expelled and there still remains a small amount in the cylinder. The moment the inlet opens this pressure seeks an outlet through the intake manifold, causing a strangulation of the incoming gases; but if a larger amount of time is allowed to transpire the remaining exhaust pressure will be reduced and a small vacuum produced instead; then the incoming gases will be sucked up faster and the continuation of this effort will be felt during part of the compression period, accounting for an increased lag of the inlet valve closing. So much for when the valves are not open at the same time. The question then is, What happens when the two valves are open at the same time? The flow of gas in the exhaust manifold does not cease immediately and the continued flow from the cylinder can be expected to follow that in the exhaust manifold. Further, in opening the inlet valve before the exhaust the former is brought to the position of being nearer full open when the exhaust closes than if it were to open afterward, obviating any back pressure and doing away with any vacuum.

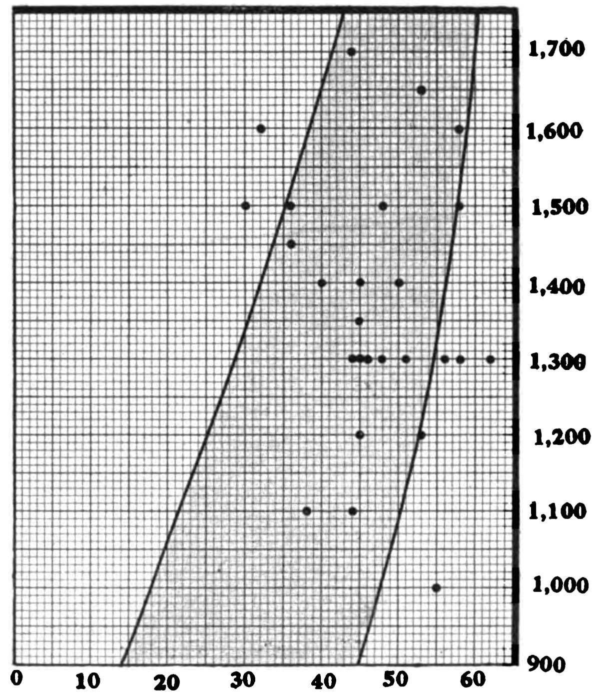
Chart for Determining the Proper Timing of 4-cycle Motors at the Several Working Speeds

Instead of dealing with the five functional conditions (a) opening of the inlet valve, (b) closing of the inlet valve, (c) opening of the exhaust valve, (d) closing of the exhaust valve, and (e) ignition of the charge, in a single chart, it is so contrived here that each of the functional parts may be handled separately, with the expectation that it will lesson the complication involved and enable the average autoist to obtain a better understanding of the benefits to be derived.

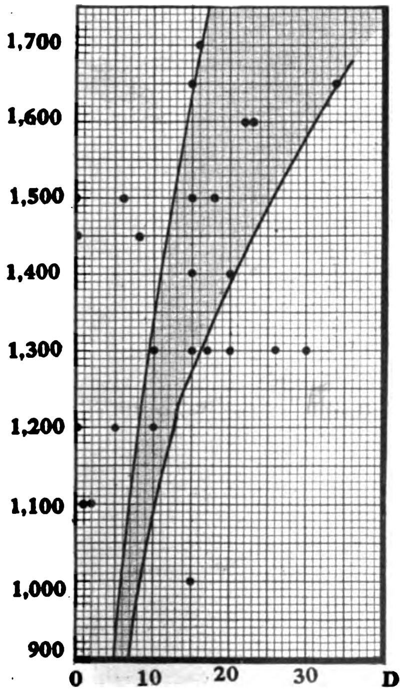
The ignition chart shows a range of between 17 and 23 degrees advance at 900 revolutions per minute of the crankshaft, increasing to a maximum of 38 degrees at 1,700 revolutions. As a rule the ignition is subject to variation at the will of the operator, and all that is necessary is to remember that the higher the speed the greater the advance should be, keeping within the limits as here given. In the remaining diagrams an attempt is made to indicate approximately how the opening and closing of the valves should be regulated according as the speed is high or low, but it must be remembered that the design of the motor will have an influence upon the performance in view of a given valve setting, and in adjusting the valves some account should be taken of the characteristics of the motor. As a rule, the maker of a given motor will indicate just what is the best setting of the valves, but even then the charts as here given will tell the user how to proceed in case it is desired to experiment, with the intention of obtaining a better result if the same is feasible at all.



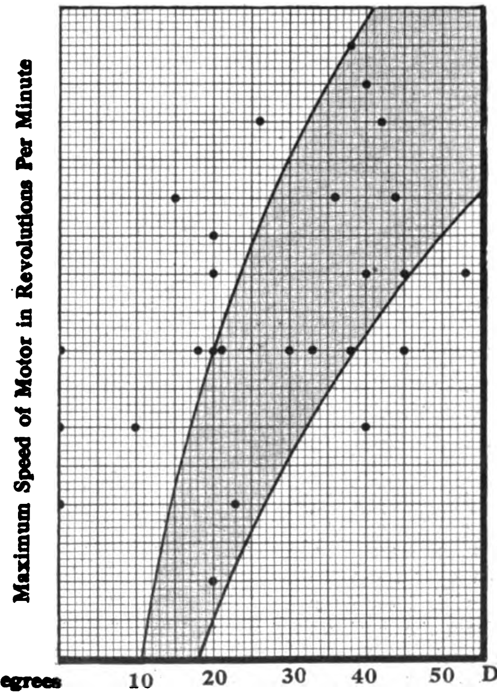
Advance of Ignition in Degrees



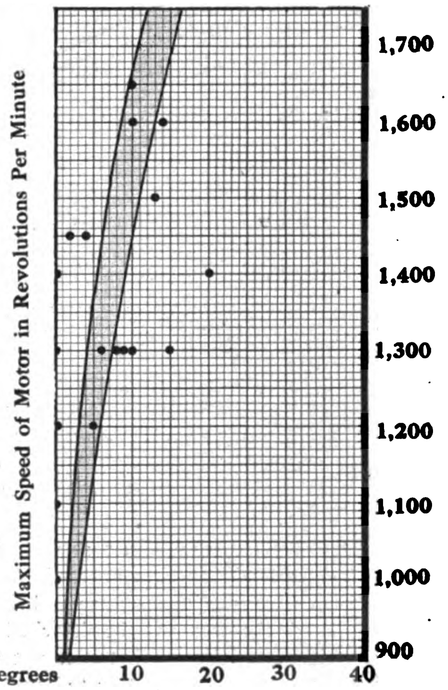
Lead of Exhaust Valve Opening in Degrees



Lag of Inlet Valve Opening



Lag of Inlet Valve Closing



Lag of Exhaust Valve Closing

Bateye as Chauffeur

OLD WALT, ENVIOUS OF THE SUCCESS OF SECOND-STORY WORKER IN NEW FIELD, TELLS DETAILS OF HOW A FINE JOB WAS LANDED

"FLAHERTY," exclaimed Old Walt, wiping his mouth with the back of his hand and approaching the café proprietor, "this chauffeur game must be a beaut.

"I have been thinking since yesterday of passing up the old hack and settling down to a glittering existence as a chauffeur. You recollect I showed you that piece in The Automobile some time ago about the fellow who advertised for a chauffeur and specified that the applicant must have all the qualifications of a college professor, butler, stevedore and a few other callings? I was discouraged when I read that piece, because I knew I could never fill the bill, but since I met a fellow who landed a job just about like the one the advertisement promised, I am on my feet again, sparring for wind and gathering myself for another punch."

"Don't you change," cautioned the proprietor as he felt for the hack driver's special bottle, "you're a good kebbie, but you'd be running a risk to switch the cut at this stage of the game."

"Well, just let me tell you about this duck who got the job," said Walt, pouring out a drink. "The ad called for about the same kind of a man as the one in the story in The Automobile, except that he didn't need to act as secretary to the boss. He had to be good and careful, and a mechanic, and willing, and know French, and act as valet and be ready to work any time. I read the ad and passed it up as too tough for me, but Bateye Wilson, who had just finished an 11-month job on the Island for that Harlem second-story enterprise, was the successful applicant. Bateye certainly knew mechanics. I never knew a man who could handle a ratchet drill with the grace of Bateye.

"He went up to the man who put in the ad and satisfied him that he was just what the doctor ordered. He got a license from Kansas City Riley, who took the examination in August for the whole gang and is doing pretty well now selling them. It is funny to hear Kansas City tell how he copped out those licenses, but as somebody or other says, that is another story.

"Bateye can talk all kinds of Greaser, and he found out in a minute that the Boss could not; so he was safe in spreading himself along that line. He had the most beautiful recommendations you ever saw, giving telephone numbers and a lot of other punk. He asked the Boss to 'phone and satisfy himself that he had worked for Mr. Van Payne or some one else. Bateye says it was worth a front seat in a $2 show to see the performance. The boss fell for the recommendations and called up Mr. Van Payne. For the time being—for the occasion, I might say—the leading role of Mr. Van Payne was taken by Slippery Casey, who was planted in the saloon which had the 'phone number given in the recommendation. He said a few kind words for Bateye and cinched the job for him by inviting the Boss to have dinner with him just as soon as he returned from Kamchatka, where he was going at 10:30 o'clock.

"That's about all. Bateye won't hardly look at me now when he is out joy riding with a bunch of glittering wit and beauty. He is getting "it" in bunches. He tells a friend of mine that the Boss only gets to use the car about twice a month. This is because it is in the shop most of the time Bateye is not using it personally and because Bateye says his hands are too tender to steer for the Boss, especially as long as the Subway is running and there is no real, pressing need of it.

"Bateye gets a healthy percentage on the repair bills and tire bills; has a royal time riding the girls and his friends and has the Boss buffaloed with a strangle-lock because of what he found out about him on the few trips he actually drove him."

"But why do you get sore on Bateye's luck?" said Flaherty.

"Me, I'm not sore on Bateye," said Walt. "All I want is to get a whack at that soft money myself."

Quick Nickel Plating

The Average Autoist Would Prefer Nickel-Plated Trimmings

ADJUNCT to the tumbling barrel method of burnishing brass work of automobile bodies, the latest method of nickel plating is worth trying. In this process all that is necessary is to prepare the rubbing powder and apply it, using a wet rag. The powder is compounded of:

Nickel ammonium sulphate	60 parts
Metallic magnesium	3 parts
Chalk	30 parts
Talcum powder	7 parts

The process is electrolytic; magnesium, being highly electropositive, forms the anode, while the surface to be coated forms the cathode. Due to the "local action" set up when this compound is applied to the metallic surfaces to be plated the nickel in the solution will plate onto the surfaces just as well as when the plating is done in the conventional way.

The metallic magnesium particles must be protected from oxidation, and this is accomplished by bathing the particles of magnesium in a bowl of any wax that will dissolve in gasoline, as resin. The wax will form a protecting coat over the magnesium, but when the plating mixture is being rubbed onto the parts to be plated, the wax will be detached from the surfaces of the magnesium particles so that it is not a detriment in any way. There is no other complication to consider, and the plating powder may be mixed and stored until it is desired for use.

Nut Quad Quits His Job

A Tale of Woe and a Quick Getaway

"FAKE!" yelled Nut Quad, "I will not go on in this way, trying to make the public believe that I go to the races and to the other events, gather the news, and then repair to the editorial *sanctum sanctorum* and divest myself of that with which I was invested in the shape of real facts and the live happenings of the day. Here I am trying to write a story of the Quaker City (Fairmount Park) event without a leg to stand upon; I was not there; you were not there; there wasn't anyone there from this punk joint, and when this sheet is driven out upon the street to live or die, survive or perish, it will go up against the real thing from another quarter of the globe, and the end will be as plain as the nose on your face.

"I'm willing to write a column around an idea as big as the dent of a gnat's heel, I am," said poor Nut Quad. "I don't mind poring over a cord of stale clippings day after day, I know they are cheaper than carfare; it's a cinch to say in the editorial column of the paper that we give the news; if you say it loud enough most animals will take it for Gospel.

"I've stuck like a cat in a tree that was being stalked by a bulldog, I have," said watery-eyed Nut Quad. "You strut around, beating a path in a circle, making a few softies believe that you are the real thing; you wouldn't make a good paper if you could do it for less money than you scatter to gather up this sheet."

Steel Bank Cars

ILLUSTRATING THE BELLAMORE ARMORED MOTOR CAR FOR USE BY BANKS IN THE TRANSFER OF FUNDS—EQUIPPED WITH PERFECT BANKING FACILITIES AND PROTECTED BY HEAVY BOLTS AND LOCKS

FUNDS must be transferred by banks, trusts and express companies by day and by night through all parts of congested cities, and heretofore it has been more or less of a serious problem with a considerable cost feature and a measure of safety that is barely up to the minimum requirement, with here and there an attack and a contingent loss. The Bellamore armored car as here illustrated represents the latest endeavor in the direction of filling this want in a more efficacious way. The plan takes into account the mobility of automobiles, coupled with the carrying capacity of an automobile truck, thus making it possible to build and mount upon the chassis a form of armored steel body that will permit of the transfer of funds and valuables generally with the same safety that now surrounds money as it rests in the vaults of the banks.

The new car is so designed as to possess substantially all the facilities of a first-class bank, with every safeguard against even a protracted effort on the part of those who prefer not to work for what they get. The windows, doors and other points of attack are protected by electric burglar alarms; the walls and roof are built of steel and the construction throughout is fireproof. It is anticipated that this new form of traveling bank will enlarge the field of bankers' operations, making it possible to deliver pay rolls under the most conservative conditions and to collect and transfer valuables, covering considerable distances, and doing all the work at a lower cost than that which is now suffered, counting, of course, the men who must be placed to guard those who are in charge of this character of undertaking.

The interior of the car has a banking room, including a large steel safe, the door of which is equipped with a heavy bolt-work system, with a Yale bank combination lock capable of 100,000,000 changes. A desk, or counter, extends for the full width of the car under the cashier's window. To the right and left underneath the desk is arranged a series of compartments which can be used for the storage of books and other articles necessary in the transaction of the business to which the car is devoted. The walls and floors are finished with polished hardwood. An electric lighting system is used; storage batteries provide the electric energy; the windows are fitted with bevel plate glass, and the doors are equipped with special duplicate key latch locks with alarm bells attached operated electrically from the batteries.

The driver occupies the customary position at the front, there being a separating wall between the driver's position and the bank proper, but, as the illustrations show, the driver is protected from the dangers of inclement weather by means of wind shields and side panels, so that while he is not expected to do more than drive the car, he is afforded sufficient protection to render his lot reasonably comfortable.

There are three distinct models of this car, each being designed for a particular service, and they range in price from $4,500 to $6,000. The motor car bank idea was taken up abroad some time ago, and it was found to be a profitable equipment, broadening the activities of the banks and adding very materially to the safety of operations at the same time. There is no reason why this idea should not thrive in the American money centers, and the Bellamore Armored Car & Equipment Company, of 286 Fifth avenue, New York, is making preparation to enter this business in a substantial way, and it has excellent promise of support from important banks.

Electric Refining of Steel for Automobile Work

In the electric furnace the tonnage per expenditure of electric energy is a matter that is receiving much attention, and it is more than likely that the maximum expenditure is not far from one ton of steel (2,240 pounds) per 1,000 kilowatts of electric energy, starting with the cold charge. This figure is reduced considerably under the best conditions, it being reasonable to expect an output of one ton of steel from the expenditure of 500 kilowatts of electric energy, referring to mild steel for the lower rate of energy consumption. In electric refining work, the consumption is considerably less than this figure, it being the practice in this refining work to melt down the charge in open hearths and then apply to the electric furnace to do the refining work. Much headway is being made in this field, and, as one of the activities that is bringing good results for the automobile, mention will be made of permanent magnet steel; electrically refined magnet steel is now looked upon as most efficacious for the purpose.

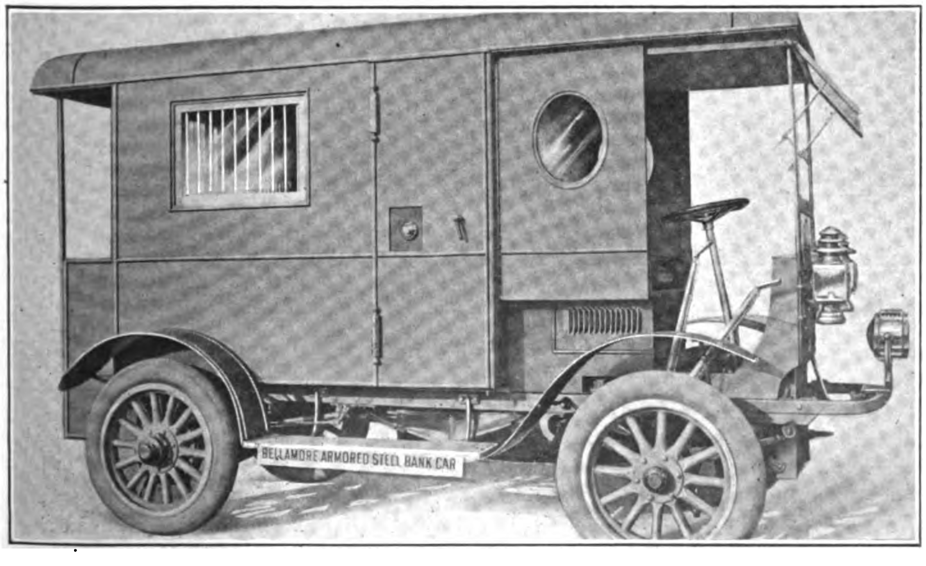


Fig. 1—Side view of a steel bank car, showing the driver's position, with wind shield, entrance to the bank and a combination lock for the door

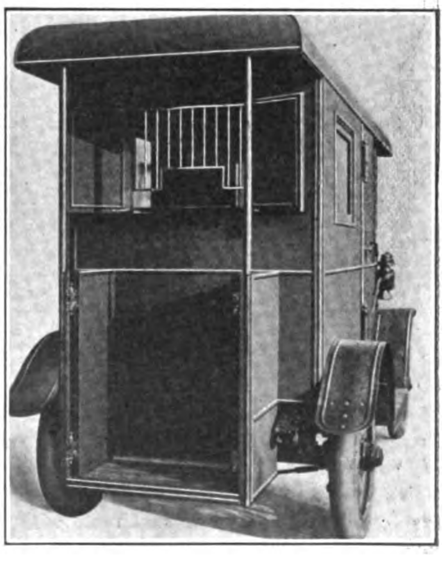


Fig. 2—Rear end view of a steel bank car, showing the cashier's window

Savannah Automobile Club

NEAR APPROACH OF THE GRAND PRIX DRAWS ATTENTION TO ONE OF THE SOUTH'S MOST ACTIVE MOTORING ORGANIZATIONS


J. Jones


F. C. Battey


R. M. Hull


W. B. Stillwell


D. J. Rosenheim


Vernon View, Where Club Will Build


A. W. Solomon


F. M. Oliver


S. E. Theus


H. Granger


T. E. Youmans

SAVANNAH, GA., Oct. 24—In the vortex of public interest at this time is the Savannah Automobile Club, because of its success in gaining the privilege of staging the second Grand Prize race for the international trophy of the Automobile Club of America. The club conducted the first race for the trophy, which was in the fall of 1908. It achieved notable success in its first effort. The race was run off without a hitch or accident to any spectator, and furnished a magnificent and spectacular struggle.

The profits derived from the race were enormous, but the funds were expended in civic advancement for Savannah rather than for the use of the club itself. As a matter of fact the club spent all it took in in advertising the city and its tributary territory in Georgia.

There was no renewal of the race in 1909, and this year the opportunity to stage the event close to New York caused the Automobile Club of America to sanction a race for the cup on the Long Island Motor Parkway. Owing to a storm of protest after the Vanderbilt Cup race the Long Island contest was abandoned, and at the instant when it appeared as if there might be no Grand Prize Race this year the Savannah Automobile Club sent a delegation of citizens to New York to make application to hold the race. This delegation presented its case so clearly and forcibly to the Contest Board of the Automobile Club of America that the race was transferred to Savannah.

Amid much rejoicing the news was received throughout the South, and before the delegation had reached home from New York with a sanction to conduct the race on November 12 work had commenced to repair the surface of the course to be used. The delegation was armed with authority from the Governor to promise military protection of the course to be used, and this promise had as much to do with the granting of the sanction to the club as any one factor.

The running of the Grand Prix in 1908 brought much credit to the club for its superb work in arranging the preliminary details and in administering the contest itself. It proved to be worthy of respect, and its performance on that occasion is the best evidence of its ability to conduct the coming race satisfactorily. The problem that confronts the club this fall is much more complex than the other, for the field in the big race will be considerably larger and the light car races for the Savannah Challenge Cup and the Tiedeman Trophy will undoubtedly attract big entry lists. Then again, the interest in contests of automobiles is much more intense this year than ever before, and vastly larger crowds will attend.

These will furnish the ground work of a fine puzzle, for the accommodations of the city are necessarily limited; its transportation facilities will be taxed to the limit and beyond; and every available space for housing and feeding the visitors will be subjected to a straining demand. But the club, city and State are determined to make the event a success and earnest efforts to apply a definite system are being exerted at present, with the result that it is promised that nobody shall suffer.

The successful administration of the 1908 Grand Prix race is not all that the Savannah Automobile Club has accomplished in a sporting way. It has projected and promoted a number of road runs, endurance tests and reliability tours. The first of these was given in 1909, when the club projected a run to Augusta. Road conditions at that time were lamentable, and the way to Augusta was exceedingly difficult to traverse.

To-day the difference in the condition of the roads is remarkable. The undertaking that required almost the life of the participants now is a pleasure trip of five hours. A year ago the club promoted a run to Atlanta, 300 miles, which resulted in numerous road betterments. Last April the club conducted a run to Jacksonville, Fla. This event marked the opening of the last link in the great automobile route from New York to the Florida winter resorts.

The club also has the distinction of conducting the first "Good Roads" convention ever held in Georgia, which was attended by over 300 officials connected with the making of good roads.

To-day the Savannah Automobile Club is one of the most virile motor organizations in the land. It holds a finger on the public pulse; it exerts a very real influence on proposed legislation and the construction of automobile laws; it shows an appreciation of the rights and wishes of others and devotes a considerable effort toward charity and the general application of justice. But while it has a full part in all these activities, and while it is undoubtedly a distinct influence in a social way and, as has been outlined all through this article, is a living factor in the sport of motoring, the chief object of the Savannah Automobile Club is Savannah.

Throughout the Old South, as well as the New South, civic spirit is the most potent of municipal and sectional forces. Georgians generally partake of this spirit, and Savannah is not one whit behind the great city of Atlanta in exerting it. If the Georgia metropolis can afford to dedicate an expensive speedway so that the name of Atlanta shall shine in the public prints and the public eye, Savannah can afford to spend the price of many a bale of cotton, many a cargo of lumber and many a carload of peaches to attract the same character of publicity.

And that is what Savannah is doing in staging the Grand Prix. It is a costly undertaking. The immediate results from it will be unappreciable. It is a big gamble, for in case of mishap there will be much criticism, and that is the last thing desired.

With all the foregoing in view the Savannah Automobile Club, aided by city, county and State authorities, has steadily gone about perfecting its plans for the big race. The course used in 1908 has been metamorphosed. Two big excrescences have been cut off and a third has been sharply modified.

Its length has been cut down to 18.5 miles, and through the lopping off of the extraneous part of the route the straightaways have been materially increased. One of these is fully eight miles long, allowing the racing cars to open wide and shoot along at their utmost speed.

Nobody in Savannah looks for anything but complete success.

The club is planning to build a home at Vernon View, a resort situated a few miles from Savannah. While a start on this project is still to be made, the intention to do so within a year is thoroughly crystallized. The club roster contains the names of many of the best and most influential citizens of Savannah. It includes the representatives of many of the proudest Georgia families, public officials and the best of the element that has come to Savannah from other sections.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL-CLIMBS, ETC.

Nov. 19-26.......Oakland, Cal., Idora Park Snow, Under Management of Oakland Automobile Dealers' Association.
Dec. 1...........Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11.New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 14-28, 1911..Philadelphia, Annual Show, Philadelphia Licensed Automobile Dealers' Association, Third Regiment Armory.
Jan. 15-21, 1911..Detroit, Wayne Gardens, Detroit Automobile Dealers' Association.
Jan. 16-21, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4,'11.Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11,'11.Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Mch. 4-11, 1911...Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.
Mch. 25-Apr. 8.....Pittsburg, Annual Show, First week, pleasure cars; second week, commercial trucks. Automobile Dealers' Association of Pittsburg, Inc.

Races, Hill-Climbs, Etc.

Nov. 3-5..........Atlanta, Ga., Speedway Meet, Atlanta A. A.
Nov. 5-6..........New Orleans, La., Track Meet.
Nov. 5-7..........Los Angeles-Phœnix Road Race, Maricopa Automobile Club.
Nov. 7-11.........Five-day Reliability Run of Chicago Motor Club, 200 Miles a Day.
Nov. 10-12-13.....San Antonio, Tex., Track Meet.
Nov. 11-12........Savannah, Ga., Road Race, Savannah Automobile Club, and Grand Prix, Automobile Club of America.

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ECONOMY in the use of fuel, such as automobile gasoline, while it is the problem for the automobilist in Continental Europe for the most part, has its echo in the United States, owing to the gradual increase in the gasoline quotations and the relatively slow advance in the direction of the use of benzol, alcohol and other synthetic liquid fuels. In the meantime, very little attention seems to be paid to the questions that will lead to the more complete combustion of automobile gasoline; there seems to be no notice taken of the fact that when a pound of hydrogen is wasted it is like throwing away 62,100 heat units, and when the fuel is burned to carbonic oxide but 4,476 heat units are turned to good account, leaving all the way from 18,000 to 50,000 heat units per pound as a valuable residuum, turned to no better account than to perfume the surrounding atmosphere to the disgust of the inhabitants. Every time the guardians of the peace are "sicked" onto automobiles on account of smoke, and the pungency of the odor that emanates from the exhaust orifice of a muffler, it is a sure sign that valuable fuel is being wasted and that the carbureter and the ignition system are asleep at the switch. When the fuel is burned to complete combustion, producing carbonic acid and water, the odor is burned, too, and the legal luminary with two rows of brass buttons, and the majesty of the law in the form of a locust stick is put out of a job. Under the circumstances the officer who is directed to enforce the law, instead of getting after malefactors is really preaching economy, and there is so much good sense in his form of preaching that his presence should be encouraged, and the automobilist who is so lacking in his sense of the fitness of things that he is willing to throw away 75 per cent. of his fuel would look better paying a fine for violating the smoke ordinance than he does when he deliberately and foolishly makes a heavy inroad on the available fuel supply.

* * *

ACCORDING to the information gathered by the Forest Service of the United States Department of Agriculture, bearing upon the growth and value of hickory, considering the excellence of the service rendered by this wood in the wheels of automobiles, there is every prospect of an ultimate shortage in the supply, unless an effort is made to prevent its waste, with something of a concerted movement, besides, leading up to hickory forestry as a commercial undertaking. Statistics are responsible for the statement that it takes substantially 50 years to grow second-growth shag-bark hickory to a diameter of approximately six inches, measuring at a point breast high on the butt of the tree. Even assuming that a four-inch butt would be satisfactory for wheel-work wood, it remains to consider that thirty years will elapse in the growth of the tree to this diameter. It will be a great misfortune if the hickory supply is drawn upon at so rapid a rate that a famine will result, and it will be something of a question as to just what material can be used efficaciously in the interim of 30 years or more, pending the growth of a new supply, assuming that the present available supply is exhausted before an effort is made to relieve the situation. The makers of automobiles should encourage the Forestry Service.

* * *

DOCTORS are good customers of the automobile, and many of them are numbered in the honor roll of the pioneers who put up with the vagaries of the earlier efforts of the makers at a time when it was a large question as to whether or not a man would ever get back without walking, if he started out in a car. Some of these doctors made automobiles of their own that were eminently satisfactory, and were the information they possess available to the designers of cars it doubtless would redound to the good of the industry. Here and there a doctor or two were wont to interject a series of ideals, and a few impossibles, failing which, they went away dissatisfied, and as a means for advertising the good that resides in automobiles they must be regarded as a lasting failure. There still remain a large number of medical practitioners who for one reason or another stick to the horse, but they are rapidly reaching the conclusion that a doctor can do more work and can better look after his patients if he takes less time getting to them. It stands to reason that a physician, if he is capable, will be the most valuable to his patient if the time interval between the call and the response is cut down to a point where it would be were the patient to live next-door. As a suggestion of a physician's car, THE AUTOMOBILE offers something this week, but it should be remembered that a comfortable body is entirely out of place on a running gear that is likely to give trouble on the road. A good running gear must accompany a good body to be entirely satisfactory in this service.

The Dealer and the Daily

DISCUSSING THE ADVERTISING PROBLEM WHICH CONFRONTS THE DEALER IN AUTOMOBILES; PROPER USE OF THE DAILY PAPER RECOMMENDED

GOOD advertising copy often draws the line between the success or failure of a business. How to write an advertisement sounds like "how to get rich quick." Some well-known principles govern in each case. Dealers who have made a success, hold views on this subject, as here briefly stated:

Don't buy space and write copy to fill it; write the advertisement and then buy the space for it.

Don't buy space in all the papers all the time. Write the advertising copy for a certain class of buyers and then select the papers reaching this class.

Don't write an advertisement for a standard financial paper reaching bankers, brokers, and financial interests, and insert it in the sporting edition of a paper making a specialty of sporting news.

Don't try to reach any class by circular. If the man's name is known, write him a letter. Where the name is not known there is only one other method that will reach all the possible purchasers in a given territory at a minimum expense; that way is through the daily newspapers.

The Best Rule for Using the Daily Newspapers

First: Take enough space to be noticed.

Second: Take that space often enough to keep the business before the people.

Third: Take up one point at a time and tell people why that particular point makes a car or an accessory the best for them.

Fourth: With an unanswerable argument, tell it straight out from the shoulder.

Fifth: Don't mince words.

Sixth: Don't apologize.

Seventh: Just carry the same natural conviction that tells in a face-to-face talk.

Eighth: Don't talk to the audience in bulk; just talk as if to one man.

Ninth: There is nothing that people like better than to listen to the man who knows he's right.

Tenth: The straight-out-from-the-shoulder right talk to one man makes people go clean down into their pockets and pull the money out.

Just Say It So That It Will Stay Said

The right story doesn't have to be clever English; it needn't necessarily be great literature. Let it be crude, raw, and unpolished; nevertheless, when a man hears of something in which he is interested—something he wants or needs, or maybe will want or need in the future—show him where he can get the best goods that he can get anywhere, and you're going to get his business.

Advertising is the making of a FAVORABLE IMPRESSION on a POSSIBLE BUYER.

Anything that makes an unfavorable impression, or no impression at all, on a possible purchaser, is waste, or worse.

And anything that makes any kind of an impression on non-buyers, those who cannot and will not influence purchasers of the things advertised, is pure loss.

Advertise to make that favorable impression on that possible customer—nothing else.

[Copy for the Financial Newspaper.]

Cut of Town Car.

A Conservative Automobile for the Conservative Buyer Ripened by Broad Experience.

With Just the Right Amount of Power for a Town Car, Flexibility is Pronounced.

The Wheelbase Is One Hundred Inches Exactly, Making the Turning Radius Right.

The Control of the Car Is Simple and Reliable, There Is Absolutely No Noise.

Weight Is Adjusted to Hold the Car to the Pavement, the Center of Gravity Is Calculated.

The Tire Equipment Is Economical and Satisfactory. The Body Is Made of Aluminum.

In Style and Durability of Finish It Is the Product of the Craftsman. The Comfort of the Owner Is Studied.

The Advantages Are Positive: An Open Car for Fine Weather; Closed When the Weather Conditions Are Inclement, and Equipped for Day or Night Service with the Best Lighting—Electric. The Best Ignition—Magneto, and the Best of Everything. An Automobile to Transfer the Banker to His Business in the Morning, the Banker's Wife on Her Duty Calls in the Afternoon, and the Banker and His Wife to the Opera in the Evening.

The Price is Low for the Quality at $5,000.

[Copy for Sporting Newspaper]

Cut of Roadster.

NET RESULT OF ALL THE RACING EVER DONE.

A POWERFUL ROADSTER.

Equipped with a 60-horsepower, 6-cylinder Motor Along Racing Lines, with Endurance Added, in a Chassis That Weighs Barely 2,000 Pounds, Making 3 Horsepower per Hundredweight the Only Limit to Speed Is That as Dictated by Prudence.

With a 4-speed Selective Type of Transmission Gear, and a Straight Line Drive, a Quick Get-away and Enormous Hill Climbing Ability, Puts the Owner in a Position to Say Good-bye to Dust.

It Is a Noiseless Machine, Made so by Duplicating Accuracy in the Best Equipped Plant That Money Can Buy, And the Use of Chrome Nickel Steel in Every Part of Any Responsibility Assures a Continuance of the Same Sweet-running Qualities That Come with the Car When It Leaves the Shop.

The New Torpedo Body Built to Cut the Wind, with a Smooth Exterior, and an Inside Locker for the Spare Tire, Is Made of the Latest Aluminum Alloy, Which Is Stronger than Steel, Bringing the Weight of the Whole Body down to 90 Pounds.

With a Long Wheel-base, a Low Center of Gravity, Precision of Fit of the Parts, and Delicacy of Control, There Is Nothing More to be Desired But Smartness and Flexibility, Which Are Natural Accompaniments of a Car of These Pretensions.

The Price Is $6,000—It Includes Everything.

Trucks Run 212 Miles

LONG ROUTE TRAVELED BY CARS IN CHICAGO-MILWAUKEE EVENT, THROUGHOUT WHICH ICY WIND SCATTERED CONFETTI AND DISPELLED COMFORT

CHICAGO, Oct. 31—Manufacturers of commercial motor cars had their inning in the West last week when a motor truck run to Milwaukee and return was held with the Chicago *American* in the promoting rôle, assisted by the Chicago Automobile Club and the Milwaukee Automobile Club. Originally it had been planned to make the competition the same as that which has prevailed in other affairs of this sort, but wind and weather prevented this and converted the test into an out-and-out reliability run with the economical features eliminated. The wind played such pranks with the confetti that many of the contestants lost the road at different points along the course so that the officials of the contest declared it would be unfair to figure the gasoline and oil consumption when the distances varied to such an extent. Therefore the awards were made on a road and technical examination basis.

Two of the fifty-one starters went through the test with perfect scores in both departments. One came in Class 1D for cars of 500 pounds and under capacity—the Brush. The other perfect score car was the Gramm, which won the 4,001 to 6,000-pound division. Thirteen of the contesting cars made perfect road scores as follows: No. 17 Brush, No. 6 Sears, No. 6 Cino, No. 15 Alden Sampson, No. 4 Buick, No. 11 International, No. 1 Overland, No. 37 Rapid, No. 31 Rapid, No. 34 U. S. Motor, No. 38 Grabowsky, No. 39 Mais and No. 51 Gramm. Surviving the technical examination with clean records were the No. 17 Brush, No. 6 Sears, No. 40 Kelly, No. 51 Gramm, No. 44 Rapid, No. 52 Alco, No. 50 Kelly, No. 55 Reliance and No. 54 Reliance.

Among the otherwise penalized entries which passed the technical examination unscathed were Sears, No. 6; Randolph, No. 28; Marquette, No. 22; Buffalo, No. 35; Kelly, No. 40; LeMoon, No. 41; Gramm, No. 51; Rapid, No. 44; Alco, No. 52; Kelly, No. 50; Reliance, No. 55, and Reliance, No. 54.

SUMMARY OF CHICAGO TRUCK RUN

Car No.	Car	Driver	Car Wt.	Gross Wt	No. Cyls.	Bore	Stroke	Road Pen		Tech. Ex.	Total
								1st Day	2nd Day		
	Division 1D, 500 Pounds and Under										
17	Brush	Taylor	1360	1896	1	4	5	0	0	0	0
6	Sears	Woodrich	1150	1660	2	4½	4	0	3	0	3
5	Ranger	Pinkerton		4020	2	5½	4	159	withdrawn		
	Division 2D, 501 to 1000 Pounds										
2	Cino	Wight	2980		4	4¾	5	0	0	0	1
15	Sampson	Johnston	2470	3500		4½	4	0	0	5	5
4	Buick	Easterday	2690		2	4½	5	0	0	5	5
3	Buick	Kunze	2760	3770	2	4½	5	3	0	2	5
11	International	Peterson	2270		2	5	5	0	0	7	7
1	Overland	McGlenn	2360	3175				0	0	11	11
12	International	Sadilck	2260		2	5	5	5	17	8	30
10	Economy	Jenkins	2350	3480	2	5	4	16	15	35	66
8	Hart Kraft	Merillat	2520	3530	2			0	3	w'hdr'n	
9	C. P. T.	Hayes	2390	3240	2	5	4	withdrawn			
14	Sears	Kropp	1330	1830	2	4½	4	withdrawn			
	Division 3D, 1001 to 2000 Pounds										
19	Chic. Mot. Wagon	Beckley	2500	3890		4¾	5	3	4	3	10
37	Rapid	Carey	3670	5670	2	5	5½	0	0	11	11
16	Overland	Ditsler	2895	4900				11	0	1	12
20	Utility	Gardiene	3740	5850		4½	5	15	0	1	16
29	Randolph	Bensley						6	0	25	31
28	Randolph	Kreet	3960	6180	2			33	0	0	33
22	Marquette	Beck	2750		2	5	4	13	23	0	36
23	Randolph	Alberty	3750	5690				14	Withdrawn		
27	Chic. Com'l. Car	Fleig	2780	4940	2	5½	4	77	disqualified		
25	Monitor	Manley	2820	4000	2	5	4½	44	134	0	178
26	Ranger	Dalton	2400		2	4½	4	Withdrawn			
	Division 4D, 2001 to 3000 Pounds										
31	Rapid	Anson	4010	8010	2	5½	5	0	0	19	19
30	Rapid	Schmidt	4415	7430	2	5½	5	4	3	14	21
34	U. S. Motor	Crego	3630					0	0	31	31
35	Buffalo	Morrall	4330	7460	4			6	183	0	189
33	U. S. Motor	Schumard	3590			5½	4½	0	Withdrawn		
32	Harder	Phillips	4310	7310		4½	4¾	109	Withdrawn		
	Division 5D, 3001 to 4000 Pounds										
38	Grabowsky	Kallmeyer	4340	8310	2	5½	5	0	0	1	1
39	Mais	Mais	5520	9900	4	3¾	5½	0	0	14	14
40	Kelly	Edwards	5780	10010	4	4¾	5¼	31	2	0	33
41	LeMoon	LeMoon	4240	8480	4			0	77	0	77
	Division 6D, 4001 to 6000 Pounds										
51	Gramm	Haines	7000	13200	4	5	5	0	0	0	0
44	Rapid	Robertson	9315	15345	4	4¾	5½	3	0	0	3
45	KisselKar	Morse	6770	12280	4	4½	4¾	8	0	7	15
52	Alco	O'Mara	7360	13740	4	3$\frac{5}{16}$	4¾	13	2	0	15
47	Knox	Crane	7130	13450	4	5	4¾	11	0	8	19
50	Kelly	Bennett	5800	11980	4	4¾	5¼	21	0	0	21
48	Herman	Herman	7140	13160	4	5	6	12	3	w'hd'n	
49	Kelly	Moffitt	6240	12500	4	4¾	5½	12	Withdrawn		
	Division 7D, 6001 to 10,000 Pounds										
56	Sampson	Lee	10000	19080	4	5	5½	20	3	1	24
55	Reliance	Blohm	8105	15105	3	5½	5	0	41	0	41
54	Reliance	Post	9815	19815	4	5	5½	38	33	0	71
53	Reliance							Withdrawn			

Good Automobile Driving

By J. B. Bartholomew, President of the Bartholomew Company

BEFORE leaving the garage the matter of gas supply, filled and well-trimmed lamps, water in the radiator, and lubrication are all looked into and known to be in good condition.

The tool kit is intact, the tires are examined to see that no tacks, nails, pieces of wire or other undesirable materials are attached thereto; the extra tire is in position, an inner tube is aboard to meet the case of tire trouble, and the tire pump is in good working condition and in place; the storage battery is properly charged, the car has been properly cleaned and polished, and any slight adjustments to machinery or brakes have been made, loose wire connections and loose bolts and nuts have been taken care of.

It is bad practice to sit in a car and allow the motor to run for an indefinite period. Stop the motor and start it when ready to go, thereby saving the gasoline and oil, besides unnecessary wear and tear on the motor.

All driving should be done at a speed with respect to road conditions and the speed ordinances and laws, and a good driver will never exceed the speed limit unless he is requested or instructed to do so, and then only on road conditions clear of other rigs, people or obstructions. The driver should watch the road and slow up for bumps and horses. If horses show skittishness, stop. At all times in passing horses the motor should be throttled down and the car coasting as nearly as possible.

Mufflers should not be cut out in places where it will excite the displeasure and criticism of other people.

Drive to miss all of the sticks, stones, bricks and other obstructions that are liable to damage the tires. Driving in street car tracks is bad practice, as fine particles of steel are apt to injure the tires.

Rubbish raked up in piles from yards should be avoided—it is apt to contain tacks.

In passing other rigs, observe the rules of the road. Never cut in close ahead of another rig. If you have a speedy car others will know it. If you have an exceptional hill climber, don't be afraid to give the other fellow a chance, and always remember that the driver who drives the car to please the customers, rather than to satisfy the crazy notions of his own, is the one that most people want to retain at the highest salary.

Final Report on Boston Truck Run

Boston, Oct. 31—The detailed technical report of the recent Boston *American* truck run has been issued. The report shows the cost of transporting a ton of freight one mile, total cost and its items and details. The report is as follows:

MANUFACTURERS' DIVISION

No.	Name	Weight Carried	Comput. Weight	Gals. G's'line	Pints Cyl. Oil	Total Cost	Cost per Ton Mile
	Class A—1000 Pounds and Less						
11.	Warren, Detroit,	1320	1000	9	1½	$1.53	.0248
47.	I. H. C.	1000	1000	11	9	2.32	.0386
3.	Hart Kraft	1040	1000	13½	8¾	2.71	.0450
19.	*Metz	460	500	9½	2	1.65	.0548
18.	*Metz	460	500	14	7	2.68	.0892
44.	*Reliance	1120	1000	12½	8	2.50	.0416
	Class B—1001 to 3000 Pounds						
13.	Franklin	3060	2000	4⅝	1¼	.82	.0068
4.	Atterbury	3260	3000	13½	2½	2.32	.0128
23.	Victor	3060	3000	16	5	2.47	.0158
21.	Wilcox	3135	3000	16¼	8	3.10	.0172
8.	Rapid	2200	2000	10½	7½	2.15	.0179
2.	Rapid	2160	2000	13	11	2.77	.0230
9.	McIntyre	2120	2000	15	9½	2.99	.0249
	Class C—3001 to 5999 Pounds						
34.	Frayer-Miller	4320	4000	22½	13	4.41	.0184
29.	Garford	4310	4000	29½	14	5.60	.0233
28.	Garford	4160	5000	34¼	15	6.42	.0107
	Class D—6000 to 8000 Pounds						
32.	Frayer-Miller	6310	6000	18½	5½	3.30	.0091
33.	Frayer-Miller	5115	6000	20¾	5	3.63	.0100
35.	Johnson	6140	6000	22	10	4.15	.0115
30.	Alco	6320	6000	23¾	12	4.55	.0126
6.	Knox	8245	8000	39	6½	6.65	.0138
	Class E—10,000 Pounds						
26.	Morgan	10,220	10,000	34¼	15	6.42	.0107
24.	Sampson	10,560	10,000	40	8	6.90	.1150
	PRIVATE OWNERS—Class B						
41.	Autocar	3240	3000	9¾	5	1.87	.0103
1.	Autocar	3780	3000	11¾	8	2.38	.0132
17.	Rapid	2220	2000	10	8	2.10	.0175
40.	Gramme	4320	3000	20¼	5	3.55	.0196
	Class C						
43.	Frayer-Miller	5060	5000	21½	7½	3.91	.0130
	Class E						
49.	Mack	6160	10,000	20	21	4.51	†

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*Road Penalty. 44—164 points. 19—38 points. 18—10 points. All others clean. †Did not carry full load.

Gasoline figured at a uniform rate of 16 cents per gallon.

Cylinder oil figured at a uniform rate of 50 cents per gallon.

Number of miles covered—One hundred and twenty.

A. M. C. M. E. A. Show

List of Exhibitors Swelled to 42; Will Open New Year's Eve

METROPOLITAN devotees of the motor will have ample chances to examine everything that pertains to the automobile at the trio of shows that will be held in New York in January. The A. L. A. M. exposition which will take place in two sections, each a week long, the first devoted to pleasure cars and the second to commercial vehicles or freight carriers, will be of much wider scope and detail than ever before. An unprecedentedly large collection of licensed cars will be shown amid all the splendor of Madison Square Garden in gala attire.

The independent show, which will be held at the Grand Central Palace from December 31 to January 7, promises to be a large and interesting exhibition. Mr. Longendyke, secretary of the A. M. C. M. E. A., announced late Wednesday afternoon that the application for sanction of the show, which had been made to the National Association of Automobile Manufacturers on October 18, had been refused. In speaking of the matter Mr. Longendyke said:

"We applied to the N. A. A. M. for sanction in order to outline our status as far as that organization is concerned. We did not feel that our application would be granted, but we determined to apply anyway. The holding of the show was never dependent upon the sanctioning of the event and it will be held despite the fact that sanction has been withheld.

"Our list of signed-up exhibitors to date includes forty-two distinct companies. I am confident that the list will be extended to at least 70 names. The list is as follows:

Abbott Motor Co.,	Detroit, Mich.
American Motor Truck Co., of Mich.,	Detroit, Mich.
American Motor Truck Co.,	Lockport, N. Y.
Atterbury Motor Car Co.,	Buffalo, N. Y.
Babcock Company, H. H.	Watertown, N. Y.
Bergdoll Motor Car Co., L. J.,	Philadelphia, Pa.
Carhartt Auto Corporation,	Detroit, Mich.
Car Makers' Selling Co.,	Chicago, Ill.
Chase Motor Truck Co.,	Syracuse, N. Y.
Chicago Pneumatic Tool Co.,	Chicago, Ill.
Cortland Motor Wagon Co.,	Cortland, N. Y.
Clarke-Carter Auto. Co.,	Jackson, Mich.
Columbus Buggy Co.,	Columbus, Ohio.
Demot Car Sales Co.,	Detroit, Mich.
F. A. L. Car Sales Co.,	Chicago, Ill.
Findlay Motor Co.,	Findlay, Ohio.
Gramm Motor Car Co.,	Bowling Green, Ohio.
Houpt Mfg. Co., Harry S.,	New York, N. Y.
Imperial Auto Co.,	Jackson, Mich.
Johnson Service Co. (pleasure),	Milwaukee, Wis.
Johnson Service Co. (commercial).	Milwaukee, Wis.
Kelly Motor Truck Co.,	Springfield, Ohio.
Krit Motor Car Co.,	Detroit, Mich.
Lion Motor Car Co.,	Adrian, Mich.
H. Moeller & Co.,	New Haven, Conn.
Martin Carriage Works,	York, Pa.
Michigan Buggy Co.,	Kalamazoo, Mich.
Metz Company C. H.,	Waltham, Mass.
Otto, Albert T.,	New York, N. Y.
Owosso Motor Co.,	Owosso, Mich.
Parry Auto Co.,	Indianapolis, Ind.
Paterson, W. A., Co.,	Flint, Mich.
Penn-Unit Car Co.,	Allentown, Pa.
Penn Motor Car Co.,	East Liberty, Pa.
Quimby & Co., J. M.,	Newark, N. J.
Schacht Mfg. Co.,	Cincinnati, Ohio.
Scioto Auto Car Co.,	Chillicothe, Ohio.
Seitz Motor Car Co.,	Detroit, Mich.
Staver Carriage Co.,	Chicago, Ill.
Spencer, Llaana, Briner Co. (Petrel Car),	New York, N. Y.
Warren Motor Car Co.,	Detroit, Mich.
Whiting Motor Co.,	Flint Mich."

The Importers' Salon, at which the foreign cars will be shown, will be held at the Hotel Astor from January 2 to 7. The floor space of 11,000 square feet has all been contracted for except about 1,000 feet.

Al Livingstone, Auto Racer, Killed

Al Livingstone, one of the leading racing drivers in the employ of the National Motor Vehicle Corporation, was killed as the result of an accident on the Atlanta Speedway, Tuesday. Livingstone was giving his car a final try-out in preparing for the races now in progress, and was doing some fast work when his right rear tire blew out, and the driver was thrown thirty feet into the air, landing on his head. His skull was fractured, and he was dying when removed to a hospital. Mr. Livingstone leaves a widow.

Premier Car Finding Aeroplane Landings

With Ray McNamara at the wheel, a Premier 4-40, 1911 model, is now traversing the Western part of the continent, picking out locations for aeroplane landings from coast to coast, which may be used in transcontinental flights such as the one for which a prize of $50,000 was offered. There is nothing unusual about the trip save its purpose. The route is via Buffalo and Cleveland to Chicago, thence westward by the way of Davenport, Omaha, Kansas City, Trinidad, Santa Fé to Los Angeles.

Premier 4-40 Pathfinder in Continental Aviation Prize. Ray McNamara at wheel.

27 Clean Truck Scores

TWO-DAY RUN CONDUCTED BY NEW YORK "AMERICAN" PROVES INTERESTING TEST OF RELIABILITY UNDER CONDITIONS LIKE THOSE OF REAL SERVICE

SUCCESSFUL in every way proved the truck run conducted by the New York *American* Friday and Saturday of last week. There were 49 starters in the various classes of the contest, of which 27 completed the scheduled course with perfect road scores. One dozen of the gasoline cars were penalized for work on the run, and of these only four reported mechanical troubles. Only two of the electrics suffered mechanically.

The chief difficulty experienced in both classes of trucks was the shortage of gasoline and current, which accounted for nine penalizations, six among the electrics and three among the gasoline cars. Two gasoline cars missed the course and were disqualified; another missed some of the controls and the final demerited car suffered magneto troubles. The other electsics to lose their clean scores were charged with being late and failure to finish the route.

Alco, No. 16, clean score in Division No. 4

The run was about 65 miles a day for the transfer divisions and from 30 to 45 miles a day for the delivery divisions. The first day's course was laid out through the streets of the city to Westchester County and the second was on Long Island, past the aviation field and return. That nearly two-thirds of the cars finished the whole course without penalization is considered remarkable by the promoters of the run, and that only six out of 49 suffered mechanical troubles is very gratifying.

The officials are still figuring out the relative expenditure of gasoline, oil and current for the various entrants, and the winners of the sweepstakes and class events will be announced in due course. The summaries of the road work are as follows:

MANUFACTURERS' CARS (GASOLINE)

No.	Car	First Day	Second day
	Transfer classes—Division 1, 1000 pounds and under—		
1	Chase	0	0
2	Hatfield	0	0
3	Hatfield	0	0
4	Brush	Dis., wrong route	
	Division 2, 1001 to 3000 pounds—		
5	Grabowsky	0	Dis., taking oil.
8	Victor	0	422
9	Atterbury	0	0
	Division 3, 3001 to 5000 pounds—		
10	Renault	0	0
11	Walter	Dis., wrong route	
12	Kelly	0	0
	Division 4, 5001 to 8000 pounds—		
16	Alco	0	0
19	Grabowsky	0	0
20	Knox	0	Withdrawn, burned connecting rod brasses
21	Kelly	11	Ignition; dis., taking gas
22	British-Atlas	0	20 Magneto
23	Alden-Sampson	37 adj'mt	0
	Division 5, 10,000 pounds and over—		
24	Hewitt	Dis., taking gas	
25	Morgan	0	0
26	Gaggenau	Dis., taking gas	
	DISTRIBUTING CLASSES (GASOLINE VEHICLES)		
	Division 1, 1000 pounds and under—		
28	Brush	0	0
29	Hart-Kraft	0	0
	Division 2, 1001 to 3000 pounds—		
7	Cass	0	Withdrawn, broken bearing
30	Monitor	0	0
32	Grabowsky	Dis.; missed stops	
34	Grabowsky	0	0
	MANUFACTURERS' CARS (ELECTRICS)		
	Transfer classes—Division 1, 1000 pounds and under—		
37	General Vehicle	92 Work	0
	Division 2, 1001 to 3000 pounds—		
38	General Vehicle	Dis.; taking current	
39	Lansden	Withdrawn; short circuit	
	DISTRIBUTING CLASSES		
	Division 2, 1001 to 3000 pounds—		
44	Lansden	0	0
	OWNERS' DIVISION		
	Electric distributing class—Division 1, 1000 pounds and under—		
47	General Vehicle	Dis.; taking current	
	Division 2, 1001 to 3000 pounds—		
40	Lansden	0	0
41	General Vehicle	31 Late	0
42	General Vehicle	0	0
43	General Vehicle	Dis.; taking current	
45	Lansden	0	0
46	General Vehicle	Dis.; taking current	
	Division 3, 3001 to 5000 pounds—		
48	General Vehicle	0	0
49	Chicago	Failed to finish	
	Division 4, 5001 to 8000 pounds—		
50	General Vehicle	0	0
51	General Vehicle	Dis.; taking current	
52	General Vehicle	Dis.; taking current	
53	General Vehicle	0	0
54	General Vehicle	0	0
55	Commercial	0	0
56	General Vehicle	0	0
	Division 5, 10,000 pounds and over—		
36	General Vehicle	0	0
37	General Vehicle	0	0
58	General Vehicle	0	0
	OWNERS' DIVISION (GASOLINE)		
	Distribution class—Division 2, 1001 to 3000 pounds—		
33	Autocar	0	0

Reeves Says A.L.A.M. Will Show in 1912

General Manager Reeves, of the A. L. A. M., in speaking for his association, stated Wednesday that the National Automobile Show of 1912 would be conducted at Madison Square Garden by the association. He said that he had heard some talk among the New York dealers about handling the show in 1912, but that the manufacturers had decided to hold the show themselves.

General Vehicle, No. 58, perfect in heavy electric class

Atlanta Lists Well Filled

NUMBER OF ENTRIES FOR COMING MEET PROMISES MAGNIFICENT SPORT DURING THREE DAYS, WITH BIG FEATURE AT EACH SESSION

ATLANTA, GA., Oct. 31—The Atlanta Speedway meet gets under way Nov. 3, and for three days there should be really good sport on the fast two-mile Georgia course.

When entries finally ceased, about ten minutes before the official closing time, there were 48 cars named for the three days' meet, and a brace of Fords will ask permission of all concerned to allow them to enter in the 250-mile free-for-all.

Special interest attaches, of course, to the three feature events of the meeting, one each day. The opening race will be a hundred-mile dash for the Coca-Cola trophy. This is for the 301-450 machines, and fifteen good ones are named. The list includes three Nationals, three Falcars, a brace of Pope-Hartfords, a Cole, a pair of McFarlans, two Marmons, a Halladay and a Wescott.

Nineteen cars have been named for the City of Atlanta trophy race, a contest at 200 miles for cars of 451-600 displacement. These machines are two E-M-Fs, three Pope-Hartfords, two Nationals, a Parry, a Halladay, a Stearns, three Abbott-Detroits, a Stoddard-Dayton, a Firestone-Columbus, a Simplex, and a pair of McFarlans.

In the 250-mile free-for-all more than half the cars at the meet are entered, twenty-six, to be exact, with prospects that two more machines will be allowed to break in.

Here is the list:

Number	Car	Driver
1	E-M-F	Cohen
2	Fiat "90"	Bragg
3	Fiat "60"	Stoddard
4	Pope-Hartford	Church
5	Lozier "4"	Mulford
6	Lozier "6"	Horan
7	National	Livingstone
8	National "6"	Aitken
9	National	Wilcox
10	National	Aitken
11	Marmon	Heinemann
12	Falcar	Geinaw
13	Simplex "90"	Church
14	Falcar	Hughes
15	Cole "30"	Endicott
16	Cole "30"	Edmunds
17	Pope-Hartford	C. Basle
18	Cole, 1911 Model	Endicott
20	Firestone-Columbus	McKinstry
21	Marmon	Harroun
22	Pope-Hartford	Disbrow
23	McFarlan	Kepler
24	McFarlan	Adams
25	Marmon	Heinemann
26	Wescott	Knight
27	Falcar	Pierce
28	Marmon	Dawson
29	Firestone-Columbus	McKinstry
30	Chalmers	Moss
31	National	Woodside
32	E-M-F	Witt
33	Parry	Phillips
34	Halladay	Harrell
35	Stearns	Rutherford
36	Simplex "50"	Beardsley
37	Abbott-Detroit	Monty Roberts
38	Abbott-Detroit	Mort Roberts
39	Abbott-Detroit	McIntyre
40	Marquette-Buick	Burman
41	Renault	
42	Stoddard-Dayton	Harding
43	Firestone-Columbus	McKinstry
44	Simplex "90"	Matson
45	Marmon	Heinemann
46	American	Wallace
47	Darracq	Kirscher
48	Knox	Kirscher
49	Benz	Kirscher

Hart Kraft, No. 29, unpenalized in New York American run

Milwaukee Club Selects Standard Bearers

MILWAUKEE, Oct. 31—The Milwaukee Automobile Club has elected officers as follows: President, Charles W. Norris; first vice-president, Oscar F. Fischedick; second vice-president, Dr. Louis Fuldner; secretary, Arthur C. Brenckle; treasurer, Lee A. Dearholt. Messrs. Brenckle and Dearholt were honored with re-election. The increase in membership since the last annual meeting has been very gratifying, and efforts will be made to still further add to the roll during the coming year.

Hatfield, No. 2, clean score in Manufacturers' Division 1

The club is in excellent financial condition and is now building a $15,000 club house near Milwaukee. This will be formally opened on New Year's eve. The third annual show will be held in February, it having been practically decided to again follow the Chicago passenger vehicle show.

Massachusetts State A. A. Elects Officers

BOSTON, MASS., Oct. 29—The annual meeting and election of officers of the Massachusetts State A. A. was held here Friday night at the Parker House. The following officers were reelected unanimously as a tribute to their efforts during the past year in enlarging the organization: A. D. Converse, Winchendon, president; J. P. Coghlin, Worcester, vice-president; James Fortesque, Boston, secretary and treasurer. Vice-President Coghlin was made chairman of the legislation committee; W. H. Chase, chairman of the good roads committee, and A. E. Lerche, chairman of the signs committee. The association now has a membership of 4,300 and it was reported that this figure will be largely increased during the next year.

Moisant Wins for America

IN THRILLING RACE AROUND STATUE OF LIBERTY HE BEATS GRAHAME-WHITE AND DE LESSEPS IN NEWLY PURCHASED BLERIOT MONOPLANE

Hamilton's machine patterned after the Curtiss type and equipped with a Christie motor of 110 indicated horsepower. The motor was not ready and the machine seldom flew

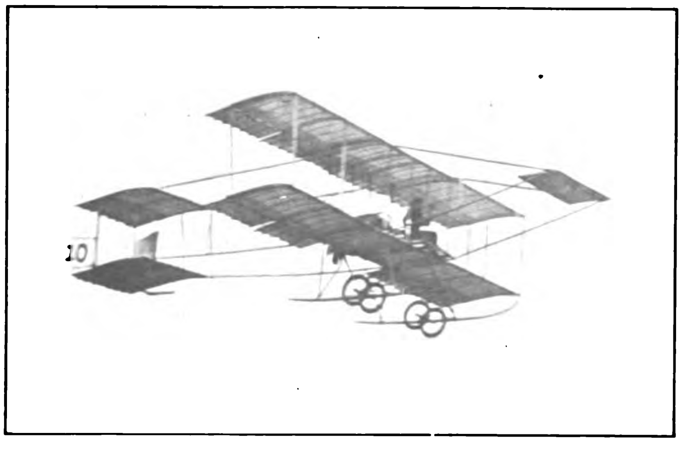
AMERICA, Britain and France divided the honors of competition in the International Aviation Meet which came to a close Monday evening after John B. Moisant in his hastily purchased 50-horsepower Blériot monoplane had won the great race from Belmont Park around the Statue of Liberty in New York harbor and return by less than one minute.

Grahame-White in a 100-horsepower Blériot apparently had the race won by his magnificent flight around the statue earlier in the afternoon and was receiving congratulations for England's triumph when Moisant was announced as a competitor. Count De Lesseps had made his trial and failed to equal the showing of the British aviator.

Moisant shot into the air with his motor buzzing like a wasp and, after reaching an elevation of nearly 3,000 feet, headed straight for the harbor across Brooklyn. In the teeth of a cold wind he flew the 16 1-2 miles a trifle over 50 miles an hour; made the turn with a short sweep and came back at the rate of well over a mile a minute. His total elapsed time was 34:38 84-100.

Grahame-White, by winning the Coupe Internationale d'Aviation, covering the 100 kilometer course in 1:01:04 3-5, in his high-powered Blériot, took away from America this trophy, which was won last year by Curtiss. Moisant was second in this event. But for an accident in which his Blériot was wrecked in the final round of the course, M. LeBlanc would have won, as he had a lead over the winner of over five minutes when he struck a telegraph pole. At the time he was making rounds of the course under three minutes and several of his circuits were considerably below that figure, establishing a new world's record mark of 2:44.32 for a single round of five kilometers.

The daily attendance at the meet was excellent and on the various days when feature events were carded the big stands, lawns and fields were thronged.



Harmon's Farman biplane operated by Grahame-White. Gnome motor. Large area. Small weight. Considerable lifting and altitude capacity. Small speed. Small ability for braving the wind. Always ready for flight in fair weather

One type of Blériot monoplane, head on. Other type has spreading tail. Gnome motor. Planes slightly curved near front edge. Slight warp. Rear control. Always ready. Medium stability in the wind. Medium weight. When built for carrying capacity has larger planes more curved

In the inclosure of the park on Sunday afternoon and gathered nearby at various points of vantage were fully 75,000 enthusiasts, and the reception given the American winner has never been equaled so far in the history of air contests.

The story that underlies the running of this race is one of the most romantic in the archives of sport. Moisant had been formally entered for the statue flight for several weeks and had a special racing machine all ready to take part. In starting Moisant's motor went wrong and his machine was smashed against a crippled biplane. He had only a few minutes in which to get another, and the only available machine was a new one belonging to LeBlanc, who was confined to his bed in a New York hotel on account of bruises received in the International Cup trials. By telephone the terms of the sale were arranged after LeBlanc had been assured that no French aviator had a chance to beat Grahame-White's time. Just within the limit the American made his start and won.

In a diminutive Wright aeroplane, Ralph Johnstone broke the world's altitude record on the final day of the Belmont Park meeting. His feat was accomplished late in the day. The machine, which has only 173 square feet of plane surface, was specially built to climb the air and in its preliminary trials under the handling of Orville Wright, it had demonstrated much facility in Pike's Peaking.

Johnstone made the first 7,000 feet of his record-breaking flight in twenty minutes, and then swung around in narrowing circles until he reached the height of 9,714 feet. Summaries:

Wednesday

Hourly distance—Latham (Antoinette), 17 laps; time 36:22 2-5.
Altitude—Hoxsey (Wright), 6.183 feet.
Cross country—Aubrun (Bleriot), 20 miles; time 28:08:75.

Thursday

Hourly distance—Latham (Antoinette), 14 laps; time 55:24.06.
Altitude—Brookins (Wright), 650 feet.

Friday

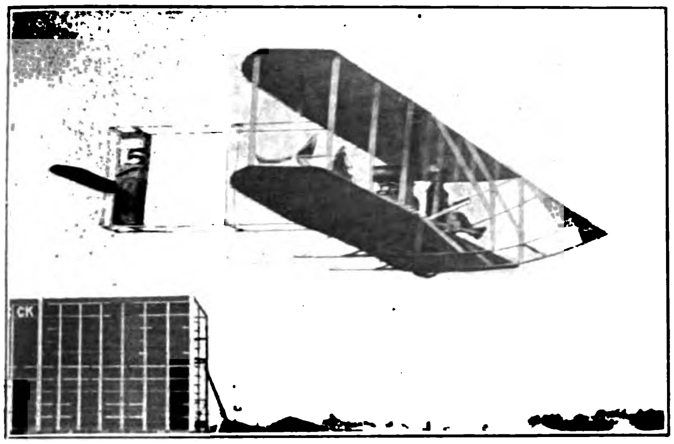
First hourly distance—Latham (Antoinette), four laps; time 14:25.
Second hourly distance—Latham (Antoinette), 12 laps, time 40:34.01.
First hourly altitude—Hoxsey (Wright), 6,705 feet.
Second hourly altitude—Parmalee (Wright), 3,636 feet.

Saturday

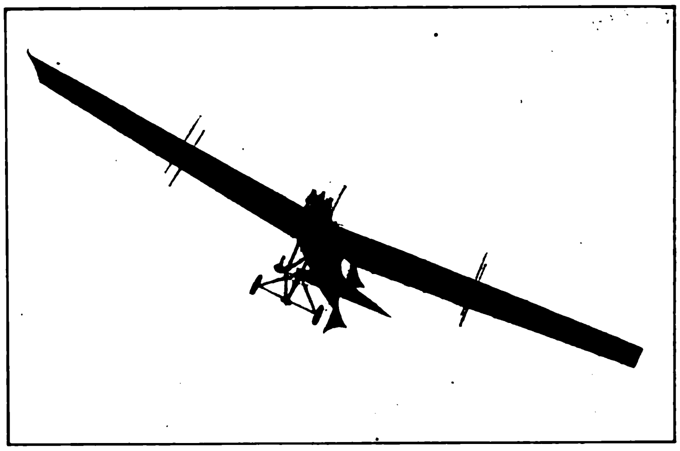
International speed race, 100 kilometers—Grahame-White (Bleriot), first; time 1:01:04:74; Moisant (Bleriot) 1:57:44:85.
First special altitude—Hoxsey (Wright), 5,146 feet.
Second altitude—Hoxsey (Wright), 4.644 feet.

Sunday

Statue of Liberty flight—Moisant (Bleriot "50"), first; time 34:38:84. Second, Grahame-White (Bleriot "100"); time 35:21:30. Third, De Lesseps (Bleriot), 41:56.25.
Hourly distance—Latham, 33 laps;
Altitude—Simon, 959 feet.
Monoplane race—Grahame-White, ten laps in 14:56:30.
Cross country (20 miles)—Radley, 20:05:60.
Aero Club distance event (two hours),—Moisant, 53 laps.
Special altitude—Johnstone, 9,714 (World's record).
Grand special speed contest (ten laps)—Grahame-White; time 14:34 2-5.



The normal Wright machine for rear control. Wright motor with direct injection of fuel. Great capacity for altitude. Always ready. Large area. Medium weight. Flies in higher wind than any other machine shown at the meet. Head resistance smaller and warp more pronounced than in earlier Wright machines.



Latham's Antoinette monoplane. Weight about 2500 pounds. Antoinette 16-cylinder V-motor, usually hard to get running well till heated. Long tubular radiator along sides of frame. Slight warp. Cannot turn sharply. Seldom if ever seen banked as much as photograph shows.

Flying for Prizes

BY MARIUS C. KRARUP—OBSERVATIONS BEARING UPON CONSTRUCTION FROM THE BELMONT PARK AVIATION MEET—MATURED AMERICAN FLYERS SHOW SUPERIOR INDEPENDENCE OF THE WEATHER

AT the Belmont Park meet, just closed, nothing which was new mechanically was successful, but refinements in design as well as minor differences due to the accidents of rule-of-thumb construction were shown to have a very pronounced influence upon the flying properties of the machines, especially on speed and stability.

Among the new features the most conspicuous were the small Wright flyers specially built to demonstrate speed and of the biplane type, the Curtiss monoplane with Curtiss motor, the Christie monoplane with two Christie motors and two propellers, both on shafts running axially through the middle of the machine, and the Hamilton biplane, built in close emulation of the Curtiss type, but equipped with a Christie motor of 110 indicated horsepower.

Among the events, the altitude flights performed by Hoxsey and Johnstone in full-sized Wright biplanes and their daring corkscrew descents under weather conditions which were sometimes very trying, indicated substantial progress, accomplished very largely, it seems, by eliminating the front elevating rudders and thereby rendering the control less sensitive and infusing more confidence in the aviator. An inspection of the machines indicated that the rear spars, and possibly the front spars as well, were more flexible than formerly, so that the machines were probably subject to a readier and more decisive control by warping of the main planes than the earlier machines in which the front elevating rudders were retained, and it seems that this is the feature through which a much improved ability to weather gusty winds of moderate strength or strong steady winds has been materialized. Their superiority over all other machines at the meet was in this respect marked. Their ability to "plane" down with the motor shut off and at dizzy angles, their course at times showing the lines and proportions of an ordinary corkscrew of steep pitch, was in itself plain evidence of three important refinements: (1) more pronounced warping, admitting of the sharp turns; (2) reduced air resistance from the non-supporting parts of the construction, brought about by the elimination of the front control and the more refined contours and dimensions of stanchions, spars and radiator, and (3) the increased confidence of the operator inspired by relieving him of attention to the too-sensitive front rudder, while yet placing his safety fairly independent of the motor power by virtue of the warp and the large area of the planes. The large and more or less flexible rear edges of the planes probably also contribute to their relative independence of the weather.

Other events of importance to the student of these forces which make or unmake flight, were the speed trials, including particuarly the flight from the aviation field to the Liberty statue and return, through which it was shown that identical machines differ greatly in speed capacity and that a machine driven by a 85-100-horsepower motor is not necessarily speedier than another machine of the same design but driven by a 40-50 horsepower motor. In the 36-mile flight around the Liberty statue only Blériot monoplanes were engaged. Grahame-White's, with a 100-horsepower motor, made the distance in about 37 minutes. DeLesseps, with a 50-horsepower motor, used about 6 minutes more, traveling at practically the same time and under the same wind conditions. Moisant, about one hour later, made the same circuit a little faster than Grahame-White, with a 50-horsepower motor and a machine so near alike to that piloted by DeLesseps that the eye could barely detect any difference, by a somewhat close comparison made at the sheds the following day. The wind, however, had changed a trifle in direction and possibly in velocity, as indicated by the position of a captive balloon floating above the statue. The difference of 6 minutes in the speed of Grahame-White and DeLesseps would correspond to about one-third greater propulsive power in the Grahame-White machine, a gain of one-sixth in speed, meaning about one-third more resistance overcome, in the case of machines of identical shape and dimensions. DeLesseps and Grahame-White are men of about the same size and weight, while Moisant is much smaller and the machine which he bought from Leblanc was no doubt adjusted to the weight of the latter, which is about the same as Moisant's. The mere difference in the loads, possibly amounting to 40 pounds, would, according to experience at previous meets, make a scarcely perceptible difference in the speed, but a different balancing of the machines might make a considerable difference, necessitating constant rudder action or a higher flying tilt in the machine least well balanced. The inspection seemed to indicate one slight difference between the machine of DeLesseps and Moisant. The angle of the planes with the main extension of the tail seemed to be 2 to 3 degrees larger in the DeLesseps machine than in the other. This angle serves the purpose of giving a certain degree of automatic fore-and-aft balance, since a rise of the wings immediately brings the under-surface of the tail into action for rear support. The smaller this angle can be made and yet serve its purpose, the greater the sustentation of the machine must be, other things equal, and the machine with the greater sustentation can fly at a smaller tilt, thereby meeting smaller resistance and gaining greater speed. Finally, the motors of the three machines may have been in different conditions of "tuning up," and the efficiency of the propellers may be different, the slightest variation of the curves of a propeller, such as may be caused by warping of the wood, having been found to affect the propulsion very noticeably, though the laws governing the action have not yet been defined. The fact that the motor power of Grahame-White's machine overcame only one-third more resistance than was overcome by DeLesseps' motor of one-half the power seems to find its readiest explanation in the difficulties in harmonizing propeller dimensions with the speed and power of the motor. Altogether the three performances give rise to a number of mechanical considerations which all designers of speed machines must take into account, even if the slight change of wind offers a facile explanation of the apparent discrepancies.

On one of the days of the meet Hoxsey and Johnstone, whom the spectators had become used to seeing disappear through the clouds to the sunny but cold regions above and suddenly reappear in the same manner after an absence of hours, were engaged in this sport while the wind was blowing at the rate of possibly 25 miles per hour, when the velocity of the wind began to increase, reaching perhaps 60 miles per hour, as estimated by Johnstone. Under these conditions the flyers could not hold their own, but drifted with the wind, while heading it and working against it at full motor speed. They were carried away from the field a distance of about 25 miles in one hour, showing that, as against the atmosphere, they were making their usual maximum speed of 35 miles per hour, while in relation to things terrestrial they flew backwards at the rate of 25 miles per hour—an entirely new experience in aviation for the simple reason that nobody before has flown in a wind of 60 miles velocity. At last Johnstone was compelled to risk a descent, as his gasoline was running very low and a planing descent without power was out of the question in the high wind. And he succeeded in making this descent through strata of atmosphere where the wind was not only strong but gusty as well, and landed near Middle Island, whence he flew back to Belmont Park the next day. As a 60-mile wind has never been known to stop a 30-horsepower limousine, incidentally stopping its motor, although the wind resistance encountered by a limousine is no doubt greater than that which the propulsion of a Wright biplane overcomes, Johnstone's experience suggests that the propulsive efficiency of propellers is very much smaller than that of a wheel rotating on a firm road. It is commonly figured that the automobile motor delivers about 70 per cent. of its power at the wheel rim, on the high gear, and as the much simpler transmission of the biplane should deliver at least as much to the propeller shafts, the loss in efficiency can be charged to the propeller only. This would be apparent from the mere fact that the highest speed of these biplanes in a calm does not exceed 35 to 40 miles, while that of the limousine of 30-horsepower easily reaches 50 miles on a smooth and firm road, if the gears permit it, but the experience of the two Wright fliers in being actually driven backward seems to bring the interpretation of the fact nearer to reality, emphasizing that the need in aeroplane construction should be sought in the direction of a propeller which will operate with the positive action of an automobile driving wheel rather than in the direction of motors with enormous power, expensive to maintain, as well as difficult to produce within the weight limits.

The small Wright speed machines shown at the meet and of which much had been expected, turned out to be biplanes, with very small plane areas. One of them had a wing span reduced to about 22 feet, or about half of the usual Wright dimensions, and was equipped with a new V-motor with eight cylinders, figured capable of developing 60 horsepower. The motor appeared difficult to get into working order and the accident to Brookins, when the latter was preparing to enter in the speed trials, was due to four of the cylinders ceasing to function and the rest being insufficient to keep the machine in the air. Its weight was said by Wilbur Wright to be about 920 pounds with the aviator and gasoline on board, and a ground speed of more than 40 miles per hour was required for starting it. Flown by Orville Wright, it showed great speed, according to the writer's timing, at least equal to that developed by the 100-horsepower Blériot. The other speedy Wright machine was operated by Ogilvie, of the English team, weighed about 750 pounds with everything up, spanned 26 feet with a width of 3 foot 6 inches, was equipped with the ordinary Wright motor and was said by its operator to require a starting speed of 40 miles per hour in a calm. The two machines must, therefore, be intended to start at very different tilts, the curvature of their planes being very much alike, while their weights and areas differ, as stated.

Terrific Speed in Grand Prix

EARLY PRACTICE OVER COURSE DEVELOPS REMARKABLE STORIES OF FAST TIME—FIELD WILL PROBABLY INCLUDE 21 FLYERS

SAVANNAH, Oct. 31—In addition to the entry list published in The Automobile last week, the Grand Prize entries now include a Sharp-Arrow, two Pope-Hartfords, two Oldsmobiles and a Stoddard-Dayton. There is a question whether the two Lorraine-De Dietrichs mentioned in the list last week will start, but there is a probability that such will be the case.

The course has been thoroughly oiled and rolled out and will be thrown open for formal practice to-morrow. The usual crop of reports of fast time made in unofficial spins have made their appearance. One of the entered cars is said to have turned a mile in Ferguson avenue at the rate of 106 miles an hour.

The Fiat team is quartered at Doyle's on Thunderbolt road; the Benz crew and cars are at the German Club; the Loziers will be quartered at the Thunderbolt Casino; the Marmons, Marquettes, Buicks and Roebling-Planche are at Fifty-second street and White Bluff road.

Already the city is beginning to feel the influx of visitors as nearly every train and ship brings in a handful connected in one way or another with the big race. Chairman Robert Lee Morrell, of the Contest Committee of the Automobile Club of America, and a delegation from that organization has reached this city. Mr. Morrell and his party were met by a committee from the Savannah Automobile Club and escorted to the Chamber of Commerce, where they were presented to Mayor Tiedeman, who turned over to them the administration of the race.

All the drivers who have been over the course unite in predicting a new American road race record in the Grand Prize. These predictions run all the way from 68 to 75 miles an hour, with the majority selecting about 70 miles an hour as the favorite figure. On account of the three stiff turns the general opinion is that the world's mark of over 74 miles an hour will stand.

There is little likelihood of any more entries than those already mentioned. The starters will probably number about twenty-one, although twenty-seven have been nominated.

Texans Race Three Days

FINE WEATHER AND BIG CROWDS COMBINE TO ADD TO THE SUCCESS OF THE DALLAS MEET, AT WHICH GOOD SPORT IS ENJOYED

DALLAS, TEX., Oct 29—Favored with large crowds, ideal weather and a track that was in first-class shape for fast auto racing, the three-day meet held under the auspices of the Dallas Automobile Dealers' Club on the mile track at the Dallas State Fair Grounds was brought to a close to-day.

The feature event on the last day of racing was the 50-mile free-for-all Dallas Derby. Four cars faced the starter in this event, as follows: Stoddard, two Cole cars, and a Cutting. The Stoddard started out at a fast clip to cinch the race in the early running, but a foul spark plug cost it the lead in the nineteenth lap. At this stage of the race the Cutting jumped to the front with a two-lap lead and held it until the fortieth lap, when engine troubles put it out of the running.

The Stoddard proved the winner and did the 50 miles in 56:10. Summaries:

FIRST DAY

Stock chassis, fast mile, 300 cubic inches and less—

No.	Car	Driver	Time
1.	Cutting	Clark	1:00 4-5
2.	Moon	Wells	....
3.	Cole 30	Endicott	....

Stock chassis, class B, 230 cubic inches and less—

No.	Car	Driver	Time
1.	Buick 10	Fred Malone	10:43 1-5
2.	Cole 30	H. Endicott	....
3.	Cole 30	B. Endicott	....

Class D, free-for-all, five miles—

No.	Car	Driver	Time
1.	Cutting	Clark	5:27 3-5
2.	Cole 30	H. Endicott	....
3.	Cole 30	B. Endicott	....

Stock chassis, class E, 600 to 450 cubic inches, 50 miles—

No.	Car	Driver	Time
1.	Cutting	Clark	52:38
2.	Moon	Wells	....
3.	Cole	B. Endicott	....

SECOND DAY

Free-for-all, handicap—

No.	Car	Driver	Time
1.	Stoddard-Dayton (scratch)	De Hymel	9:51 3-5
2.	Cutting	Clark	....
3.	Cole 30	B. Endicott	....

Free-for-all, class D

No.	Car	Driver	Time
1.	Stoddard-Dayton	De Hymel	1:02
2.	Moon	Wells	....
3.	Cutting	Clark	....

One hour, free-for-all, stripped chassis, class C—

No.	Car	Driver	Time
1.	Stoddard-Dayton	De Hymel	....
2.	Moon	Wells	....
3.	Cutting	Clark	....

THIRD DAY

Free-for-all, class E, State championship, mile trial—

No.	Car	Driver	Time
1.	Stoddard-Dayton	De Hymel	1:02
2.	Cutting	Clark (withdrew)	

Free-for-all, handicap, class B—

No.	Car	Driver	Time
1.	Cutting (scratch)	Clark	5:05 2-5
2.	Buick 10	Malone	....
3.	Cole 30	Endicott	....

Stock chassis, class B, 300 cubic inches and less, 10 miles—

No.	Car	Driver	Time
1.	Cutting	Clark	6:14
2.	Cole 30	B. Endicott	....
3.	Cole 30	H. Endicott	....

Stripped chassis, class E, Dallas Derby, 50 miles—

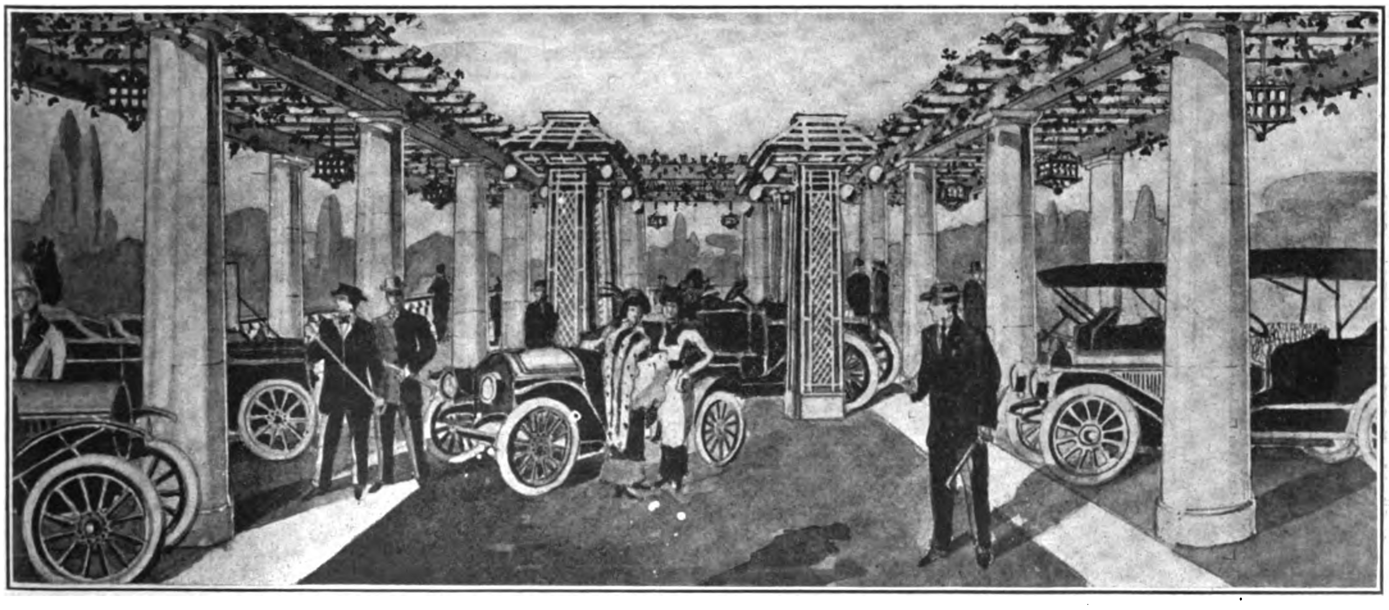
No.	Car	Driver	Time
1.	Stoddard-Dayton	De Hymel	56:10
2.	Cole 30	B. Endicott	....
3.	Cole 30	H. Endicott	....

Fitchburg Motorists Form Club

FITCHBURG, MASS., Oct. 28—A number of the prominent motorists of this city met last night and formed a motor club to be known as the Fitchburg Automobile Club. Addresses were made by several of the State officers. It is expected that more than one hundred motorists will join the club. It will become affiliated with the Massachusetts State A. A. The officers elected were as follows: F. O. Hardy, president; W. Powell, vice-president; G. Upton, secretary-treasurer. C. B. Smith was chosen representative to the State and national bodies. The following directors were also chosen: Henry McGrath, G. P. Grant, Jr., Gardner Hudson, F. R. Houghton and David Low.

Automobile Club for Haverhill, Mass.

HAVERHILL, MASS., Oct. 28—At a meeting held Thursday evening to form a permanent motor club at Haverhill to bear the name of that city, more than seventy owners of cars signed the roll. Then followed an election of officers with the following men chosen: W. W. Appleton, president; Dr. C. E. Durant, vice-president; F. S. Ball, secretary-treasurer; George E. Durgin, Dudley Hilliard, Elmer C. Bassett, Sam Jordan and John H. Bragdon, board of governors. Grant Fairbanks was chosen to represent the club at national and State meetings.



How the exhibition hall of Madison Square Garden will look after it is decorated in the style of an Italian garden for the Eleventh Annual A. L. A. M. Show, which is to be held January 7 to 12, 1911

Maxwell Wins Feature Race

FINISHED FIRST IN THIRTY-MILE EVENT OF MEET STAGED BY AUTOMOBILE CLUB OF WHITE PLAINS AT WESTCHESTER COUNTY TRACK

RUNNING with steadiness at high speed, a Maxwell car, No. 1, proved the feature of the race meet given Saturday afternoon at the Westchester County Fair grounds under the auspices of the Automobile Club of White Plains. The car finished first in the 30-mile event, winning from another Maxwell, an Allen-Kingston and two Mercedes, one of which has made creditable showings in two Vanderbilt Cup races.

The track was exceedingly trying to the heavy cars on account of its sharp turns and rough surface and the terrific strain on the right tires soon put them out of competition. The Maxwells, however, slipped along without trouble and were all alone at the finish on account of their light weight and the fact that no mechanic rode with either of the drivers.

A good crowd turned out to see the races, but wholesale scratching deprived the card of much of its interest. The best time trials were made by Mercedes, 4, driven by S. E. Wishart, 1:14 1-4; Allen-Kingston, 8, Ormsby, 1:21, and Maxwell, 1, 1:23.

The first race was won by Mercedes, 9, driven by H. Mendell, Jr., who covered the five miles in 7:09 1-2. Marion, 24, Thebaud, and Allen-Kingston, 8, Ormsby, also ran.

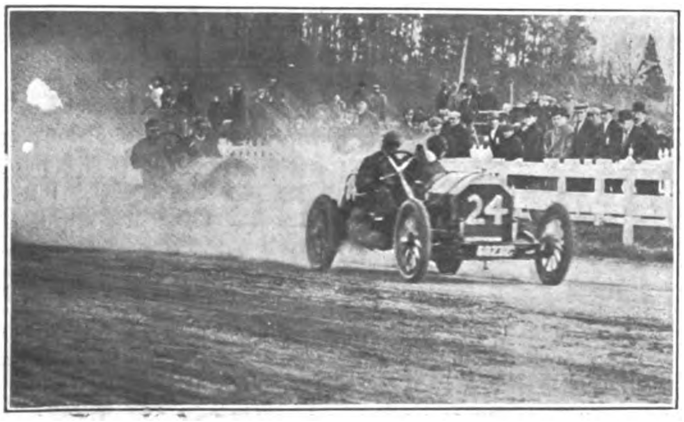
Maxwell, 1, Costello, had a cake-walk in the second, making the five miles in 6:44 1-5. Maxwell, 11, and Krit, 16, finished as named.

The third race failed on account of scratches and Mercedes, 9, and Marion, 24, contested in a match race, the former finishing the ten miles all alone after the Marion had suffered gear trouble. Chalmers, 18, was awarded the cup in the 20-mile event as the other contestants failed to show up. A 10-mile extra event was put on in its place and the Chalmers won the race from the two Maxwell entries.

The final number was the 30-mile feature event in which the two Maxwells, Allen-Kingston and the two Mercedes appeared at the scratch. Mr. Wishart's Vanderbilt Cup car jumped into the lead at the crack of the gun and within five miles had lapped the field twice when a gasoline feed pipe broke and the car lost five laps before temporary repairs could be made. In the meantime Maxwell, 1, had challenged the other Mercedes and had succeeded in getting to the front. From there to the finish the Maxwell remained in the van. Mercedes, 4, made quick repairs and started after the leaders but after four rounds was obliged to withdraw.

About the same time Mercedes, 9, swung into the stretch in trouble with its right tires and on the next round the Allen-Kingston drew out with the same trouble. The tires were worn almost to the inner tubes in each case. The Maxwells tin-canned along by themselves and completed the route in good order.

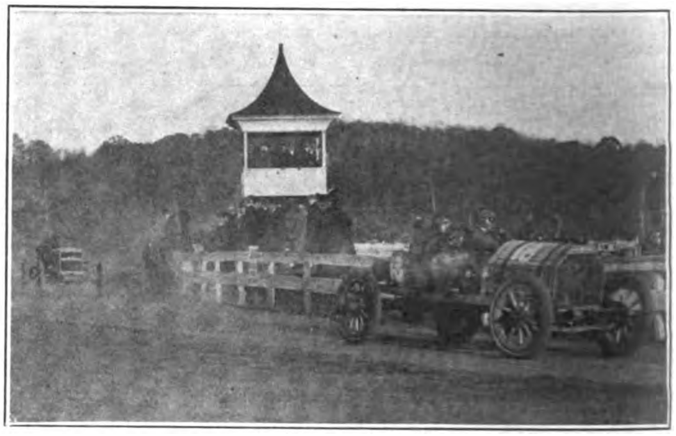
The track is thoroughly unfit for automobile races and the high speed made by Mr. Wishart's car courted fatal accident in every round.



Marion No. 24, which performed well at White Plains meet

Two Los Angeles Meets Announced

Two track meets, opening the Los Angeles motordrome for this season have been announced. The first of these will take place November 26 and 27, for which a varied program has been prepared. The first day will see six events decided. The first event will be mile speed trials; second, a pursuit race, restricted to four entrants; third, Class C, Division 3C, five miles; fourth, free-for-all, 25 miles; five, Class C, Division 2C, five miles; and six, the first hour of the Motordrome Endurance Derby of two hours, open to Class C. On the following day six more races will be held, mostly for larger cars.



Chalmers No. 18 leading in ten-mile event at White Plains

The second meet is a 24-hour race scheduled for December 25-26 for a Challenge Trophy and a purse of $1,500, divided into three moneys. Class C cars are eligible and special trophies will be awarded the winners in each of the divisions providing that there are two or more. The entry list is limited to 16. The meets are both fully sanctioned.

Newark Club Elbows Deep in Politics

Working with all its accustomed vigor and efficiency, the New Jersey Automobile and Motor Club is taking a prominent part in politics just at this time. The club is laboring for a decent automobile law in Jersey and has taken useful means of determining how each legislative candidate stands with regard to reasonable legislation on the automobile. The club has propounded a quiz to each candidate and has received replies agreeing to better laws from 79 of them so far. Essex County is the scene of m [illegible] ity and largely as a result of the club canvass, both the Republican nd Democratic candidates have been pledged to remedial legislation.

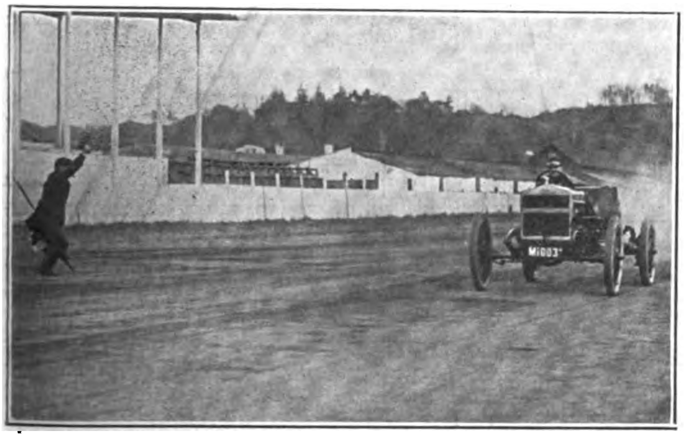
The club will take a distinct interest in the election at the polls. As its membership is tremendous, it will probably have a salutary effect.

Maxwell Wins Reliability Run

COMPLETES FIVE-DAY ROUTE WITH BUT 13 DEMERITS—AWARD PROTESTED BY ENTRANT OF WASHINGTON CARS

WASHINGTON, D. C., Oct. 28—For the second time this year a Maxwell, driven by H. E. Walls, won the sweepstakes in a reliability contest. The recent victory in the Munsey historic tour was repeated in the five-day reliability tour of the Washington *Post* to Richmond and return. A total of 13 points was marked against this car, three of them being for stalled motor and ten in the final examination.

The award was protested by A. G. Carter, entrant of one of the Washington cars, who claimed excessive penalties were laid against his car. Mr. Carter had an argument with B. B. Caverly, representative of the Contest Board, and the Washington entries were thereupon disqualified. The whole matter has been referred to the Contest Board for decision. The winners were Division 1A, Maxwell, B. Robertson; Division 2A, Buick, S. Mortimer; Division 3A, Maxwell, H. E. Walls; Division 4A, Washington, W. D. Arrison; Division 5A, Columbia, G. M. Wagner.



Maxwell on the starting line in White Plains time trials

The two Maxwells, two Washingtons and the Parry had perfect time scores. All the cars were perfect on the clutch test. The final examination report shows the following:

Buick.—Front wheels sprung three-quarter inch, 30 points; loose front gas lamp bracket, 2 points; time penalty, 52 points; road penalty, 15 points. Total, 99 points.

Washington.—Lost grease cup, left rear axle, 2 points; lost truss rod under rear axle, 25 points; foot brakes, 3 points; road penalty, 1 point. Total, 31 points.

Washington.—Loose left rear fender, 2 points; foot brake, 8 points; emergency brake, 10 points; road penalty, 2 points. Total, 22 points.

Columbia.—Two loose cap screws on exhaust and intake manifold, 2 points; one broken spring clip, left rear spring, 15 points; one broken truss rod under rear axle, 25 points; five leaves broken in right front spring, 25 points; five leaves broken in left front spring, 25 points; loose mud apron, 2 points; nut off transmission cover, 1 point; loose set nut on connecting link of throttle linkage, 1 point; brass binding on dash loose, 1 point; half inch of spread rear wheels, 20 points; foot brake, 46 points; hand brake, 26 points; road penalty, 22 points. Total, 211 points.

Maxwell.—Loose spark terminal, 1 point; loose yoke on steering column, 15 points; broken leaf in left front spring, 5 points; loose left hand short brake lever, 25 points; loose left front fender bolt, 2 points; one tappet rod spring loose, 1-2 point; one tappet rod spring lost, 1-2 point; one loose right hand front axle bolt, 2 points; two loose body bolts, 2 points; road penalty, 8 points. Total, 61 points.

Maxwell.—Fan belt off, 1 point; one lost cap screw from magneto distributor, 1 point; one loose cap screw from magneto distributor, 1 point; loose right rear fender, 2 points; tw[illegible]ent brake band brackets, 5 points; road penalty, 3 point[illegible] 13 points.

Parry.—Loose right front fender, [illegible] points; loose rear right fender, 2 points; bent left front fender, 2 points; left front spring leaves out of line, 2 points; right front spring leaves out of line, 2 points; base of steering column loose at dash, 15 points; gasoline strap loose, 2 points; brake band guide bent, 2 points; stud loose on transmission cover, 1 point; truss rod on rear axle loose, 5 points; loose muffler, 2 points; front axle bent back, 150 points; spread of rear wheels, 95 points; emergency brake, 17 points; time penalty, 58 points; road penalty, 205 points. Total, 562 points.

Washington.—Loose left fender, 2 points; loose strut rod under rear axle, 5 points; loose right front deck, 1 point; loose right front fender, 2 points; spread of front wheels, 5 points; foot brake, 3 points; tire penalty, 625 points; road penalty, 328 points. Total, 971 points.

Buick.—Loose steering column, 15 points; loose sprocket on jack shaft, left side, 50 points; distance rod nut, left and right side, 2 points; foot brake, 30 points; time penalty, 8 points; road penalty, 2 points. Total, 107 points.

The heavy penalties earned by the Washington and Parry were due to accident. The summary:

			Final Standing			
Name of Car	H.P.	Driver	Time	Road	Tech.	Tot'l
Maxwell, ...	30	H. E. Walls, ...	0	3	10	13
Washington, ...	40	W. D. Arrison, ...	0	2	20	22
Washington, ...	40	A. G. Carter, ...	0	1	30	31
Maxwell, ...	14	B. Robertson, ...	0	8	53	61
Buick, ...	18	S. Mortimer,.........	52	15	32	99
Buick, ...	14	W. Angle, ...	8	2	97	107
Columbia, ...	28-30	G. M. Wagner, ...	0	22	189	211
Parry, ...	36	I. C. Barber, ...	58	205	299	562
Washington, ...	40	G. Halstead, ...	625	328	18	971

Santa Monica Road Races Announced

LOS ANGELES, Cal., Oct 31—Thanksgiving Day has been selected for holding the second annual Santa Monica Road races and the start will be at daybreak. The race is practically a triple attraction, for beside the free-for-all event there will be a light stock car and a heavy stock car competition which will precede the main contest.

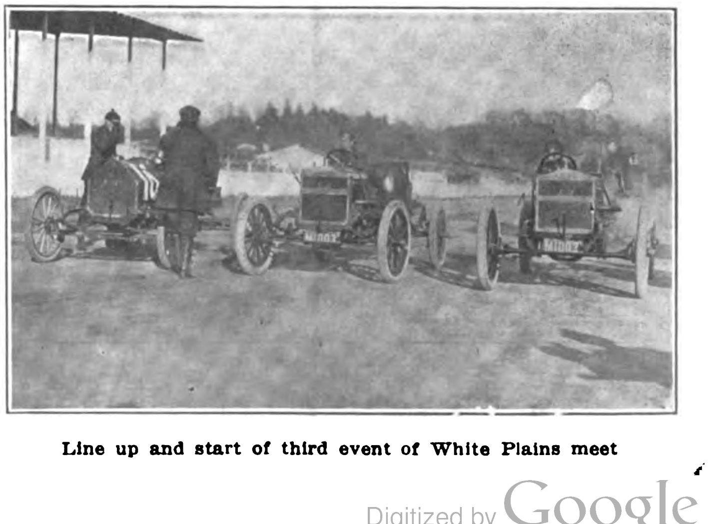
In the light car class the limit has been placed at 250 cubic inches piston displacement without minimum weight restrictions and the course is 12 laps of a circuit 8.4 miles long. The entrance fees will be divided among the first three to finish in the proportion of 70, 20 and 10 per cent. The winner will be awarded the Leon T. Shettler trophy valued at $600.

In the heavy stock car event, open to cars of 600 cubic inches displacement, the course will be 18 laps of the same circuit and the awards will be given on the same plan as in the foregoing. The Dick Ferris Trophy, worth $1,000, goes to the winner.

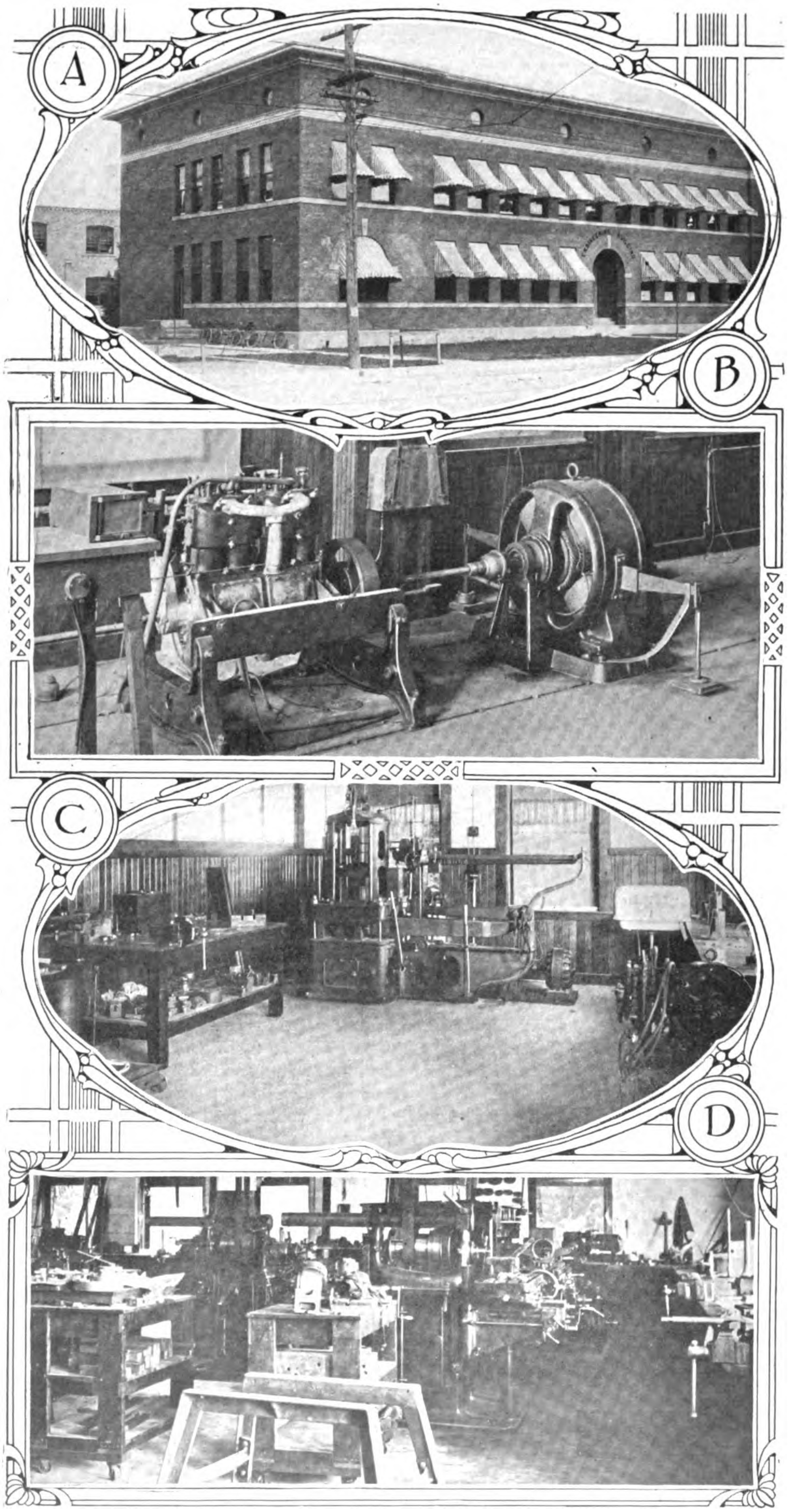
The main event is a free-for-all, 24 laps of the course and the prizes will be awarded according to the same plan.

The course is considered the fastest road racing surface in America. There are no difficult turns and no grades of any moment. In past contests light stock cars have made faster time than the big road locomotives that have competed in the Eastern cup races. This, of course, is due to the difference in the roads.

The events are sanctioned and will be conducted under the management of Dick Ferris.



Line up and start of third event of White Plains meet



The new Reo engineering building at Lansing, Mich., has been completed. It is three stories of reinforced concrete and has floor space of 31,200 square feet. The building is equipped with a particularly complete line of machinery capable of handling the smallest repairs or the construction of entire cars. Horace T. Thomas is in charge. A—View of engineering building. B—Motor testing laboratory. C—Material testing laboratory. D—Machine shop.

News of the Trade

DETROIT, MICH., Oct. 31—Saturday was moving day for the Hudson Motor Car Company. That is, it was the first of a series of moving days, for it will take all this week, it is expected, to complete the transfer of the company's stock and equipment from the old factory at Mack and Beaufait avenues to the magnificent new plant that has been under construction all summer out on Jefferson avenue and which is not yet completed. It is so near completion, however, that manufacturing operations can be carried on without hindrance and the officers of the company were anxious to move while the weather was still favorable.

A good start was made on the moving job, Saturday. The procession of motor trucks and vans started at 7 o'clock in the morning and continued without let-up all day. The parade was resumed this morning.

The new plant approximates a high form of modern motor car factory construction. Its ventilating, heating, lighting and sanitary arrangements are all strictly up-to-the-hour and are designed to give the maximum of comfort, safety and convenience. An instance of the consideration that has been shown for the employees is seen in the use of ribbed glass, which diffuses the light so that the glare of the sun cannot hurt the workmen's eyes.

Model Garage in Far Northwest

SEATTLE, WASH., Oct. 31—One of the most artistic, substantial and thoroughly fireproof garages in the Northwest has recently been completed at Baker City, Ore. It was erected by Albert Geiser, one of the most extensive property owners in that city, and will be occupied by him as the agent for the Buick automobiles in Baker County.

The building is centrally located on a lot 50 by 100 feet, built of natural stone, concrete floor and metal roof suspended by steel arches at a height of 20 feet.

Mechanical Engineers to Meet

Cement making, as it is affected by the rotary kiln, will be treated by Ellis Soper, of Detroit, at the New York meeting of the American Society of Mechanical Engineers, November 9. Charles Whiting Baker will deliver an illustrated lecture on the Panama Canal.

THE HUDSON COMPANY MOVES TO ITS NEW QUARTERS IN DETROIT—OTHER ITEMS OF INTEREST

The main building is 610 x 60 feet in dimensions, with one wing 410 x 60, and another 210 x 60. There is an office building, 180 x 52 feet. All the buildings are two stories in height, but are designed to carry two more any time it is found desirable. They are of reinforced concrete construction.

Sanitary drinking fountains are scattered throughout the buildings, while each of the employees will have a steel locker. The work benches are equipped with private metal drawers for the use of the bench hands, draftsmen, etc. Then there are rest rooms for the women, smoking rooms for the men and an employees' dining room.

Scores of devices for lessening the cost of production have been provided, and a great many of them have been specially designed by Howard E. Coffin, chief engineer for the Hudson Company, and designer of all the Hudson models. Among these features may be mentioned an overhead crane for conveying cars to the paint shop.

A 30,000-gallon tank, supported by a tower 135 feet high, affords fire protection. An automatic sprinkler system has also been installed.

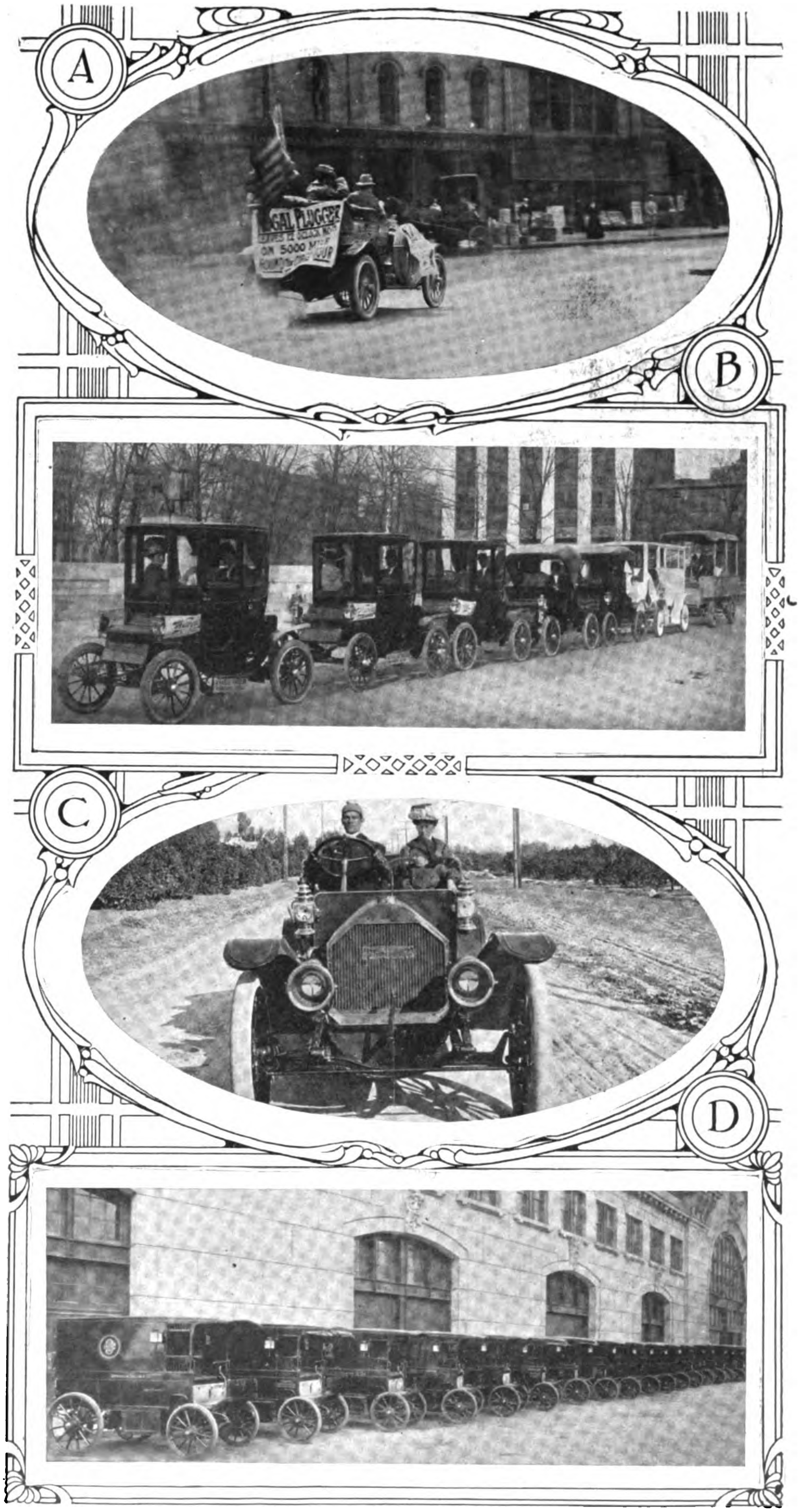
A feature of the plant is the experimental room, designed by and equipped under the personal supervision of Mr. Coffin. It has been termed a mechanic's paradise.

Larger Quarters for Studebaker

WILMINGTON, DEL., Oct. 31.—The Wilmington branch of the Studebaker Automobile Company, which is having a building erected for its use as an office and garage on Delaware avenue near Tatnall street, has decided to use all three floors of the building for its business, instead of only the first and second floors, as was the original intention.

Packard Company to Entertain

Celebrating the completion of factory additions which have been under construction for a considerable time, the Packard Motor Car Company will give a reception to the business men of Detroit November 3. For the convenience of the guests, the company will install a motor car service from the street car line to the factory buildings before and after the function.



A—The "Regal Plugger," that is now touring through the South giving a demonstration of its power and reliability. B—A string of electrics just turned out by the Waverley plant and ready for shipment. C—The great Western car is a favorite on the Coast—F. A. Beals and family driving on Highland Avenue, San Bernardino, Cal. D—Studebaker cars are replacing horses in many of the large commercial houses in New York

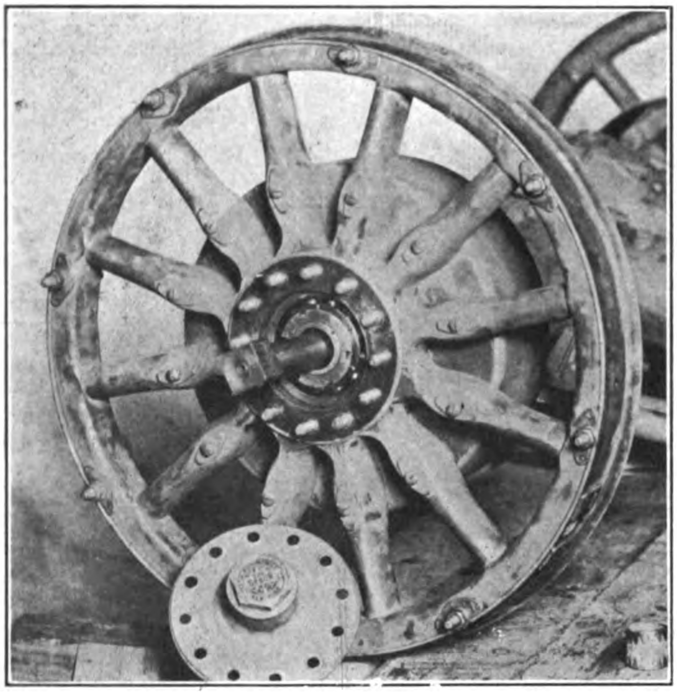


Fig. 1—Forged hub removed, showing driving square

Motor Activities in Hoosier Capital

INDIANAPOLIS, IND., Oct. 31—The Cole Motor Car Company has recently increased its capitalization and will build approximately 2,000 cars next season. The American Motor Car Company will increase its output to 400 cars and other concerns will similarly increase production. Contracts for the new season are coming in quite satisfactorily.

A number of changes in the trade have been made during the last few weeks. The Ford Motor Car Company is planning to open a factory sales branch in North Capitol Avenue, succeeding the Ford agency, which has been held by the Gibson Auto Company.

Plans have been completed for the factory building of the recently organized Great American Automobile Company, which will manufacture commercial cars exclusively, near the Indianapolis Motor Speedway. The Cecil E. Gibson Motor Car Company will also soon establish a plant for the manufacture of commercial cars.

The 1910 season has been a success locally. Almost every dealer has disposed of his allotment and is booking orders for 1911 cars. It is estimated that local dealers have sold about 3,000 cars this season, and present prospects would seem to warrant the assumption that 1911 will see these figures increased to the extent of at least 50 per cent.

Fig. 3—Rear axle construction, showing a steel shell; large brakedrums and a stout bridge

Among the New-Comers

SOME time ago H. F. Kilbourn, president of the City National Bank, had a meeting with some of his Wall Street friends and it was then decided that good automobiles were too high-priced. The result of the meeting was that these gentlemen concluded to build their own automobiles and they engaged workmen and designers for the purpose, with the outcome that the first automobile is here. This car was made at the Brightwood plant at Springfield, Mass., and it is being demonstrated now in New York City to the edification of the men who braved the sea of possible failure in quest of a better automobile than can be made in the regular way.

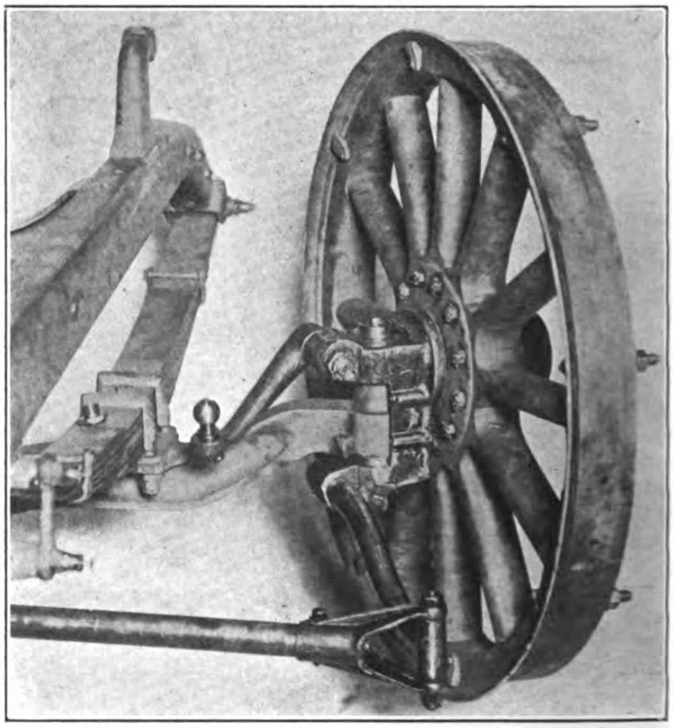


Fig. 2—Front axle and knuckle, depicting the steering arm and and cross-rod with liberal universal joints

The motor of this car is of the water-cooled, 4-cycle type, with cylinders cast in pairs, T-type, requiring two camshafts, and the crankshaft is centered on three bearings. Lubrication is by splash, with a pump to maintain a constant level. There is a tell-tale on the dash to tell the driver if the oil runs out. The cooling system comprises a honeycomb radiator, and water is circulated by a centrifugal pump, located on the exhaust side of the motor. A Stromberg, double-jet carbureter is used; the gasoline tank, holding about 20 gallons, is located back of the hind axle below the flush of the side bars. Ignition is by Simms magneto, using a separate high-tension distributor for the auxiliary (battery) system; the location of the magneto is on the right-hand side of the motor, which, by the way, is also the side that the carbureter is located upon.

The clutch is of the cone type with a leather facing. Transmission is through a selective three-speed gear, with an extra

ILLUSTRATING THE FIRST MODEL OF THE ORSON CAR; 100 BEING MADE FOR WALL STREET BROKERS; BANKERS ENTER AUTOMOBILE BUSINESS

speed change in the housing of the live rear axle. This is brought about by shifting the bevel pinion out of engagement with one of the two bevel gears used, and then engaging a second pinion with the remaining bevel gear—in other words, a double bevel drive is utilized.

The live rear axle is of the full floating type, with annular ball bearings, and the shell of the same is of drawn steel. The front axle is of the I-section alloy steel with thrust, as well as annular ball bearings in the knuckles. The brakes are of the internal expanding type in drums bolted to the rear road wheels. The side bars of the chassis frame are of the channel section with a 6-inch kick-up behind. The front springs are half-elliptic. The rear springs are of the three-quarter-elliptic type. Steering is by means of a ball-bearing worm and gear type. Control is to the top of the steering wheel, comprising spark and throttle levers. A pedal is used for acceleration. The wheelbase is 130 inches, and the tread is standard. The tire equipment is 920 x 120 millimeters front and rear. The weight of the car is said to be 2,750 pounds.

The body is a 7-passenger, fore-door type, with an overhanging cowl, presenting a good appearance, and the plan of the company is to ultimately make and sell automobiles of this design at $4,500 for the stripped chassis, and $5,250 for the automobile with body as described above.

The outcome of this project is being watched with interest, as it is the first instance on record where automobiles in quantities have been designed and built by others than those actually engaged in the business.

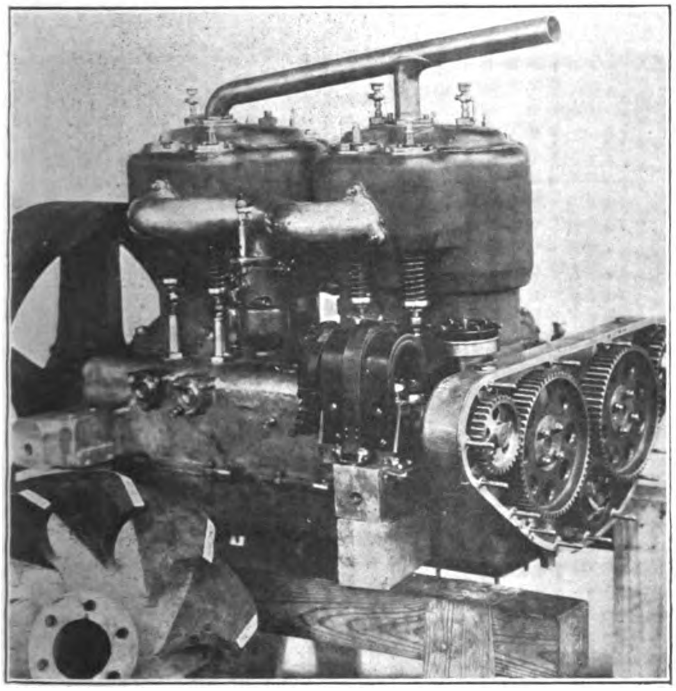


Fig. 5—Orson motor with gear wheel case removed and showing part of flywheel

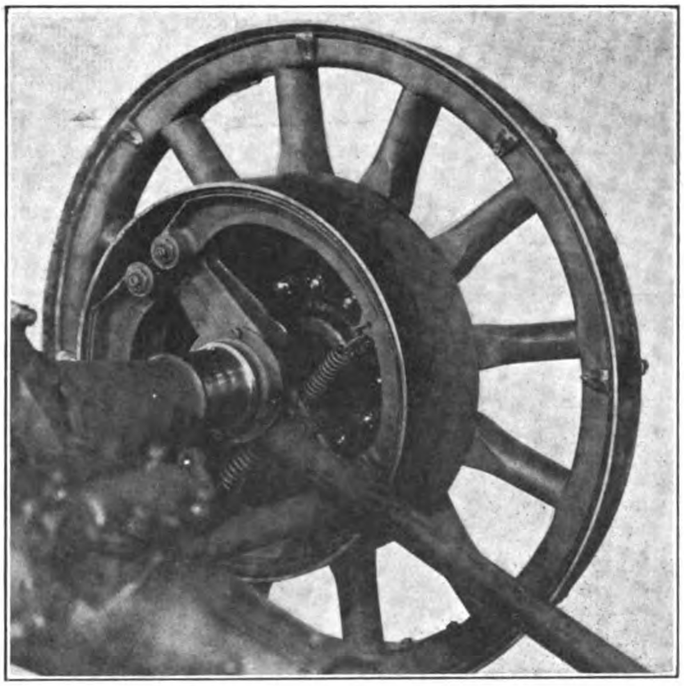


Fig. 4—Rear brake drum, wheel, and details of holding brake mechanism

Moon Company Declares 64 Per Cent. Dividend

St. Louis, Mo., Oct. 24—At the annual meeting of the stockholders of the Moon Motor Car Company, held at the factory Thursday, a stock dividend of 54 per cent. and a cash dividend of 10 per cent. were voted. The stockholders decided to increase the capitalization from $162,500 to $300,000, the increase to be effected through the stock dividend of $87,000 and the issuance of $50,000 treasury shares. The treasury stock was taken immediately by the stockholders.

Mt. Vernon Club to Race Election Day

Election day has been selected by the Automobile Club of Mt. Vernon on which to run off the postponed fall race meeting of the club at the Empire City track. The meeting was scheduled for Oct. 22, but rain prevented its being held on that date.

Rambler Organization Tells Its Story

Telling the story of the growth and development of the Rambler, the Thomas B. Jeffery Company has issued a special number of the Rambler Magazine. A feature of the issue is the part devoted to the dealers themselves. A complete announcement of the 1911 line is included in the publication.

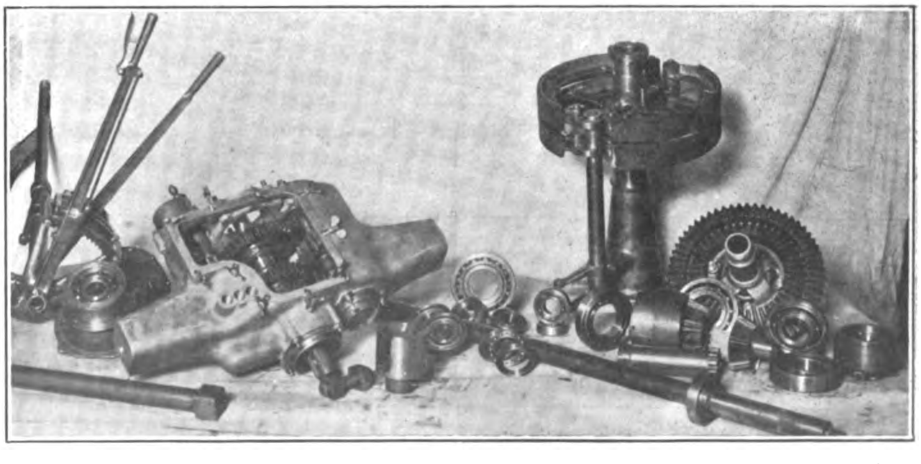


Fig. 6—Gear box assembled and parts of rear construction. Note double-bevel wheel for fourth speed

Prominent Automobile Accessories

GRAEF-ARTHUR STEERING GEARS

These gears are of the worm and nut type. By referring to Fig. 1 it is seen that the ball arm A is actuated by the rocking of the rocker-shaft B, by means of a long transmitting member C, pivoted to the eccentrically located stud-pin D on the long nut E.

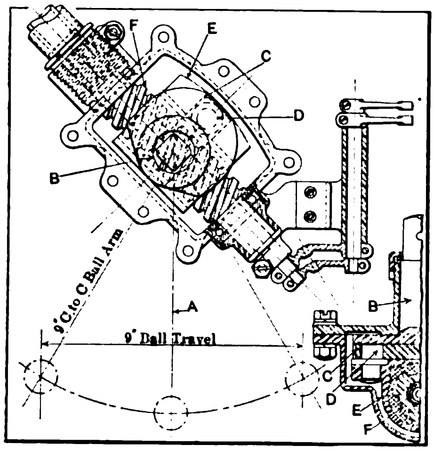


Fig. 1—Section in two planes of the Graef-Arthur steering gear, showing relations of the parts and nice construction

Ball thrust bearings are provided at both ends of the worm. Adjustment for wear and assembly is provided on the worm F and the rocker B. The full thread of the nut is in engagement with the rocker at all positions of the ball arm.

The wearing surfaces cover very large areas, while all the operating parts move in oil and are completely enclosed against dust, foreign matter and leakages.

The gear case is so parted and jointed that the natural strength of the box is not impaired and without sacrificing strength, as can be seen from Fig. 1. All parts are made of machine steel and steel forgings, excepting the case, its cover and brackets.

These gears are regularly made in two sizes; the smaller for cars up to 2,000 pounds in weight; the larger for cars up to 4,000 pounds in weight.

The small gear is fitted with outside control. The spark and throttle levers are located beneath the steering wheel.

Both designs operate upon identically the same principle, the difference being only in the size and disposition of parts and location of the control levers.

The gear is manufactured by the Cross Gear & Engine Company, of Detroit, Mich.

Fig. 2—Packard twin cable

CABLE FOR ELECTRIC IGNITION

The accompanying illustration (Fig. 2) of a twin cable presents one of a line of electric conductors as used in the arts, and in view of the high-tension current used in automobile ignition work, the Packard Electric Company, of Warren, Ohio, is paying particular attention to the requirement. The company recommends that a No. 14 cable be used for tail and side lamps, No. 12 for headlights, and No. 10 for the leads from the battery to the controlling switch. These cables (six in all) are made up in both single and duplex conductor styles, the cores of which are composed of No. 30 tinned soft-drawn copper wire, carefully stranded, thus assuring the greatest measure of flexibility. The insulation on these cables consists of one layer of high-grade rubber compound. The single conductors are protected by a single grade of fine glazed thread in fast color, in characteristic seal brown, striped spiral each way with red, and saturated with flexible enamel exactly the same as used on Packard cables for electric lighting work. The two-conductor styles are made by placing two rubber insulated cores side by side without twisting, and braiding over them a common covering composed of fine glazed thread in fast colors.

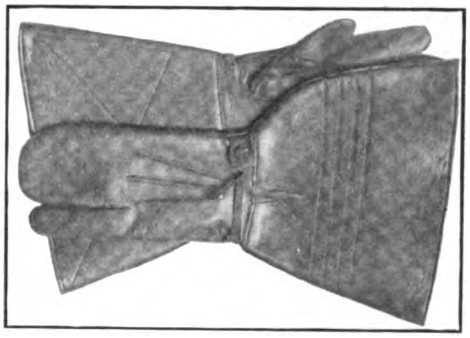


Fig. 3—"Rist-Fit" driving mittens

GLOVES FOR THE COLD WEATHER

It is all very well for poets to say—"Blow! Blow, thou wintry wind." Such sayings are easy to pen in mid-summer, when the breeze is a necessity of life; but had that same poet been alive to-day and driven in an automobile with the wind blowing off snow-clad fields his lay would have been otherwise—perhaps: "Oh, for a pair of warm gloves!" What a driver wants on a cold day is a pair of gloves to keep his hands warm and allow freedom of movement for the fingers. The Rist-Fit gauntlet mitten shown in Fig. 3 combines these qualities, being made of best leather and lined with eiderdown, fleece, lambskin or fur. The forefinger is made separate and permits free action while working.

VALVE STEM ADJUSTER

The silent operation of the valves of a gasoline motor is, to a great extent, due to the amount of clearance allowed between the push rod and the valve stem, and in cars that are not provided with adjustments after a certain amount of wear has taken place the owner wonders why the engine has become noisy; and not only this alone, but the power shows a falling off. The Apco valve stem adjuster (Fig. 4) can be fitted to any motor and the required amount of lift can be given to the valves by placing inside the cap small disks under the stems. The Auto Parts Company, of Providence, R. I., makes this handy device.

Fig. 4—Apco valve stem adjuster

PUNCTURE-PROOF INNER CASE

There has been placed on the market a tire protector that can be inserted in any make of tire between the casing and the inner tube and into the construction of which has been introduced armor-plate steel disks. It is known as the Jelco Atlas puncture-proof inner case (Fig. 5). It consists of a rubber cushion, three rows of steel disks placed over one another in a manner similar to the scales of a fish and vulcanized in the rubber. The usual inner tube can be used, but one of 1-in. small diameter is recommended. The J. Ellwood Lee Company, of Conshohocken, Pa., guarantee these bands as "positively puncture-proof."

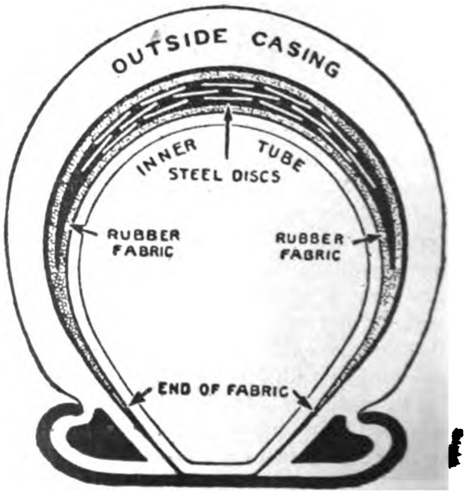


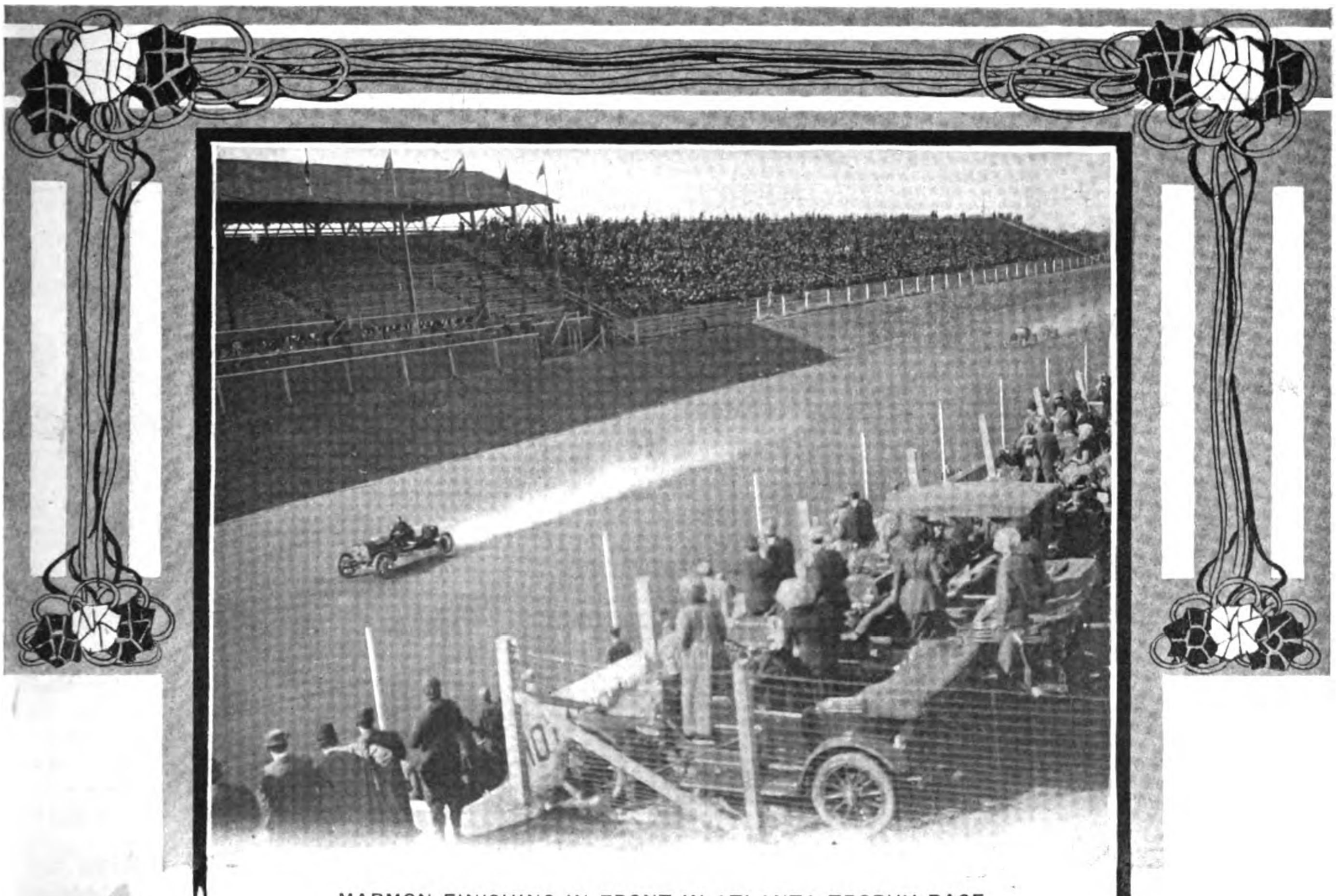
Fig. 5—Jelco Atlas puncture-proof inner case

VOL. XXIII NEW YORK—THURSDAY, NOVEMBER 10, 1910—CHICAGO No. 19

THE AUTOMOBILE

Great Races at Atlanta

THREE FEATURE EVENTS SUPPLY TRIO OF FINISHES NEVER EXCELLED IN CLOSENESS AND ABSORBING INTEREST IN HISTORY OF TRACK SPORT

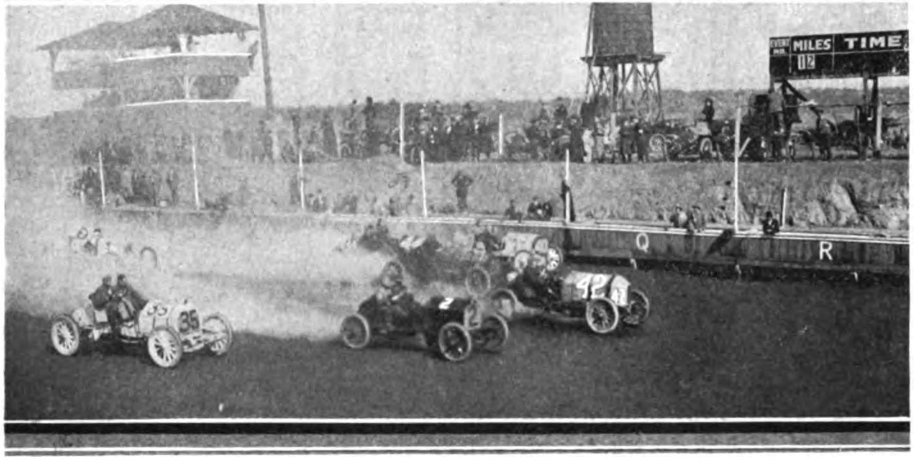


MARMON FINISHING IN FRONT IN ATLANTA TROPHY RACE

ATLANTA, GA., Nov. 7—When the checkered flag dipped for the last time this afternoon, the greatest race meeting ever held on the Atlanta Speedway came to a close. It was a complete success in every particular, even the financial end coming out neat or better.. From the sporting and utilitarian viewpoints the three days of racing could hardly be improved upon. The simon-pure stock car again demonstrated its improvement in a dozen hard driven contests, while the speedy special machines showed brilliant flights and spectacular finishes.

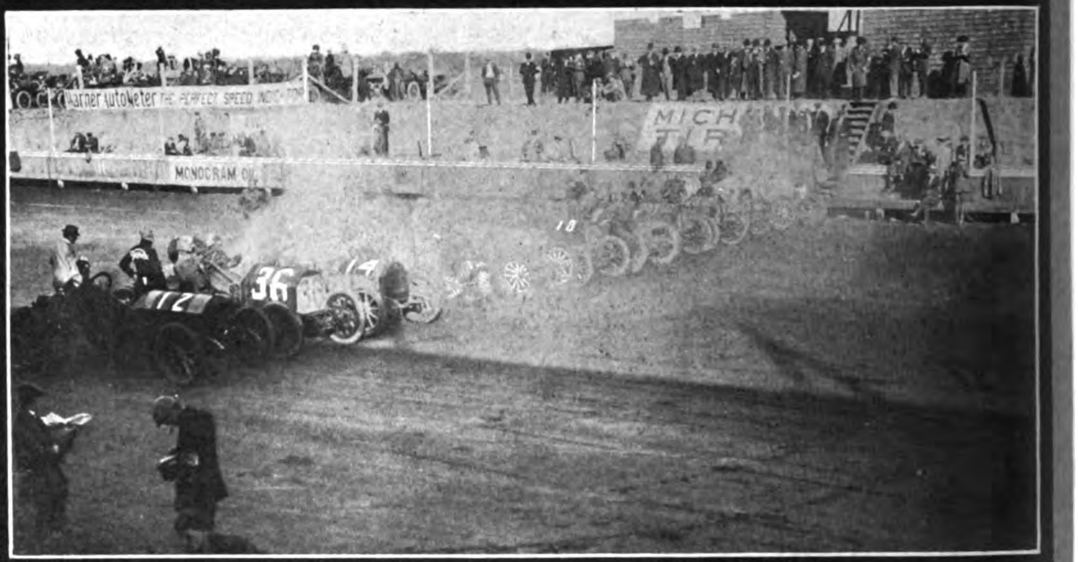
The program was so arranged as to give a big special event each day. The Coca-Cola Trophy race on Thursday at 100 miles was won in a stunning finish by a Falcar driven by Gelnaw. On Friday, the Atlanta Trophy race, 200 miles, was won in a neck and neck driven by a Marmon, piloted by Dawson, which finished 3 1-5 seconds ahead of a Lozier, driven by Mulford. On Monday the Speedway Trophy at 250 miles was captured by a Lozier with Horan at the wheel, with a Marquette-Buick (Burman) in second place.

These races were sharply contested from the drop of the flag



Stoddard leading Fiat, Buick, Simplex, Stearns and Lozier in Free-for-All

and proved wildly exciting to the spectators. The Coca-Cola race set a new mark for thrills. A Marmon driven by Dawson set the pace from the start and after making 49 rounds, or 98 miles, was over six minutes ahead of the Falcar (Gelnaw), which had been driven to the limit to keep pace with the Westcott (Knight), up to that stage of the race. The Marmon coasted down to the pits and stopped as the driver leaped out and feverishly went to work to discover the extent of the injury to his car. It proved to be the drive shaft that had twisted off at the right end of the rear axle where it carried a flange. The driver managed to replace the broken part and got started before the finish of the race, but in the meantime the Falcar had closed the gap and was well around the course on the last round. Driven desperately the Marmon was unable to make up the ground lost and the Fal crossed the tape in front. The Westcott was second, fifteen seconds back, while the Marmon squeezed in third, despite the misfortune.

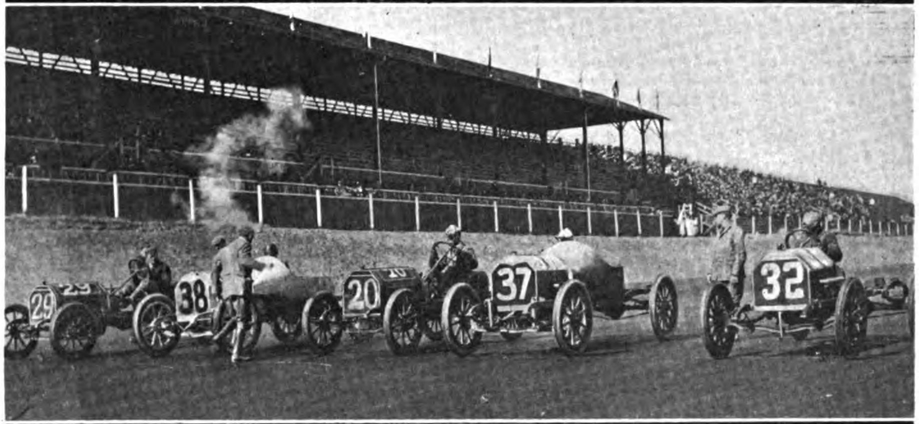


Falcar, Simplex, Falcar, Lozier pair, Cole, Marmon pair, McFarlan and Pope-Hartford

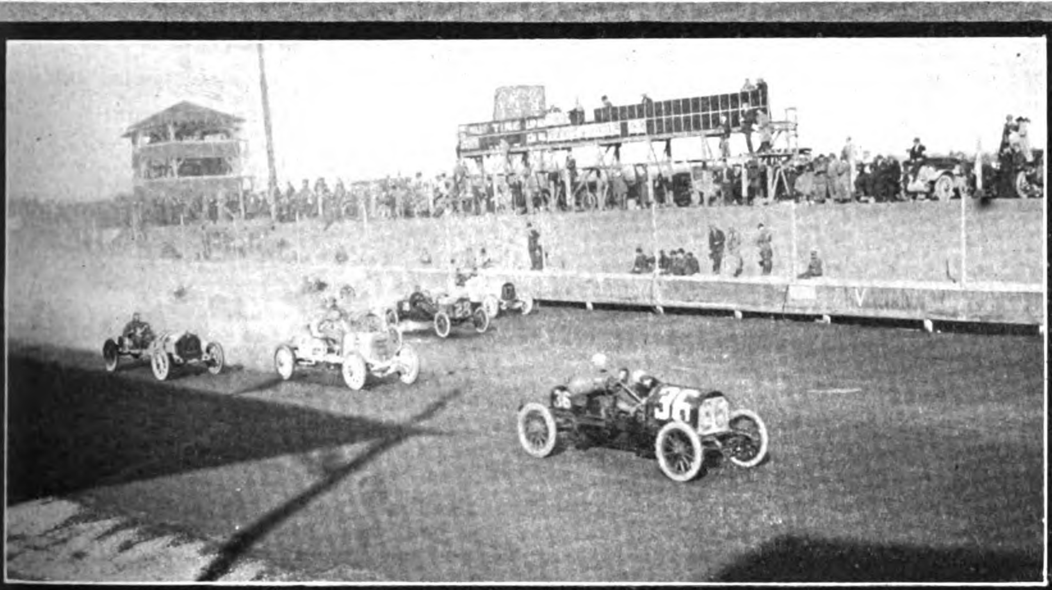
With stilled engines and bared heads during Livingston's dirge Winning Falcar in center with Marmon contender at left

The Atlanta Trophy on Friday furnished another degree of superlative sport when the Marmon nosed out a Lozier after a drive that lasted from the starting gun to the magpie flag. From one end of the race to the other these cars were never more than two minutes apart and for dozens of laps they lay alongside of one another, taking the turns wide open and shooting down the long straightaways at a terrific rate of speed. The steady Lozier, driven by Mulford cut out a fast pace in the early stages and at one time had established a lead of 80 seconds. This margin was gradually absorbed by the yellow car under the handling of Dawson, and when they came down the stretch locked together like a team, the crowd yelled with redoubled enthusiasm.

Successive tire changes caused the lead to alternate many times during the last quarter of the race, and at 170 miles the Lozier was leading by one second. Nine laps from home the Marmon pulled off the sensation of the contest when Dawson caught and passed his rival in front of the grandstand, leading by half a car length. For eight laps the yellow and white cars were practically neck and neck, but in the final round the Marmon inch by inch opened up a gap of several lengths. The right front tire of the Lozier lost its tread and the car gave a perilous slide near the finish, but the race was so close that Mulford would not stop. The Marmon continued to draw away, and at the end was about 50 yards to the good.



Abbott-Detroit and Firestone pairs and E-M-F in Event 9

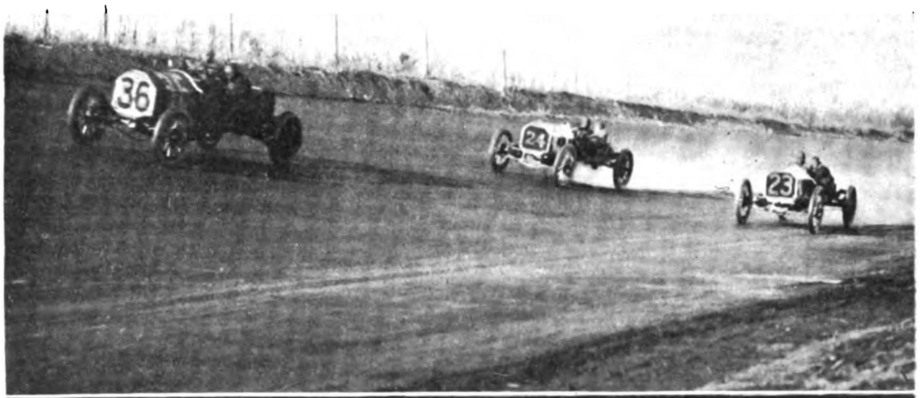


Simplex, Lozier, Falcar, Marmon and McFarlan at start of Atlanta Trophy

The free-for-all at 250 miles for the Speedway Trophy was the feature of the Monday's card. A six-cylinder Lozier, driven by Horan proved the winner in the exceedingly fast time of 3:26:15. A Marmon (Harroun) set the pace for fifty laps and looked all over a winner at ninety laps. A cracked cylinder stopped Dawson's car and a sheered pin on the magneto shaft of Harroun's, put that car out of the running also.

Marquette-Buick, driven by Burman, proved the contender at the end. Nine tire changes tell the story as far as the Buick was concerned.

The winner went to the front when the skyrocketing had subsided and



Simplex and McFarlan pair turning out of the back stretch won a gallant race rather handily. The rest of the card was abandoned on account of the lateness of the hour of finishing the grand prize.

An attractive card of class races was presented each day in addition to the feature events and their running proved to be stirringly spectacular. Not an accident of any moment marred the pleasure of the meeting although a number of cars plunged through fences and one went over the bank.

Rain intervened Saturday and prevented the carrying out of the program as originally planned, the card for that day being carried over until to-day. Naturally this hurt the attendance to some degree. The summary:

FIRST DAY

161-230 Cu. In., Class B, 12 Miles

No.	Car	2 Miles	4 Miles	6 Miles	8 Miles	10 Miles	12 Miles
32	E. M. F.	2:10	3:53	5:41	7:30	9:17	11:05
37	Abbott-Detroit	2:03	3:54	5:41	7:30	9:19	11:09
38	Abbott-Detroit	2:10	4:06	6:02	7:58	9:57	11:57
1	E. M. F.	2:05	4:04	6:05	8:07	10:30	12:15
39	Abbott-Detroit	2:24	4:35	6:45	8:54	11:04	....
30	Chalmers	2:53	5:27	7:59	10:31	....	....
20	Firestone	2:15	4:12	....	....	....	....

231-300 Cu. In., Class B, 10 Miles

No.	Car	2 Miles	4 Miles	6 Miles	8 Miles	10 Miles
25	Marmon	1:55	3:36	5:16	6:55	8:34.7
45	Marmon	1:55	3:36	5:17	6:57	8:39.4
12	Falcar	1:56	3:37	5:18	6:59	8:43.6
27	Falcar	2:05	3:58	5:49	7:40	9:32.4
14	Falcar	2:17	4:14	6:12	8:04	9:57.4
33	Parry	2:11	4:10	6:08	8:05	10:02.6

451-600 Cu. In., Class B, 20 Miles

No.	Car	Driver	4 Miles	8 Miles	12 Miles	16 Miles	20 Miles
5	Lozier	Mulford	3:24	6:34	9:45	12:58	16:13.00
16	Lozier	Horan	3:29	6:44	9:57	13:14	16:32
36	Simplex	Beardsley	3:26	6:40	9:56	13:17	16:36.4
17	Pope-Hartford	Basle	3:29	6:44	9:57	13:16	16:36.7

Southern Amateur Championship, 4 Miles

No.	Car	2 Miles	4 Miles
44	Simplex	1:40	3:20
3	Fiat	1:57	4:58

Free-for-All, 10 Miles

No.	Car	Driver	2 Miles	4 Miles	6 Miles	8 Miles	10 Miles
40	Marquette-Buick	Burman	1:50	3:16	4:43	6:11	7:42
44	Simplex	Matson	1:45	3:20	4:54	6:27	8:04
2	Fiat	Bragg	1:41	3:12	4:43	6:20	8:20
17	Pope-Hartford	Basle	1:54	3:31	5:08	6:45	8:24
35	Stearns	Rutherford	1:51	3:33	5:16	6:58	8:40

Free-for-All, 20 Miles

No.	Car	2 Miles	4 Miles	6 Miles	8 Miles	10 Miles	14 Miles	16 Miles	18 Miles	20 Miles
21	Marmon	1:42	3:14	4:45	6:15	7:46	10:49	12:21	13:54	15:27
44	Simplex	1:44	3:19	4:54	6:28	8:02	11:11	12:46	14:20	15:53
5	Lozier	1:50	3:24	4:59	6:33	8:07	11:18	12:54	14:30	16:07
6	Lozier	1:56	3:33	5:14	6:53	8:30	11:45	13:24	15:02	16:39
17	Pope-Hartford	1:56	3:35	5:14	6:33	8:32	11:49	13:26	15:06	16:41
35	Stearns	1:51	3:32	5:14	6:54	8:35	12:01	13:43	15:26	17:08
2	Fiat	1:42	3:17	4:50	6:23	7:55	11:03	13:03	Blew gasket.	
22	Pope-Hartford	2:10	3:49	6:11	Broke valve and piston					
40	Marquette-Buick	1:38	3:15	Demountable rim came loose.						
42	Stoddard-Dayton	1:53	Broke valve and piston.							

Coca-Cola Trophy, 301-450 Cu. In., Class B, 100 Miles.

No.	Car	Driver	10 miles	20 miles	30 miles	40 miles	50 miles	60 miles	70 miles	80 miles	90 miles	100 miles
12	F. A. L	Gelnau	8:56	17:40	26:23	35:01	43:36	52:12	60:46	69:19	77:48	86:17.6
26	Wescott	Knight	8:57	17:41	26:23	35:02	43:36	52:13	60:46	69:19	77:48	86:32.1
28	Marmon	Dawson	8:09	16:01	22:57	31:54	39:47	47:47	55:43	63:45	72:01	87:27.3
17	Pope-Hartford	Basle	8:23	16:33	24:54	33:24	41:53	50:31	61:46	70:41	79:23	90:07
27	F. A. L	Pierce	9:47	19:05	28:24	37:49	47:13	56:35	65:53	75:11	84:30	93:47
24	McFarlan	Adams	10:31	20:28	30:20	40:16	50:00	59:45	69:30	79:17	89:06	98:51
23	McFarlan	Kepler	10:41	20:42	30:49	40:52	50:50	60:44	70:39	80:34	90:39	100:34
14	F. A. L	Hughes	9:37	18:53	27:59	36:56	45:54	54:52	63:46	72:44	Broken shaft in gearset	
11	Marmon	Heineman	8:22	16:24	24:31	32:46	40:57	49:08	Burned out connecting rod bearing			

SECOND DAY

161-230 Cu. In., Class B, 10 Miles

No.	Car	Driver	2 Miles	4 Miles	6 Miles	8 Miles	10 Miles
32	E. M. F.	Witt	2:1	3:49	5:36	7:23	9:12
37	Abbott-Detroit	M. Roberts	2:5	3:54	5:48	7:31	9:18
20	F'stone-Columbus	McKinstry	2:8	3:56	5:48	7:31	9:19
38	Abbott-Detroit	M. Roberts	2:19	4:16	6:12	8:7	10:4
29	F'stone-Columbus	Frayer	2:5	4:2	5:58	8:9	Did not finish

Free-for-All, Class D, 20 Miles

No.	Car	Driver	4 Miles	8 Miles	12 Miles	16 Miles	20 Miles
40	Buick	Burman	3:4	5:58	8:56	12:6	15:18
2	Fiat	Bragg	3:6	6:6	9:23	12:33	15:49
42	Stod.-Dayton	Harding	3:19	6:27	9:35	12:40	15:51
17	Pope-Hartford	Basle	3:29	6:44	9:59	13:16	16:34
35	Stearns	Rutherford	3:36	7:4	10:31	13:59	17:27

301-450 Cu. In., Class B, 14 Miles

No.	Car	Driver	2	4	6	8	10	12	14
11	Marmon	Harroun	1:51	3:29	5:7	6:43	8:18	9:55	11:31
28	Marmon	Dawson	1:54	3:30	5:4	6:43	8:16	9:50	11:30
17	Pope-Hartford	Basle	1:54	3:30	5:6	6:43	8:19	9:55	11:32
43	Parry	Phillips	2:10	3:52	5:35	7:17	8:58	10:40	12:23

10 Mile Handicap

No.	Car	Driver	Handicap	Time
23	McFarlan	Clemons	Scratch	9:58
24	McFarlan	Adams	3:6	10:33
42	Stoddard-Dayton	Harding	2:36	10:34
17	Pope-Hartford	Basle	2:09	10:36
32	E. M. F.	Witt	1:24	10:39
35	Stearns	Rutherford	2:06	10:45
37	Abbott-Detroit	Montague Roberts	1:22	10:52
43	Firestone-Columbus	Frayer	1:43	

Amateur Free-for-All, 10 Miles

No.	Car	Driver	2 Miles	4 Miles	6 Miles	8 Miles	10 Mile
3	Fiat	Stoddard	1:47	3:16	4:46	6:16	7:46.6
44	Simplex	Heitemeyer	1:43	3:14	4:46	6:17	7:48.7
35	Stearns	Rutherford	1:57	3:42	5:28	7:15	9:04.1

Free-for-All, Class D, 10 Miles

No.	Car	Driver	2 miles	4 miles	6 miles	8 miles	10 miles
40	Buick	Burman	1:37	3:3	4:29	5:55	7:23.55
2	Fiat	Bragg	1:37	3:5	4:31	6:1	7:30.30
42	Stod.-Dayton	Harding	1:48	3:22	4:57	6:31	8:5.32
17	Pope-Hartford	Basle	1:54	3:31	5:08	6:44	8:23.95
22	Pope-Hartford	Disbrow	1:54	Broke rear axle housing			

231-300 Cu. In., Class B, 12 Miles

No.	Car	Driver	2 miles	4 miles	6 miles	8 miles	10 miles	12 miles
25	Marmon	Dawson	1:57	3:36	5:15	6:55	8:35	10:15.5
45	Marmon	Heinemann	1:54	3:34	5:14	6:54	8:35	10:15.7
14	Falcar	Hughes	2:1	3:50	5:40	7:32	9:22	11:15
24	McFarlan	Adams	2:9	4:5	6:00	7:54	9:48	11:43
23	McFarlan	Clemons	2:15	4:14	6:12	8:10	10:7	12:4
33	Parry	Phillips	2:16	4:16	6:15	8:14	10:10	12:5

Atlanta Trophy, Class B, 451-600 Cu. In., 200 Miles

No.	Car	40 M.	80 M.	120 M.	160 M.	200 M.
28	Marmon	34:17	67:31	106:06	139:40	171:12:72
5	Lozier	34:05	66:07	106:58	139:39	171:16:30
6	Lozier	34:15	68:43	110:08	143:26	177:32:50
12	Falcar	37:16	79:00	114:07	149:44	187:58
14	Falcar	38:50	81:56	117:39	153:19	189:46
36	Simplex	34:41	81:30	114:04	160:30	Running
23	McFarlan	39:56	84:42	122:28	160:42	Running
18	Cole	40:05	87:43			
11	Marmon	34:58	Stopped at 60 miles (time 52:54)			
24	McFarlan	39:56				
17	Pope Hartford		Time for 20 miles, 18:39			

THIRD DAY

Speedway Grand Prize, Free-for-All, 250 Miles

No.	Car	Driver	20 Miles	40 Miles	60 Miles	80 Miles	100 Miles	120 Miles	140 Miles	160 Miles	180 Miles	200 Miles	220 Miles	240 Miles	250 Miles
6	Lozier	Horan	16:12	32:09	49:01	66:16	82:25	98:14	114:52	132:55	148:57	165:01	181:06	198:05	206:15
40	Buick	Burman	15:47	33:59	50:57	67:33	82:51	99:16	115:14	130:52	149:59	167:11	182:45	199:58	207:21
44	Simplex	Matson	16:13	32:02	49:46	66:03	82:15	99:51	117:51	134:16	150:39	168:38	185:03	201:08	209:09
36	Simplex	Beardsley	16:38	33:07	50:18	66:58	84:15	101:00	118:27	135:38	154:49	172:06	189:11	208:40	217:20
5	Lozier	Mulford	48:57	65:54	81:53	97:24	115:40	131:20	146:59	163:58	179:34	196:08	211:45	227:38	235:45
24	McFarlan	Adams	19:08	37:46	56:16	74:47	92:59	111:53	130:20	149:08	168:03	187:11	208:21	229:46	241:08
34	Halladay	Harrell	20:15	40:59	61:51	82:52	104:10	122:24	142:52	162:47	182:30	202:04	221:41	241:37	251:22
43	Firestone-Columbus	McKinstry	20:56	38:51	57:01	75:42	96:13	132:14	151:42	196:47	217:35	239:17	Out 208th mile water blew		
26	Wescott	Knight	17:16	34:15	51:07	80:14	104:02	120:34	137:28	165:38	195:24	221:17	Out 208th mi. val. &wat. gas		
21	Marmon	Harroun	15:35	31:24	47:40	63:58	80:11	96:21	113:57	129:41	152:18	Sheered pin magneto shaft			
28	Marmon	Dawson	16:12	32:09	48:12	64:29	80:42	96:35	113:00	133:19	160:45	Out 184th mi. cracked cyl. wat. jacke			
3	Fiat	Stoddard	17:08	38:14	56:00	Out 76th mile broke steering arm.									
13	Simplex	Church	16:13	37:38	Out 81st mile broke crankshaft.										
17	Pope-Hartford	Basle	Out 2nd mile broken valve stud												
42	Stoddard-Dayton	Harding	Out 14th mile stripped cam gears												
22	Pope-Hartford	Disbrow	Out 10th mile cylinders lifted.												

Ready for the Grand Prix

BIG FIELD OF RACERS PREPARED TO LINE UP IN PREMIER AMERICAN SPEED CONTEST AFTER TWO LIGHT CAR CLASSES ARE RUN OFF

The much-coveted Tiedeman Trophy, which six small cars will compete for

SAVANNAH, GA., Nov. 7—With its lists full the Grand Prize, which is to be run off Saturday over a course which has been officially measured at 17.2 miles in circumference, promises to excel in every way the former running of the event, which took place here in 1908. When midnight struck Saturday, November 5, the entry lists of the race closed with a varied collection of racing automobiles, twenty-three of which have been announced to take part in the big race.

The entries for the race are as follows:

Car	Driver	Car	Driver
Fiat	De Palma	Lozier	Horan
Fiat	Nazzaro	Stoddard-Dayton	Harding
Fiat	Wagner	American	Wallace
Benz	Bruce-Brown	Pope-Hartford	Basle
Benz	Hemery	Pope-Hartford	Disbrow
Benz	Haupt	National	Aitken
Marmon	Dawson	National	Wilcox
Marmon	Harroun	Marquette-Buick	Burman
Roebling-Planche	Roebling	Marquette-Buick	A. Chevrolet
Sharp	Sharp	Marquette-Buick	Not Named
Alco	Grant		
Simplex	Matson		
Lozier	Mulford		

Such a collection is bound to produce a contest and the indications all point to several new records. All the drivers and cars that are to take part in the race are on the ground, with the exception of those engaged in the Atlanta races. Owing to a peculiarity of the Georgia law it is illegal to ship anything by fast freight on Sunday, and as a consequence several of the cars now in Atlanta will not reach the Savannah course until Wednesday, thus allowing the drivers very short time to familiarize themselves with the course.

Despite the fact that the elimination of several curves and detours has shortened the course materially, the Grand Prize race will be the longest ever run in America. Some exceedingly fast time has been reported. One of the Buicks made a round in 14:12, a Benz made a circuit in 13:55; a Fiat in 16:25; the Alco in 16:17 and others turned the course at various speeds.

A. L. McMurtry, chairman of the technical committee of the Automobile Club of America, commenced the examination of the cars to-night.

In the Savannah Challenge Trophy race, which will precede the running of the Grand Prize, nine entries have been received, as follows:

Car	Driver	Car	Driver
Marmon	Dawson	Mercer	Roebling
Marmon	Heinemann	Pullman	Not named
Falcar	Geinaw	E-M-F	Witt
Falcar	Hughes	E-M-F	Not named
Falcar	Pearce		

These cars will circle the course fifteen times, the winner to receive the handsome cup donated by Savannah and $1,000 in cash besides various accessory prizes. There is a sporting tinge apparent about the Savannah trophy entry list that has appealed to motordom with peculiar force. The Atlanta rivals at the head of the list will have another opportunity to decide as to superiority, while those in the middle and at the end are not disposed to yield a single chance to the others unless forced to do so.

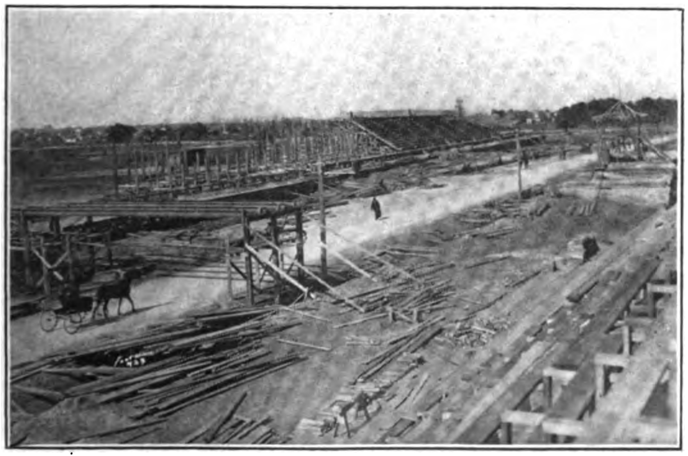
The Tiedeman Trophy for smaller cars which will make ten rounds of the course has attracted a small but select field. The list is as follows:

Car	Driver	Car	Driver
Lancia	Knipper	Maxwell	Costello
Cole	Bill Endicott	Maxwell	Wright
Cole	Harry Endicott	Maxwell	Doorley

The Lancia, which met with accident in the Massapequa Sweepstakes over the Vanderbilt Cup course while well out in front, will endeavor to reverse the verdict in that race, which was won by Bill Endicott's Cole "30." Endicott does not agree that such will be the case, and the Maxwell trio firmly expect to win over both. Thus there is the groundwork for a spirited race, with everybody trying desperately to reach the tape first.

The ancient city of Savannah is filling with visitors. So far there has been little difficulty experienced by anyone in obtaining accommodations, but the near future holds out the promise of cramped quarters for the late arrivals.

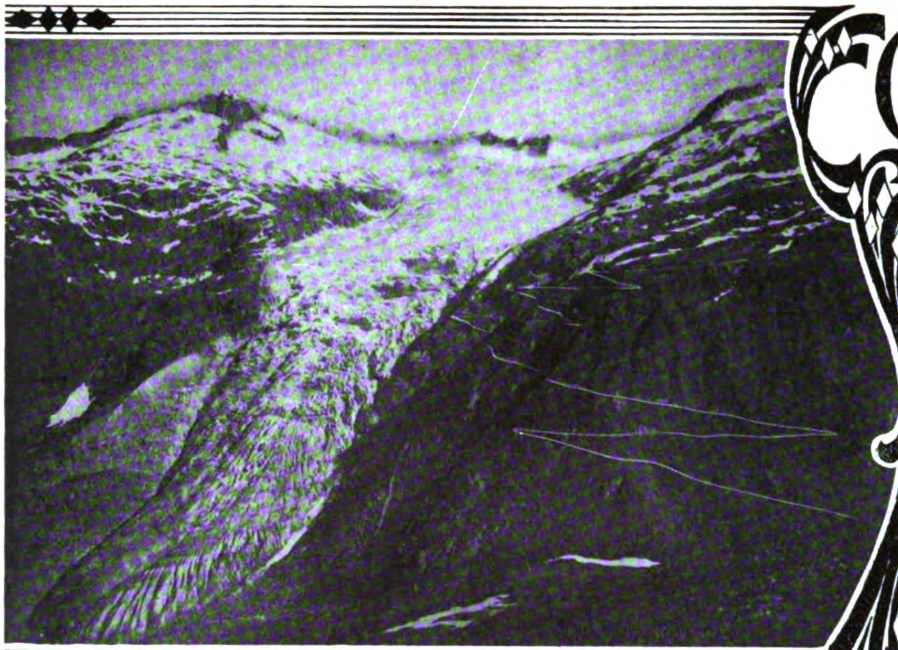
The stands are practically completed and will easily accommodate 40,000 spectators, and the course is as perfect as it can be made in the limited time that has been allowed for such work. As the drivers have grown more accustomed to the turns it has been found that only one is really difficult; the others may be taken at nearly 60 miles an hour. The straightaways seem capable of allowing the extreme speed limit of modern automobile construction.



Erecting the grand stand for the Grand Prize race at Savannah

One of the numerous small bridges adding to safety of the course

Opening Alps



The zigzag road through Furka Pass, the Rhone Glacier to the left. Mont Saleve, in the ascent of which the automobile beat the funicular railway

SWITZERLAND, the "Playground of the World," has proved itself during the past season to be wonderfully attractive to the automobilist. In comparison with the attitude of the government and people in other years toward touring parties, the position assumed by State and individual this year has proved welcome in more ways than one.

Only a few years ago cabled reports of barbarities on the part of the peasant folk and the authorities as applied to American motorists were common, but this season the whole proposition has been altered. Where only a few years ago it was unlawful for the motorists to so much as enter some of the cantons, to-day all but one invite the traffic, and in the course of another year the roads of the single outstanding canton will be opened to some extent.

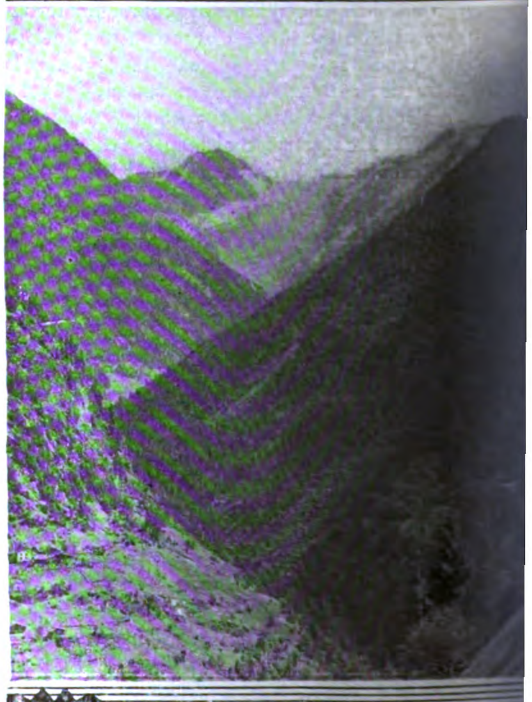
One of the accompanying pictures, which shows a bit of highway between Davos and Filisur, emphasizes the real underlying reason for the hostility of the Swiss peasantry against the automobile in times past and accounts for many of the stringent road rules of the land. As will be seen, the roadway is built out from the wall of a precipitous gorge and is rather narrow as judged by the American standards. The roadbed is delightfully smooth and well kept and on its outside edge a retaining and guard wall has been erected to hold up the road and prevent vehicles from plunging into the chasm below.

This is part of an exceedingly tortuous road, winding along the side of the gorge for many miles. The turns are abrupt and the passing of two swiftly moving vehicles on one of these turns is quite a nice little problem. At the rate of thirty miles an hour such a passing is a desperate gamble at the best and a tragedy at the worst. Consequently, the Swiss countryman decided long ago that the tragedy was unnecessary and ruled out the automobile in a large part of the Republic. Latterly, however, this general adverse legislation has been modified and the present status of affairs has resulted from a better understanding on both sides and some mutual concessions.

The road rules of Switzerland are still detailed and stringent. Speed limits are low and the regulations provide for more detailed protection of life and property than do those of America or of other States of Europe. It cannot be said that the automobile is really popular in any part of rural Switzerland, but it can be said with truth that only in recent years has the motor car been safe in numerous other countries and localities. In fact, to-day it is not quite a pleasure trip to try to cross some of the parishes of lower Louisiana on account of the hostile attitude of a considerable portion of the populace.

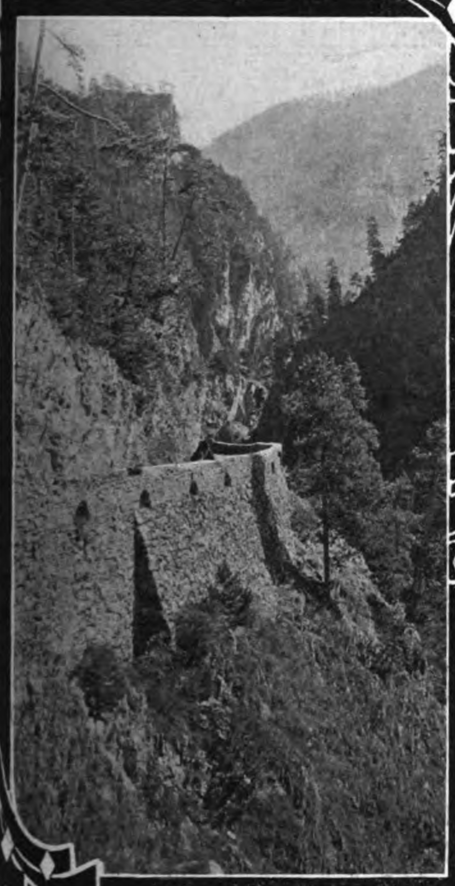
But the Swiss are great respecters of the law, and the law now reads that motoring is not a crime, and consequently if the tourist keeps strictly within the letter and spirit of the law he is safer in the Swiss mountains than he would be in the hands of a pack of Louisiana "Red Bones."

Last year when the Grisons canton was opened up to motor travel there was some popular hostility, which has now subsided in that locality. One of the first motorists to essay any remarkable record breaking in the Grisons district was Dr. Douglas Fawcett, of San Francisco, Cal., and Paris, France, who climbed to the



Showing one of the stretche

To The Auto



Between Davos and Filisur, the road built at great expense
The floor of the Valley of Chamounix between Les Praz and Aiguille du Dru

top of the Gornergrat Peak in a 50-horsepower automobile. The average gradient of the climb was slightly more than 20 per cent. and spots where the machine had to climb better than 30 per cent. were common enough. The peak of the Gornergrat is shown in one of the accompanying illustrations.

During the past Summer a novel race to the summit of Mont Saleve, shown on this page as a perpendicular bluff of majestic proportions, was run between a small touring car and the funicular railway. Saleve is 4,290 feet high, and prior to this event had never been scaled by an automobile. So dangerous is the mountain regarded to be that the project was discountenanced by the authorities at first. Four men met death on the mountain this year through falls and avalanches, and nobody had any idea that the car would be able to make the ascent.

But when the actual trial was made the automobile went up the grades and reached the summit on low gear and finished a trifle over half an hour ahead of the railway train. The return trip was even more perilous, but with careful driving it was accomplished without accident.

The other pictures show a scene in one of the Swiss valleys; a vivid illustration of a highway midway between the floor of the valley and the heights of the Alps and the third depicts and outlines the marvelous Furka Pass, with the famous Rhone Glacier on the left. Along the road, that seems but a tangled thread in the picture, motor tourists are now enabled to pierce the very heart of the Swiss mountains with all the comfort they might enjoy from a spin along Riverside Drive.

llent road en route to **Finhaut**

A Strange Case

Just Goes to Show That Men Are Willing to Risk Other Men's Funds

NOW that the automobile has most thoroughly supplanted the horse up to the limit of the ability of makers of automobiles to place them at the disposal of users, those who are charged with the spending of the "ratepayers" fund in England propose to expend a vast sum of money in the breeding of horses for use in the British army. The latest report from "over seas" says that the "service" is to be provided with mounts of a special breed, the money-spenders claiming that the present mounts are mongrels. From a modern point of view, horses in the army should have one value that automobiles cannot lay claim to: should rations run out, the troops may eat the horses. Looking at it from still another angle, it is all they can do, whereas, with automobile transportation, they could go to some place and take what they want by way of food. The great point to be borne in mind is that men seem to have the faculty of making cost if other men pay the score. The point is adequately illustrated in the method that obtains in New York City: if a street is to be torn up for the purpose of putting down sewers, etc., it is first repaved, but no sooner is the new pavement down than the sewer contractor comes along and pulls it up again.

Engineering Section

DEVOTED TO THE DISCUSSION OF ENGINEERING PHASES OF AUTOMOBILING, INCLUDING DESIGNING AND CONSTRUCTION FEATURES OF PRODUCTS, AND INFORMATION TO AUTOISTS

DEPICTING THE METHOD OF HEAT-TREATING STEEL TO BRING OUT KINETIC QUALITIES, USING SALTS OF METALS FOR THE BATH, AT WOOD'S PLANT

THERE is nothing to be said for the manufacturing of automobiles that is of greater importance than the methods that have to be employed in the bringing out of the desired qualities in the parts of kinetic responsibility in cars. The time was when it seemed to be good enough to utilize cold-rolled steel even for jackshafts and such other parts as the automobilist must depend upon in the transmission of the power of the motor to the point of contact of the driving wheels with the ground. It is slowly being felt that cold-rolled steel is subject to fatigue at an alarming rate.

Even the best grades of steel to be rendered fit must be subjected to specific forms of heat-treatment, the desire being to bring out (a) great surface hardness when this property is needed, (b) good surfaces for bearings where plain journals are employed, (c) accentuated shock-withstanding qualities at every point, (d) free cutting characteristics during the manufacturing processes, and (e) good service when the automobiles are placed in the hands of the users.

Some of the older methods are being proven as inadequate, failing utterly to accomplish what their sponsors claimed for them, and the dawn of broad knowledge, which is peeping up over the hill, is indicating the way to better automobiles, requiring a more careful selection of material, taking into account the peculiar demands of the service, and the fact that roads, unlike steel rails, introduce conditions which have to be met in a new way.

Fig. 1 (A)—34 x 4 Continental tire inflated to 35 pounds pressure per square inch showing holes and cuts that need filling

Fig. 1 (B)—34 x 4 Continental tire at 27 pounds pressure per square inch the tread looked good to the naked eye, but in reality was full of small holes

Imprint Method of Testing

TESTING TIRES TO DETERMINE THE AREA OF CONTACT AND THE EXTENT OF DESIRED INFLATION—TESTS MADE AT THE HUDSON GARAGE, NEW YORK

USUALLY the questions of the care of tires are handled without reference to the area of contact of the tread with the ground, but, as a matter of fact, this point leads to a field that is rich in result. In a series of tests that were conducted on a special tire-testing machine, at Chicago, Illinois, under the direction of F. J. Newman, chief engineer and shop manager of the Woods Electric Company, it was found that flexure and its manifestations, as well as the damage done by it, also the power taken in doing this damage, were all represented in the area of contact of the tire with the ground, and it is suggested here that automobilists look into this phase of the subject just a little, it being the case that any one can make the imprints and observe the effect of pressure, also the extent to which the area of contact is altered as the pressure is raised or lowered.

While this form of testing will naturally demand a large amount of investigation ere it will lead to anything very tangible as a general proposition, the fact remains that, under conditions of a single set of tires of a fixed size, on a car of a given weight, so many of the factors are on a fixed basis that the result of observation will lead to good and beneficial results. When an automobilist learns, in this way, just what the area of contact should be, it will be a simple matter for him to make a check imprint occasionally, and, by so doing, find out how the tires are holding out. If the fabric is not stout enough, or if there are other structural changes, all of these conditions will be reflected in the changing area of contact.

At all events it is a good idea for every automobilist to become acquainted with the source of his greatest expense, and by observation learn how to limit cost and obtain a better return for it.

In making imprint tests it will of course be true that the shape of the tread and the thickness of the material employed therein, together with the flexibility thereof, will have a marked bearing upon the area of the imprint, particularly when the tire is new. On this account it will not be possible to make valuable comparisons of the various types of tires, one with the other, and the data, to be of value, must be confined to comparisons involving a given shape and make of tire. Nevertheless, observations along this line, if they are made at reasonably regular periods, measured in miles traveled rather than in time, will have the virtue of showing the rate at which the material of which the treads are made disintegrates, it being the assumption that the initial rigidity of the material is desirable, and that as this rigidity falls away in service, it is a sign that internal work has had its effect upon the molecular relations, nor will it be far-fetched to reach the conclusion that changing molecular conditions are but a sign of deterioration. If this contention is not right, and the reverse holds, it is equal to saying that the tires are not good when they are new, and that they improve with age. If there is anything in this phase of the story, every automobilist in the land will be pleased, but experience proves to the contrary. Even if it is difficult to arrive at any definite conclusion from imprint tests and observations, there still remains the advantage that must come if the autoist pays more attention to his tires than is now the case, and certainly investigations along these lines will compel that measure of attention that is bound to result in a more intimate acquaintance with what is a serious problem; but let the intent be to conduct all investigations without trying to foresee how good or bad they are, since knowledge comes with intimacy, and the latter is the child of investigation.

Fig. 2 (A)—34 x 4 Goodrich tire with damaged cut caused by striking the curb, inflated to 80 pounds per square inch

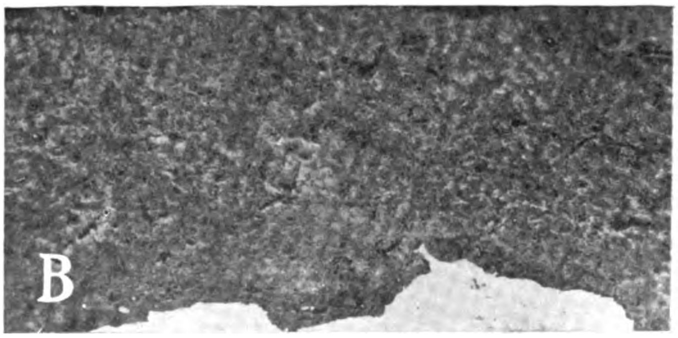
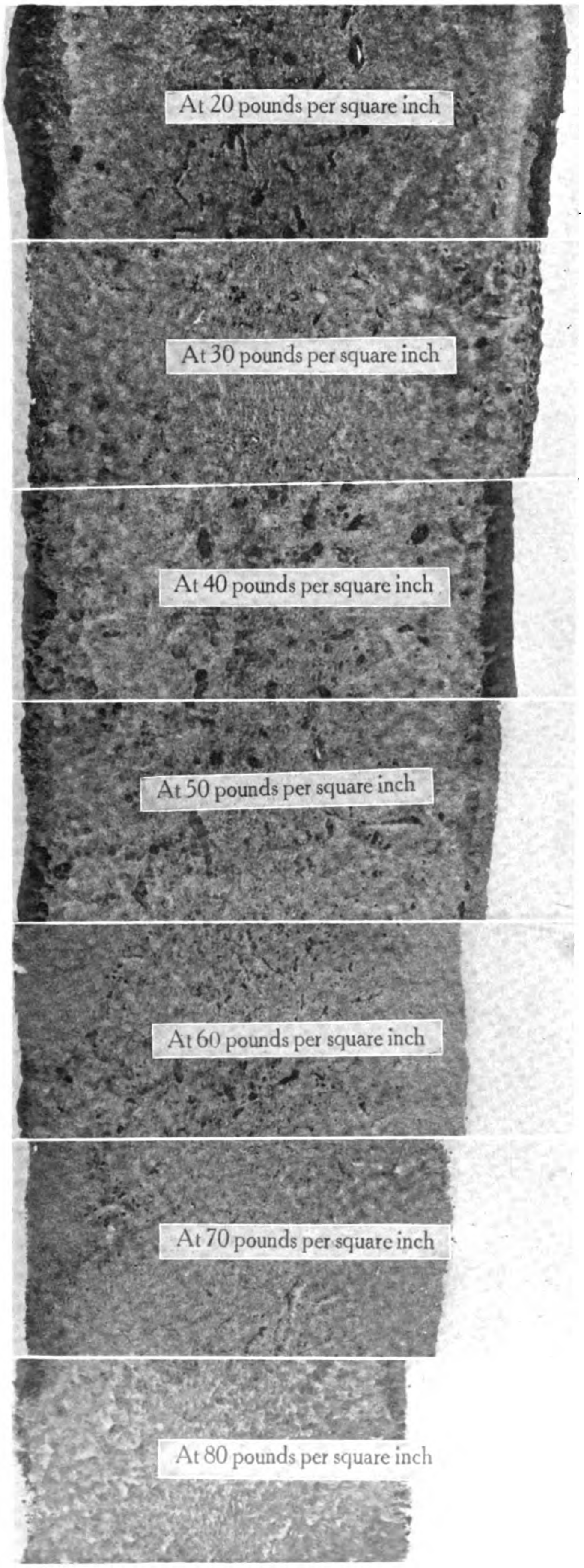


Fig. 2 (B)—The same tire inflated to 40 pounds per square inch



Imprint of a 36 x 4-inch tire under different pressures, showing the width of the tire-contact on the ground for the several pressures

Out of 13 tires recently tested at a public garage for pressure, irrespective of size, but one, 36 x 4 1-2, showed correct pressure, viz., 90 pounds per square inch. Of all the tires tested, the condition of this one was the worst; but the mileage obtained from it was 5,000 miles, and in comparison with those that had run only from 1,000 to 2,000 miles it compared very favorably. There were no signs of deep cuts and the tread was worn evenly, and considering that the car was of 50-horsepower, with a heavy limousine body, it is but fair to the tire to presume its longevity is in great degree due to the proper pressure being maintained.

The two following tables show the amount of flexure of the tires taken promiscuously, as compared with the size of the tire at the top:

TESTS ON REAR WHEEL OF EMPTY SEVEN-PASSENGER, SIX-CYLINDER TOURING CAR FITTED WITH 37 X 5 PLAIN TREAD TIRES

Pressure in pounds per square inch	Measurement of tire on top in inches	Measurement of tire at bottom in inches
105	4 9-16	4 1-16
100	......	4
90	......	3 7-8
80	......	3 13-16
70	......	3 25-32
60	......	3 3-4
55	4 1-2	3 3-4
50	......	3 11-16
40	......	3 5-8
30	......	3 7-16
20	......	3 1-8
14.7	......	2 13-16

The extreme widths of the tire at the pressure that the tire was found to contain, viz., 55 pounds, measured with a pair of calipers, were as follows: Top, 5 5-16 inches; side, 5 1-4 inches; bottom, 4 3-4 inches.

TESTS ON FRONT AND REAR WHEELS OF LIMOUSINE FITTED WITH 36 X 4 1-2 TIRES

Pressure in pounds per square inch	Front Tire		Rear Tire	
	Top	Bottom	Top	Bottom
90	4 1-16	3 3-8	4 1-16	3 3-8
80	......	3 1-4	......	3 5-16
70	......	3 7-32	......	3 1-4
60	......	3 3-16	......	3 3-16
50	......	3 1-8	......	3 1-16
40	......	......	......	2 7-8
30	......	......	......	2 5-8
20	......	......	......	2 3-16
14.7	......	......	......	1 13-16

The extreme width of the tire at the lowest pressure, viz., 14.7 pounds, was: Top, 4 5-8 inches; bottom, 5 15-16 inches.

Storing Tires

If the Car Is Not To Be Used for the Winter Store the Tires

SOME automobilists prefer not to drive in the Winter time, and in order that the car will be in good order when Spring time comes they remove the tires from the wheels, and after washing them, making all necessary repairs, and wrapping them up, put them away in a dark, damp place. Tepid water and castile soap are used for washing; repairing is done in the most careful way, remembering to heal up every little wound so that mildew cannot get at and bite the fabric. The inner tubes are also fixed, and when everything is in shipshape the inner tubes may be put back into the outer casings and slightly inflated to remove all creases, laps and folds, having a care not to employ a pressure of more than just enough for the intended purpose. With the inner tubes stored in the outer casings, the next thing is to wrap the tires in burlap, putting a wrapping of black oilcloth over the outside, and with stout twine binding the wrapping sufficiently to prevent the seams from opening up and letting in the light. The tires, in this shape, may be stored in a reasonably cool, damp cellar, in the darkest place that can be found. Keep well away from the furnace, if there is one in the cellar, but it will not be necessary to fret about the dampness. All tire-makers store rubber in dark, damp vaults, and there is no reason why tires may not have the advantage of this treatment, provided there are no little wounds upon the surfaces such as will expose the fabric and allow the mildew pest to enter and feed upon the cotton, of which this fungus growth is very fond indeed.

A word while on the subject of testing tires: See that the test gauge fits the thread of the valve and that it clears the brake drum of the rear wheel, as in several cases where tests were being made it was impossible to take the pressures on this account. The gauge fitted to the pump does not give the pressure in the tire, as it registers the force exerted to overcome the valve and not the pressure actually in the tire. The gauge must be actually fitted to the valve so that the pressure in the tube can blow out directly into the gauge when the small pointer inside the gauge presses the valve down. This does not take place with the tester fitted to the pump, and in one or two instances it was found to be about 20 pounds above.

In making these tests the length of contact around the periphery of the tires was, of course, shown. For convenience the lengths were eliminated, thus making it possible to show seven points in one example and eight pressure conditions in the other, giving the width of contact only. It is the firm belief that the peripheral length of contact is of value when making observations in general, it being the expectation that area of tire-contact is the figure that is wanted in the long run. It is just possible that some good will come from noting not only the width, but the area of tire-contact as well, comparing the one with the other, and, perhaps, making a set of charges in order to see how the values increase with increasing pressure and how they relate to each other as well. In the testing machine made to work on this principle the results show very clearly.

TABLE OF TESTS MADE TO SHOW AMOUNT OF DEFLECTION

Body and H.P.	Sizes of Tires		Pres. lb on sq. in.	Right front		Left front		Right rear		Left rear	
	Front In.	Rear In.		Top. In.	Bot. In.	Top. In.	Bot. In.	Top. In.	Bot In.	Top. In.	Bot. In.
40 hp. Lim.	935x135	935x135	60							4 3-16]	3⅛
Delaunay...	non-	skids		4⅛	3 1-16	4 3-16	3⅛	4⅜	3 1-32		
30 hp. Lan.	33x4	33x4									
Chalmers..	plain	tread	55	3 7-12	3						
			42					3 7-12	2⅞		
Limousine.	37x5	36x4½	40	4½	2⅞						
48hp.6 cyl.	Q. D.	plain	55					4½	3½		
50.hp.Lim.	36x4½	36x4½	90	3½ (well	3¼ worn)						
			60					4	3⅜		
Touring....	34x4	34x4	35	3⅝	2¾						
40 hp.7pas.			22					3⅜	2¼		

Tires and Pressures

Too Much Importance Cannot be Attached to Right Tire Pressure

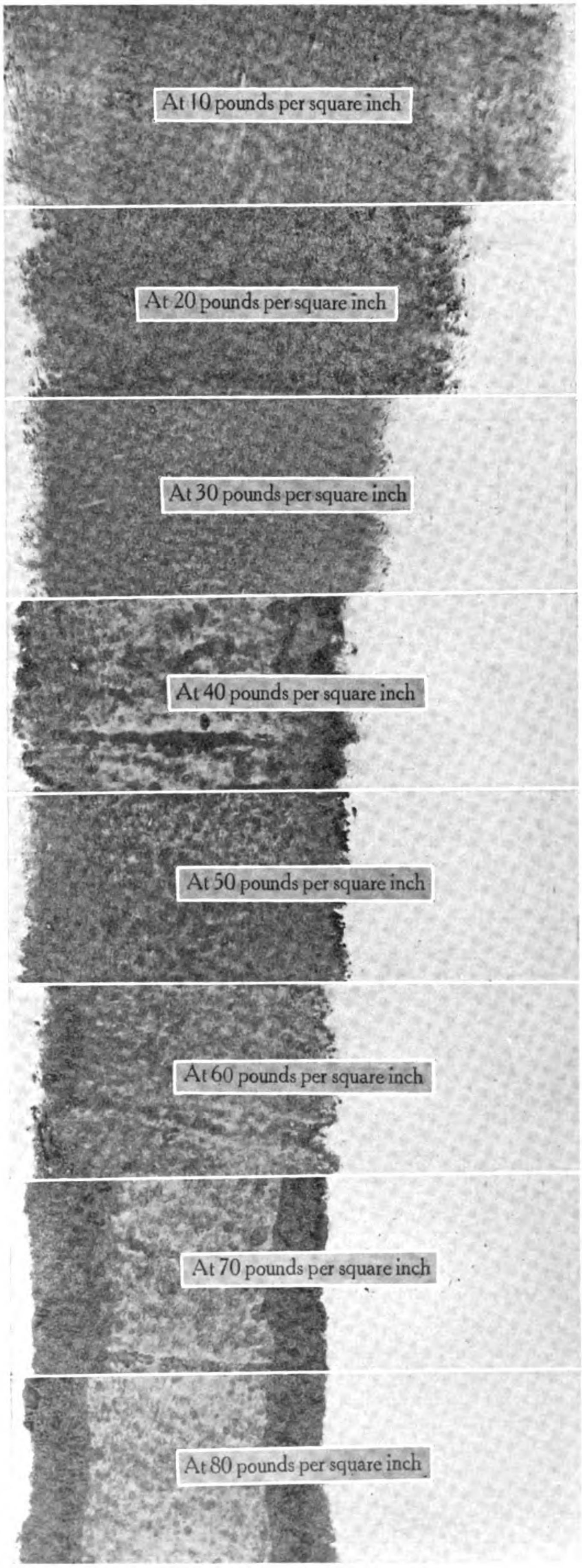
THE first point to take into consideration is the weight of the car, and this is a matter that seldom occurs to the owner. By weight is meant the complete weight of the car loaded with full equipment of passengers, tools, luggage and full tanks Even before the question of sizes of tires is considered this should be found out and a certain margin for safety allowed in case additional weight is carried from time to time.

The way to ascertain the weight is to place the front wheels on the scale first and the rear wheels afterward to find what weight is carried on each axle. This amount halved will give the proportion each wheel has to carry.

The following table shows the weight a given size tire is made to carry and the pressure to which it should be inflated:

Diameter of tire in inches	Maximum allowable weight on wheel	Air pressure in pounds per square inch
2 1-2	225 pounds	50
3	350 "	60
3 1-2	600 "	70
4	750 "	80
4 1-2	1000 "	90
5	1000 "	90 to 100
5 1-2	1200 "	100 to 105

If the flexure of one tire is greater than another for the same pressure it is as well to reduce the pressure of the highest to correspond with the other to equalize the flexures. There is danger of extra tire depreciation if one tire is blown up stiffer than another and it has been found in practice that this is likely to be true even with equal pressures.

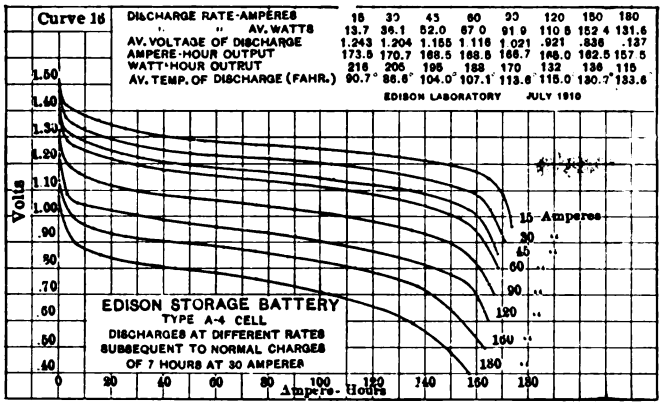


Imprints of a tire under different conditions of pressure, showing how the width of contact decreases with the increasing pressure

1910 Edison Storage Battery

FOURTH INSTALLMENT—DEALING WITH WALTER E. HOLLAND'S PAPER AS PRESENTED BEFORE THE TWENTY-SIXTH ANNUAL MEETING OF THE ASSOCIATION OF EDISON ILLUMINATING COMPANIES, HELD AT FRONTENAC, THOUSAND ISLANDS, N. Y., SEPTEMBER 6, 7 AND 8, 1910.

IN Fig. 16 is shown a series of tests made according to the plan outlined in last issue. It will be seen that the ampere-hour output now decreases very slightly as the discharge rate is increased, but, as before, most of the loss is a voltage loss. The variation of ampere-hour output, average voltage, and watt-hour output with discharge rate is shown in Fig. 17 where normal values of these are each taken as 100 per cent.

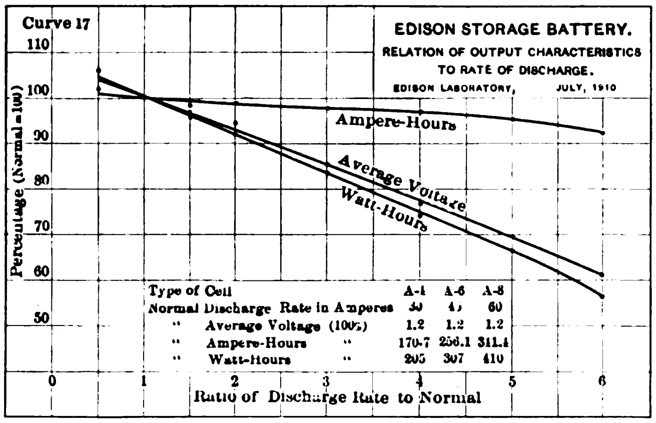


DISCHARGE RATE-AMPERES	15	30	45	60	90	120	150	180
" " AV. WATTS	13.7	36.1	52.0	67.0	91.9	110.6	152.4	131.6
AV. VOLTAGE OF DISCHARGE	1.243	1.204	1.155	1.116	1.021	.921	.836	.137
AMPERE-HOUR OUTPUT	173.5	170.7	168.5	168.5	166.7	165.0	162.5	157.5
WATT-HOUR OUTRUT	216	206	195	188	170	132	136	115
AV. TEMP. OF DISCHARGE (FAHR.)	90.7°	86.6°	104.0°	107.1°	113.6°	115.0°	130.7°	133.6°

EDISON LABORATORY JULY 1910

Fig. 16—Discharges at different rates subsequent to charging at normal rates

In judging of the relative merits of storage batteries of different classes there are two appropriate bases of comparison as to output—the basis of weight and the basis of volume. In all non-stationary service such as automobile or car propulsion, car-lighting and so forth, high output per unit-weight of battery is all-important, while the space which a battery occupies, if not ridiculously great, matters little, amounting to a question of vehicle design. In Fig. 18 is given the energy output at different rates of power delivery calculated for one pound of Edison battery; and the same referred to one cubic foot of battery is given in Fig. 19. The figures are based on the total weight and maximum volume—that is, the required volume of battery compartment—of a complete battery of a standard number of cells. These curves were derived from the normal-charge tests shown in Fig. 16. It is not the purpose of this paper to make comparisons, but those who have reliable data on lead batteries are invited to plot in comparative curves made on the same basis. They will then see that the Edison battery has an immense advantage in weight over the best lead batteries, while in volume it matches them pretty closely.



Type of Cell	A-4	A-6	A-8
Normal Discharge Rate in Amperes	30	45	60
" Average Voltage (100%)	1.2	1.2	1.2
" Ampere-Hours "	170.7	256.1	311.4
" Watt-Hours "	205	307	410

Fig. 17—Relation of output characteristics to normal rate of charge

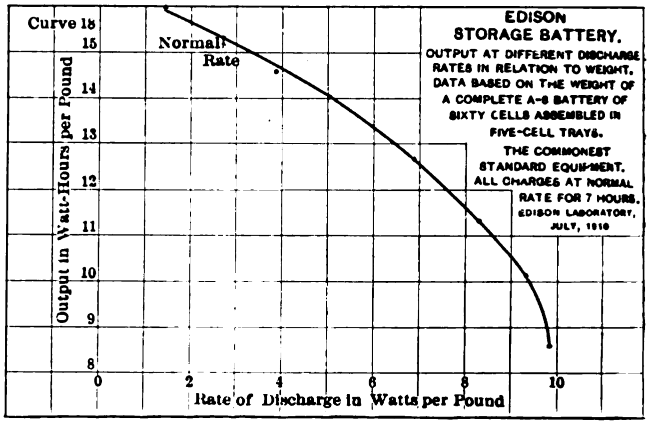


Fig. 18—Output at different discharge rates in relation to weight of battery

The effects of changes of temperature on the behavior of a storage battery are so varied and numerous that a book could be written on this subject alone. Many tests of the Edison battery have been made to determine these effects and an extensive series of temperature tests is now being carried on at the Edison Laboratory; but the subject can merely be touched upon here, and later, in all probability, an entire paper will be devoted to it.

So far, it has been determined that, in general, the cooler a battery is kept the longer will be its life; and that heat during charge is more detrimental than heat during discharge. As regards immediate output, the highest results are obtained by charging cool—say at a cell temperature of 75 to 85 degrees Fahrenheit—and discharging hot, that is, at 120 to 130 degrees cell temperature. The output will be reduced if charging is done at a cell temperature of less than 50 degrees F. or more than 105 degrees F., or if a battery is cooled to a low temperature during discharge. The Edison battery appears to be affected in about the same degree as the lead battery by low temperatures.

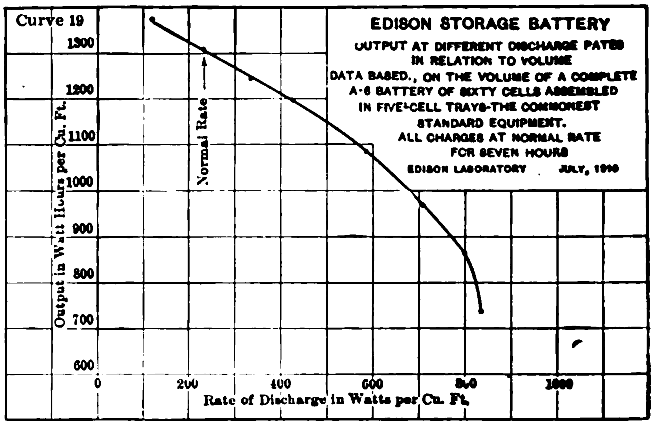


Fig. 19—Output at different discharge rates in relation to volume

and the salvation of both in cold weather lies in the fact that they are self-warming. It is a providential arrangement that the internal resistance of a cell becomes greater as the temperature decreases, because on this account the generation of heat within a battery is greatest when the battery is cold and automatically decreases as its temperature rises.

An interesting but not at all surprising characteristic of the Edison battery, which probably is common to storage batteries in general, is the fact that the rate of loss of charge during idleness varies with the temperature at which it stands, the loss being slight in the cold and greater as the temperature increases. Fig. 20 shows the results of two series of tests in one of which the cells after charge were immediately put in an ice box to stand, while in the other case the cells were left to stand in a room whose temperature averaged close to 75 degrees F.

The sturdiness of the Edison battery has often been summed up in the statement that it is "fool-proof." And so it is—but there *are* idiots! Therefore the company does not feature this quality, but rather insists on careful handling of the battery at all times. Nevertheless, we have made many "fool" tests for our own satisfaction, and there can be no harm in showing the results of some of these to sensible men. The curves are self-explanatory and will be presented with little comment.

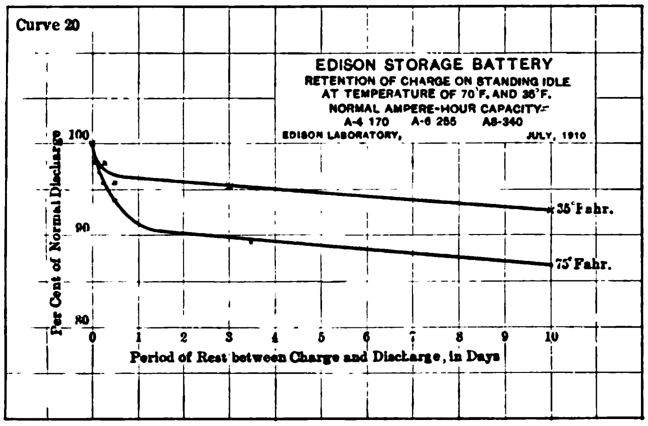


Fig. 20—Relation of charge on standing idle at different temperatures

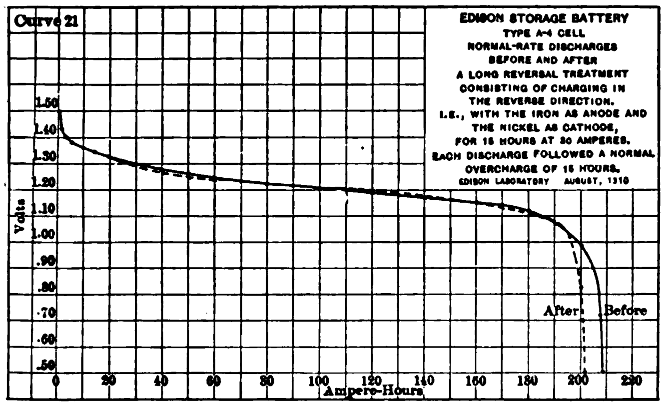


Fig. 21—Normal-rate discharges before and after a long reversal

Fig. 21 shows that no injury results from connecting up a discharged cell with the polarity reversed and charging in the reverse direction at normal rate for 15 hours.

Fig. 23, contrary to all reason and theory, demonstrates that even carelessness in regard to keeping the plates covered with solution does no immediate damage to a cell. However, this should not be taken to mean that such treatment if persisted in would not ultimately do harm.

Fig. 24 shows successive discharges of a cell following a period of standing with the solution entirely removed. The cell was discharged before emptying the solution and afterward was left for two weeks with its filling aperture open. This permitted of enough air getting in to discharge the reserve capacity of the iron electrode by direct chemical oxidation, and consequently it had to be built up again before the cell gave a normal discharge curve. It took five normal-charge runs to do this, as Fig. 24 shows, but could have been accomplished at once—it has been found in other instances—by giving a long overcharge.

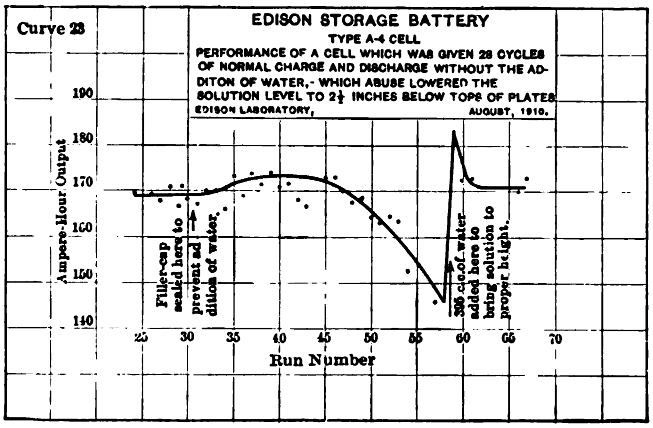


Fig. 23—Performance of a cell that was given 28 cycles of normal charge

The effect of time upon a battery is not always satisfactory, but it is one of the particular claims for the Edison type of battery that it will remain in good order when out of use and it may be put back into service at a moment's notice, this, too, without any doctoring or hospital treatment whatever. In other words the Edison battery can be set aside and forgotten in any state of charge or discharge for a practically unlimited length of time without fear of injury. Fig. 25 shows comparative discharges of a cell before and after it had stood six months in a totally discharged condition.

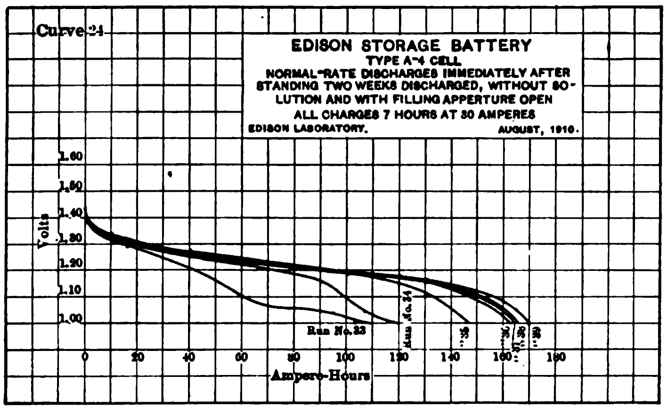


Fig. 24—Normal-rate discharges immediately after standing two weeks

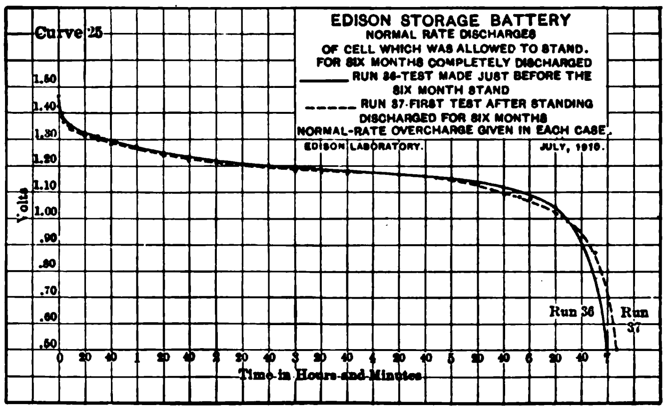


Fig. 25—Normal-rate discharge of a cell which was allowed to stand for six months

Cantor Lectures on Motors

PROFESSOR W. WATSON, D.SC., F.R.S., DELIVERED A SERIES OF LECTURES ON THE GASOLINE MOTOR, OF WHICH THIS IS THE THIRD INSTALLMENT—BY PERMISSION OF THE ROYAL SOCIETY OF ARTS

THE light from an arc lamp, A (Fig. 11), passes through a lens, B, which forms an image of the crater on a small hole in a diaphragm, C. The light which passes through this hole falls on the concave mirror, G, and is reflected back on to the plane mirror, K, which is placed at an angle of 45 deg., and an image of the hole, G, is then formed either on a ground-glass screen, D, or on a photographic plate. The mirror, K (Fig. 10), is mounted on an axis, which is given a reciprocating motion by means of the lever, L. The end of this lever is joined by a short connecting rod to an eccentric, M, attached to the shaft, N. This shaft is rotated at the same speed as the crankshaft of the engine, and hence the spot of light is given a to and fro movement in a direction at right angles to that in which it moves owing to the changes of pressure, this to and fro movement representing, on a reduced scale, the actual movements of the piston.

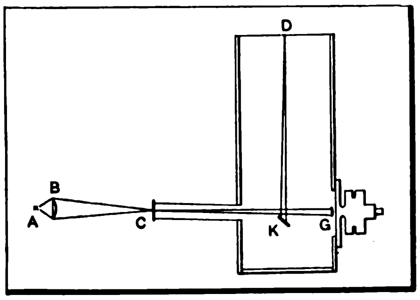


Fig. 11—Section of the Manograph showing the beam of light striking the poised mirror

By making the connecting rod which joins the lever, L, to the eccentric, M, bear the same ratio to the throw of the eccentric as does the length of the connecting rod of the engine to the stroke, the spot of light exactly reproduces the motion of the piston, and no correction on account of the finite length of the connecting rod becomes necessary.

The shaft, N (Fig. 10), is driven at crank shaft speed by a light bicycle chain, the movement being transmitted through a phase-adjusting device shown in Fig. 12 (*a*). The sprocket, A, is mounted on a shaft, B, which carries at its other end a bevel wheel, C. This wheel transmits the motion, through an idle wheel, to the shaft, F, which is directly coupled to the shaft, N, of the indicator. The shafts, B and F, can be rotated with reference to one another by rotating the axle, G, on which the bevel wheel, D, is mounted. One end of this axle is carried by the block, K, which can turn freely about B and F, while the other end is held in a fork attached to the plate, H. This plate can be rotated with reference to the plate, J, being held in certain definite positions by a pin, I, which drops into a series of holes in the plate, J. The plate J is itself capable of being rotated through a small angle between two adjusting screws, L, Fig. 12 (*b*). The phase is first roughly adjusted while the engine is at rest, so that the spot of light is at the end of its travel when the piston is at the end of the stroke. Then the engine is started and the spark retarded, so that the charge is fired after dead-center, and by means of the screws, L, the diagram is adjusted till the portion representing the top of the compression stroke, and the first part of the working stroke, is as shown in Fig. 13 (*a*). If the phase is too much advanced, so that the spot of light reaches the end of its movement before the piston reaches the top of the stroke the diagram obtained is as shown in Fig. 13 (*b*). If the phase is retarded then the diagram is as shown in Fig. 13 (*c*).

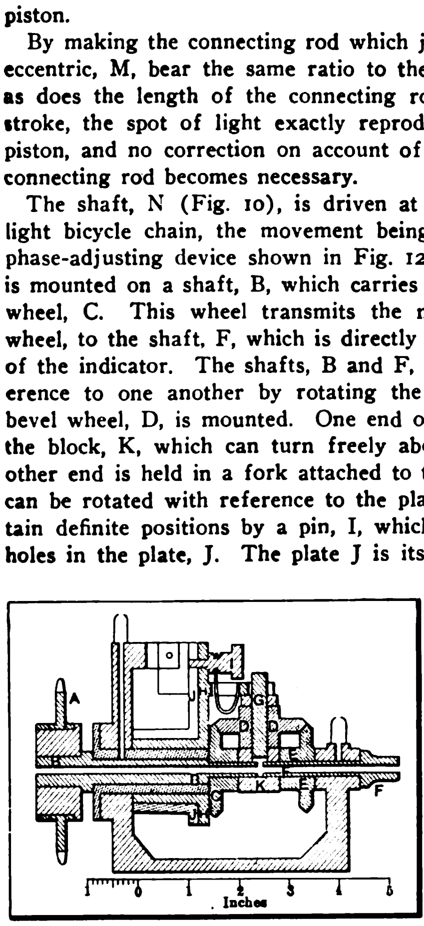


Fig. 12 (a)—Cross-section of the phase-adjusting mechanism of the Manograph

The correct adjustment of the phase is of very great importance. Thus, if the phase is 6 deg. out of adjustment, the diagram obtained in a certain engine was found to be such that the mean effective pressure obtained came out as 100 pounds per square inch, while the corresponding value from a diagram in which the phase was correct was 89 pounds per square inch.

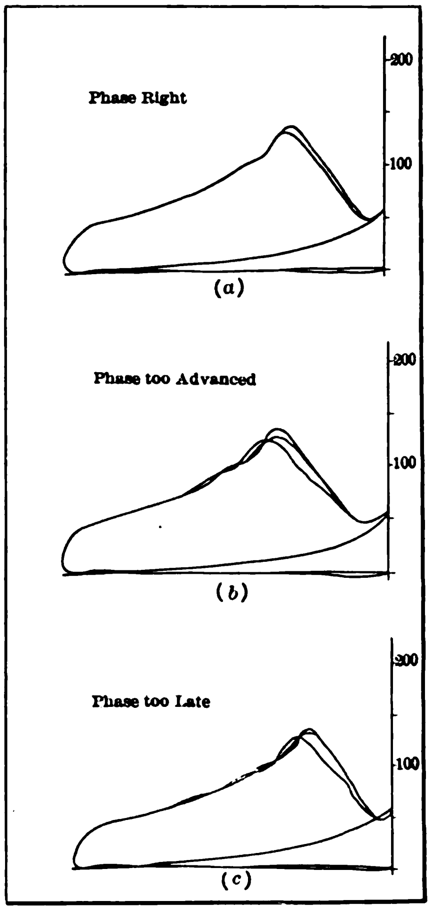


Fig. 13—Manograph cards under different conditions

Two examples of diagrams obtained with this indicator are given in Fig. 14. In addition to the full diagrams obtained with a thick diaphragm, two diagrams are given obtained with a thin diaphragm, so as to show the exhaust and induction strokes on an enlarged scale. These diagrams are taken from a four-cylinder engine, the bore of the cylinders being 85 millimeters and the stroke 120 millimeters. In each diagram the induction stroke is indicated by a single arrow head, the compression stroke by two, the working stroke by three, and the exhaust stroke by four. It will be noticed that while at a speed of 840 revolutions per minute the pressure in the cylinder at the end of the induction stroke is very little below atmospheric pressure. at the speed of 1,300 the pressure at the end of the induction stroke is about 2 pounds per square inch below atmospheric pressure. This shows that while at the lower speed the cylinder has time to get filled up by the new charge, this is not the case at the higher speed. The rapid rise in pressure at the end of the exhaust stroke at the higher speed is also to be noticed. This is produced by the gases in the exhaust manifold flowing back into the cylinder, or at least the further escape of the gases from the cylinder being prevented, caused by the rapid rise in pressure in

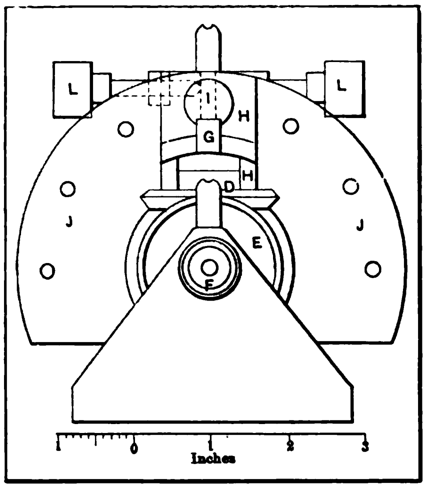


Fig. 12 (b)—Diagrammatic illustration of the phase-adjusting mechanism

the exhaust manifold due to the sudden entry of the exhaust gases on the opening of the exhaust valve in another of the cylinders. It is probable that if there was a separate exhaust pipe for each cylinder, so that the commencement of the exhaust of one cylinder would not thus prevent the free exhaust at the end of the stroke of the preceding cylinder, the filling up of the cylinder would be greatly improved, and hence the power developed by the engine increased.

In Fig. 15 are shown some indicator diagrams taken from a small single cylinder two-cycle engine (bore 3.25 inches, stroke 3.25 inches). In the figure the two upper diagrams are taken from the cylinder, the top diagram in each case corresponding to a mixture poorer in petrol than the middle one. The bottom diagram in each figure is taken from the crankcase, in which the charge is slightly compressed before being transferred to the working cylinder.

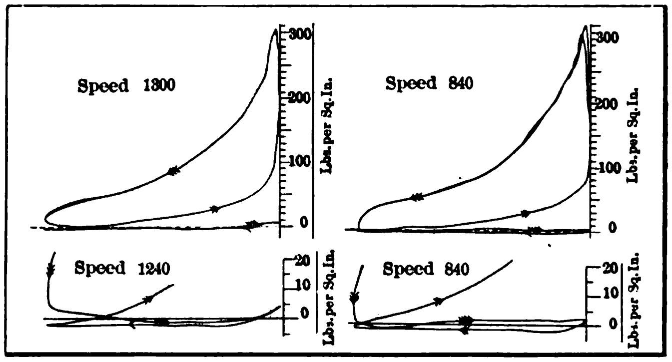


Fig. 14—Examples of indicator cards using diaphragms to obtain certain results

At a speed of 600 revolutions per minute it will be observed that, owing to the uncovering of the exhaust port the pressure in the cylinder sinks to atmospheric some little time before the end of the stroke. Further, the crankcase diagram shows that the fresh charge is able to fill up the crankcase very nearly to atmospheric pressure during the time the third port is uncovered by the lower part of the piston. At a speed of 1.500 revolutions, the pressure in the cylinder does not fall to atmospheric till very nearly the end of the stroke. Further, it will be noticed that the maximum pressure attained, and the mean effective pressure, is considerably less than at the lower speed. The crankcase diagram shows very clearly that the fresh charge has not time to enter from the carbureter, so that on the down stroke of the piston the pressure does not rise to atmospheric till more than half the stroke is complete. Further, when the inlet port is uncovered by the piston the pressure in the cylinder is still greater than the pressure in the crankcase, and hence some of the burnt gases blow back into the crankcase, causing a marked rise in pressure. It is evident, from the diagrams, that the chief cause of the decreased mean effective pressure in this engine at high speeds is that the charge has not time to get into the crankcase, and that if a larger port, open longer, were employed, the engine would have greater power at high speeds.

What Is Hardness?

Prof. Turner Divides Hardness Into Four Separate Classifications—How to Measure It Is a Problem

HARDNESS is a physical property that many physicists have endeavored to define to the satisfaction of themselves and their confreres with but limited success. Turner states that hardness has four distinct qualities, i. e., tensile hardness, cutting hardness, abrasion hardness, and elastic hardness. It has been found that relative hardness varies with the method in vogue for its determination, and last Summer, when the Society of Automobile Engineers was meeting at Detroit, the Shore scleroscope was illustrated, and its use propounded concomitant with an attempt to elucidate the property called hardness, but it can scarcely be claimed that the audience was much impressed with the clearness of the definitions that were propounded.

It is all very well to state that a piece of metal is of a certain hardness; this is as much as to say that under certain conditions it will offer a certain resistance to (a) penetration by another body, (b) permanent deformation, (c) abrasion, and (d) elastic deformation, with, perhaps, other manifestations that might well be classified with hardness, so called, as when two or more of these conditions are set up simultaneously.

This is an extremely important subject in automobile work; balls for ball bearings, for illustration, should resist deformation and the races in which they roll should resist penetration. But the bearings of crankshafts should resist abrasion, and elastic deformation is but the prelude to a broken crankshaft. Certain metals offer especial advantages in one way or another, and alloying has for its object the fortifying of the metal against the pressures that are exerted to overcome hardness. Heat treatment is intended as a means for inducing various degrees of hardness—the field is rich in unknown quantities.

British Exports and Imports

Show Increase for First Nine Months of 1910 Over 1909

THE English automobile journals have lately been looking with astonishment at what they term the "American Invasion," and the figures issued by the Board of Trade department of the Government clearly show an increase in the demand not alone for home consumption but likewise for export purposes.

The number of cars imported for the first nine months of the present year is 8,352 (this number includes chassis), which is 1,833 more than the corresponding period of last year; and 2,673 cars and chassis were exported, being 872 more. The value of imports was $19,248,500, being $2,464,500 more than last year, and the value of exports was $8,777,000, being $3,487,000 more.

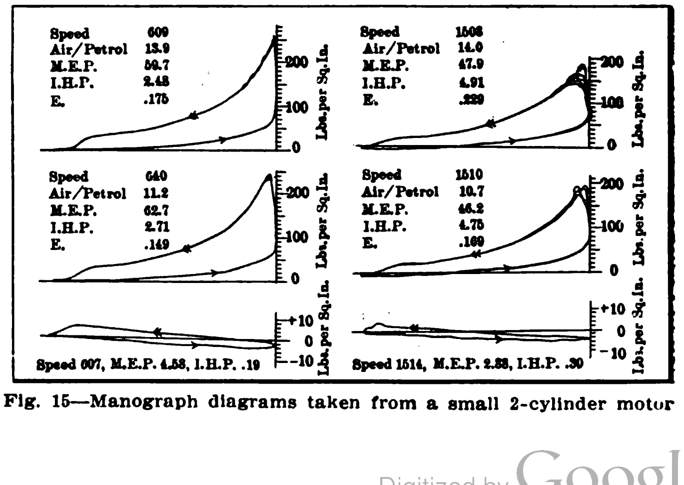


Fig. 15—Manograph diagrams taken from a small 2-cylinder motor

To Prevent Freezing Trouble

Drain All of the Water Out of the System

BUT the water cannot be drained out unless there are drain openings at all the low points, or if the system is designed on the hydraulic grade principle there must be a drain cock at the lowest point. All modern automobiles are so designed that the radiator, water-pump, piping and fittings are sloped in such a way that when the drain cock is open at the low point, which may be either the pump or the radiator, all of the water will run out. The only danger to be encountered in these modern automobiles, so built, lies in the stopping up of the puny little drain cock that is sometimes employed. It is not uncommon to see unfortunate automobilists in quest of a hairpin which they hope will be small enough to pass up through the diminutive orifice of the drain cock by means of which they hope to dislodge the accumulation of slime that gets in the way of water, and ultimately ends in the disruption of some part of the automobile, when the entrapped water freezes and swells up in consequence. If makers of automobiles persist in violating the ethics of good designing in this way, the fact that water occupies more space when it is congealed, than it does in liquid form, is much to be regretted.

Fig. 4 shows a form of goose-neck piping out of the under-side of the radiator, and the way to avoid freezing trouble is to put a drain cock in the makeup at the lowest point in the goose neck. Fig. 5 presents a suggestion of a centrifugal pump that has the intake in the bottom, thus making it self-draining, so far as the pump is concerned, but the pipe will lead off to a low point somewhere; a drain cock must be put in the pipe at that low point. Fig. 6 is an illustration of a really bad job; the water inlet is up for a considerable distance above the low point of the water jacket of the cylinder. The only thing to do is to put a drain cock in at the lowest point—broken cylinders are high-priced, but they do not rank as luxuries. Fig. 1 suggests a pipe leading from the low point in the water jacket, sliding off to a self-draining point, thus protecting the cylinders from water pockets, which, when properly named, are called ice-houses. Fig. 2 shows a drain cock in the bottom of the radiator, which is there for the purpose of draining out the water residuum, which must always be figured upon when the water outlet is above the bottom of radiator. Fig. 3 is a suggestion of a centrifugal pump showing the water inlet and outlet above the bottom line, suggesting by dotted lines a quantity of water trapped in, which will freeze in a little while on a cold day, and when the motor is started the pump will be torn asunder unless a safety universal joint is used between the pump and the drive; but even if a safety joint is used, it still remains to put in a drain cock, due to the uncertainty of automatic devices as safety joints—they generally work when it is not desired to have them do so, and, like safety devices on elevators, they usually fail to work at the propitious moment.

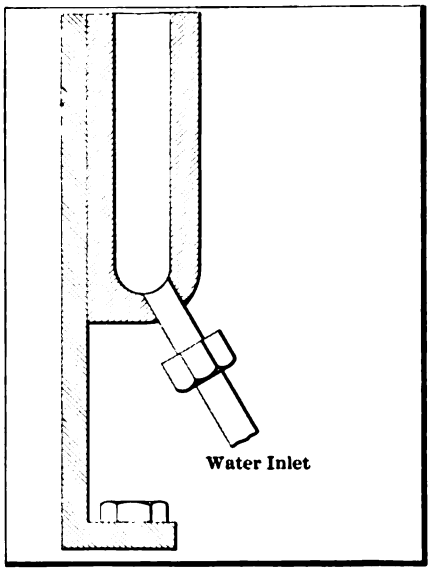


Fig. 1—Proper place for a drain cock in the jacket of cylinders

Letters from Subscribers

Fails to Allow for Varying Ability of Designers

Editor THE AUTOMOBILE:

[2,420]—Please explain in your columns the relative advantage of a 4-cylinder, 4-cycle motor, 5-inch bore and 4¾-inch stroke, and one 5-inch bore and 5½-inch stroke. Which would develop the most power at 1,000 revolutions per minute? At lower speeds, which would develop the most power? Which would run the fastest when developing, say, 30-horsepower? Would one be classed as a high-speed motor, and the other a slow-speed motor?

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There is no possible chance of any one giving the answer to any of the above questions. As a general proposition, the motor with the largest displacement will deliver the most power. It is not unusual to see a 4-cylinder 4-cycle motor with a 4-inch bore delivering more power than can be obtained from a 4-cylinder 4-cycle motor with a 5-inch bore. The difference lies in the differences in design. A good designer can get more power out of a given displacement of a motor than will be possible in the case of a designer with less skill. Some designers go in for high weight efficiency, others for high thermal efficiency, and more for a modification of the respective qualities, with the idea of producing good average results. It is not fair to compare motors of different design, because each designer may have obtained exactly what he went after. In service, the needs depend upon the character of the work to be done. In racing work, for illustration, what is wanted is maximum power and minimum weight; the designer does not care a hang how much gasoline the motor will drink up. For general touring service, the aim is to realize a sufficiency of power, moderate weight, and a high thermal efficiency. Finally, in relation to the power that may be expected from a motor with a given displacement, it should be understood that there is no method of figuring by any empirical formula as yet devised that will come within a reasonable estimate of the facts as they will be obtained by making a real practical test. It is highly improbable that any of the em-

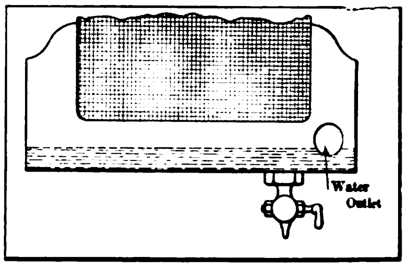


Fig. 2—Drain cock in the bottom of the radiator when the water is taken out farther up

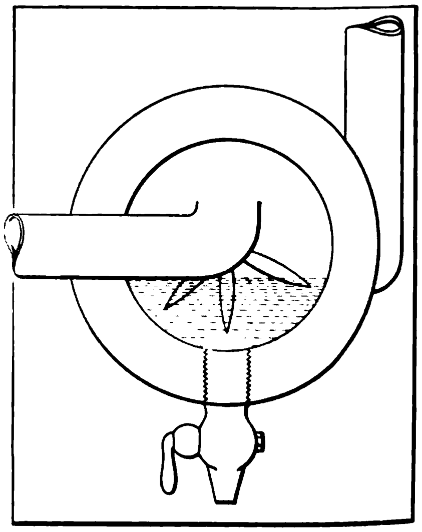


Fig. 3—Drain cock in the bottom of the centrifugal water-pump when the water connections are above the low point

OWNERS OF SMALL GARAGES ASSUME FIRE RISK; LACK OF FUNDS SOMETIMES THE CAUSE; TRUSTING TO LUCK IS COMMON PRACTICE—BY JAS. S. MADISON

becomes effective after the gasoline (or oil) has been burnt up, to prevent the spread of the flame. Each small garage should therefore have as a part of its equipment several buckets constantly filled with water and kept in definite places; also a bucket or two of clean, fine sand. The latter will, when thrown upon a small gasoline fire, smother it.

But the best means of subduing such a fire is by means of chemical fire extinguishers. There are two classes of these on the market—the "dry" extinguisher, which consists of a metal tube, tin, zinc or copper, about 36 inches long and 2 or 2 1-2 inches in diameter, containing dry, powdered ammonium acid carbonate, also called ammonium bicarbonate. These extinguishers after being filled are hermetically sealed by having the top, through which a hook projects, soldered in carefully, but lightly. They are usually kept suspended from a stout nail or screw at any convenient point on a wall or door jamb. If occasion arises for using them they are given a sharp downward jerk, which pulls off the top; the contents are then sprinkled generously on the incipient fire.

This dry powder on being heated even slightly decomposes into ammonia, carbon dioxide and water vapor. These are gases which are not only non-combustible, but excellent extinguishers in that they surround the burning object and thus exclude the oxygen of the air, which is one of the necessary factors in all combustion. They may be purchased in the market at from 50 cents to $3 each, depending upon the size. If the owner prefers he may make one himself if he has the ability to use a soldering iron. If not, the local tinner will make the tube and the chemical, ammonium bicarbonate, which must be *dry* and finely *powdered*, can be purchased from or ordered through any reliable drug dealer.

The best device, however, is the other type of chemical extinguisher, that which is universally used, and consisting of a copper vessel holding three or more gallons of water containing the proper amount of sodium bicarbonate—baking soda—dissolved in it. The upper part of the vessel contains a glass bottle partially filled with concentrated sulphuric acid, which does not come into contact with the soda solution until at the moment when the extinguisher is to be used; it is then turned upside down, which causes the chemicals to be brought together. This results in the generation of large volumes of carbon dioxide gas, which saturates the water and forces it under great pressure out of the rubber hose attached to the extinguisher.

As pointed out above, water is not a good agent with which to fight a gasoline fire, but the water coming from this extinguisher is highly charged with carbon dioxide—it is essentially a carbonated water, such as is served at soda fountains, minus the flavoring syrups. This renders it an effective extinguisher.

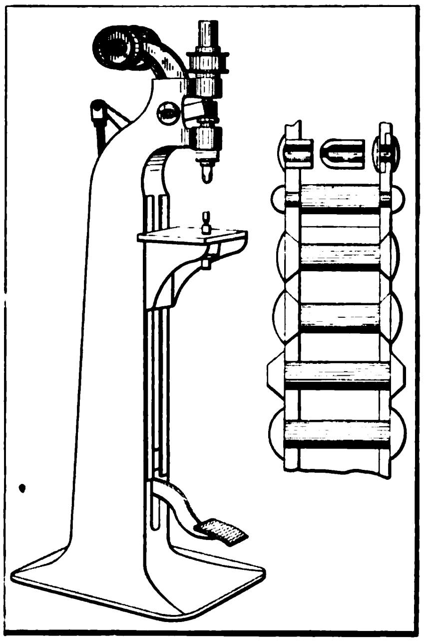
Another excellent means of subduing a gasoline fire is offered by the steel cylinders filled with carbon dioxide or carbonic acid, as it is more popularly called, under great pressure, which the motorist often carries in his car or keeps in the garage for inflating tires. If the cylinder be taken out near the fire, the gas turned on and the current of gas directed against the source of the fire satisfactory results will be obtained in nearly every case. One must be careful not to confuse "air bottles" filled with carbon dioxide with "air bottles" filled with compressed air, which are also used for inflating tires. To use the latter in subduing an incipient fire would be a fatal mistake. A current of air directed against it would only increase the conflagration in the same manner that a strong wind aids in the burning of a building.

Rotary Riveting

Riveting That Is Done in the Ordinary Way Is a Noisy Operation

GRANTING that workmen must tolerate all the little inconveniences of their calling, even assuming that they ultimately become accustomed to anything, as when a boiler-maker acquires deafness sufficient to enable him to be happy in a boiler shop, the fact remains that the quality and quantity of the work done in a plant depend upon the environment to a considerable extent; imagine the writer of this article trying to think in a boiler shop, or alongside of a battery of indefatigable riveting machines of the kind that strike a blow every second, every blow making a sound that would put a Gatling gun to shame Necessity was said to be the mother of invention. Would that mother would spank the men who employ the class of riveters that strike a hammer blow! Such noises are neither pleasant nor profitable. The illustration here given of spinning the heads on rivets has the dual advantage of doing the work 120 times faster than the old way, and the further argument that accompanies noiseless performance. It is the same old story in new garb; the silent performer does the best work. This machine is known as the Grant rotary riveter, made by the Grant Manufacturing Company, of Bridgeport, Conn., and it is capable of doing riveting of every class on a basis so efficaciously that the range of work is all the way from the riveting of sprocket chains to the most complex shapes in a structural steel establishment. The principle of riveting by this process is very simple; the rivet is placed in the usual way and the "work" is then set up on the platen of the rotary riveter with the head of the rivet in the lap of the female tool. The male spinning tool is then brought into contact with the end of the rivet to be headed over. Rotary motion is imparted to the male tool and the metal of the end of the rivet is rapidly spun down, making a riveting job that has appearance as well as security.

In a visit to the plant of the Diamond Chain Company, Indianapolis, Ind., some months ago, the Editor of THE AUTOMOBILE observed that all the riveting was done on special forms of spinning machines, and every automobilist is able to testify to the efficacy of the work done in these chains. The form of riveter as here shown is for general service, but the principle may be utilized in a hundred different ways, and the work may be done hot or cold. The spinning tools may be of any generic type of tool steel, but for hot work it is desirable to select 25 per cent. tungsten steel. Tool steel of this character will hold its hardness even up to a dull red heat. When the heading over is done by spinning the necessity for hot working is eliminated; the metal is spun down and it will run into the space equally all around, ending in a snug fit, and holding the riveted members closely embraced. This scheme of riveting should lend itself to many classes of work utilizing electric motors in the driving when portability is desired. The quality of the work is fully as good as that which is done by the old way.



The noiseless rotary riveter—a godsend in the shop

Treating Tire Wounds

Not a Few Autoists Go About It Without Judgment

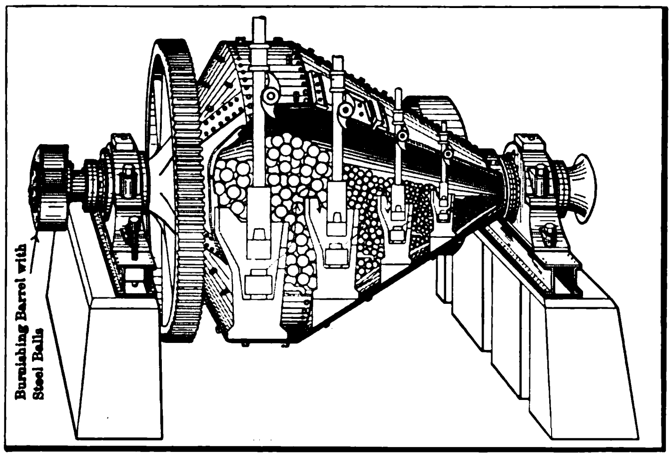
WHEN it comes to the proper handling of punctured tires, some autoists fail utterly on account of their lack of knowledge of rubber and the way that it has to be handled in order to obtain the best result. It is the practice among these automobilists to take a stick and jab it into the wounds after they become large enough to accommodate this savage instrument, without putting them to the trouble of whittling the end down to make a point, and after tickling the wound a little, they then spill a large quantity of rubber cement into, and around the wound, allowing just enough time for the cement to harden before they take to the road and hike it for a mile in just a little more than a minute. It matters very little just what speed the car is made to travel; the rubber is raw as it is dissolved to make cement, and it will not stay in the place where it is put.

Steel Ball Burnishing

A Process of Burnishing Brass Parts by Means of Steel Balls in a Tumbling Barrel

BRIGHT work, as brass and bronze parts on automobile bodies, must be brought to a high polish before it is lacquered, and the cost of polishing is rather too high to expect that good result can be a normal expectation on low-priced cars, unless some quick way can be contrived, by means of which the burnishing may be accomplished in bulk. The illustration here given of a conical tumbling barrel is of interest because it is used with good success in this class of work. The barrel is provided with an opening through which the parts to be burnished are put together with a quantity of steel balls and some ivory soap and a quota of water. The barrel is then rotated at a speed of about 60 revolutions per minute.

There must be enough of the steel balls in the tumbler to prevent the parts to be burnished from battering each other; the rule is to place two pails of steel balls per pail of parts in the barrel, then add a pail of hot water per pail of parts, and 6 ounces of ivory soap is also added per pail of water; put the soap into the hot water before it is placed in the barrel. The sizes of balls used range between 1-16 and 1-14. A special grade of steel balls is made for this work, but in some of the plants where automobile brass parts are burnished by this process the ordinary steel balls of the market are used with good success. This method of burnishing is far from new; it has been used in England for a great many years in the jewelry trade, and the finest kind of burnishing work is done in this way. The process is available for almost every class of work.



Burnishing brass parts by means of steel balls in a tumbling barrel

Don'ts for the Autoist

Don't disregard the prime selling point in salesmanship; show the purchaser how the transaction will redound to his advantage; make sure that it will be to his advantage and then it will be to your advantage also.

Don't anchor a high-tension magneto to a low (in need of attention) sparkplug; spend another dollar and lift the imbroglio.

Don't sing a song of harmonious relations of units in the automobile that you are demonstrating if it is accompanying your music with a display of 57 varieties of noise; either silence the automobile or shut up.

Don't pick out the one weak point in the construction of the car that you are trying to market and call it the best; were the prospect to accept your version, the cars as a whole would rate below the sea level at the ebb of the tide.

Don't let your fraternal connections interfere with your judgment when you are selecting an automobile; if the demonstrator belongs to the same lodge that you acknowledge, make the best of it under the circumstances, but select a good automobile just the same.

Don't let your chauffeur who has the itch purchase the tires that you require for your automobile; a bribed servant is a bad egg.

Don't place yourself in the position of the armless man who purchased gloves because they were cheap; the prudent selection of accessories will reduce the cost of automobiling a mile and a half.

Don't crow about being out of school if you do not know that merit is the automatic finder of the man whom you must reach and convince before you can make a sale.

Don't sink to the level of the dunce who never learned that capital is in the hands of the conservative man; present a conservative proposition.

Don't thoughtlessly cause trouble or expense; if you subscribe to a paper that advertises corsets and automobiles, and you want a catalogue of both at the same time, don't send the letter which is intended for corsets to signal information to the maker of automobiles; it costs quite a sum to attend to such matters.

Don't wait for trouble to come to you, and then sneak out the back door.

Don't treat your automobile as you do your watch; the oil used in lubricating the watch will stay in the jewel cups for two years.

Don't consider that you use watch oil in the bearings of your automobile, and that a single application of oil is all that you will have to apply.

Don't wait until the power plant shows that it is not big enough to overcome friction before you find out what an oil can is for.

Don't act on the suggestion that a surfeit of poor lubricating oil is equal to a small quantity of good oil.

Don't spill oil all over the surfaces of the car and take it for granted that it will penetrate into the journals.

Don't try to dissolve mud out of the oil holes and expect oil to go through and do its work besides.

Don't forget that grit will pass through a mighty small crevice.

Don't overlook the dual purpose for which lubricating oil is used; it keeps grit out, and it keeps the bearings from seizing the journals.

Don't take it for granted that an automobile will last forever just because it is new when you buy it.

SOME INJUNCTIONS IN FAVOR OF TELLING THE TRUTH; ARGUING AGAINST PROCRASTINATION; REMINDERS OF THE VIRTUE OF TIMELY PREVENTION

Don't forget that it is the bearings (as a rule) that wear out first.

Don't try to persuade yourself into believing that the bearings will last long if they are overworked and underfed; you would fag out yourself under such conditions.

Don't feed the bearings on sand; it gives them indigestion.

Don't try a table d'hôte dinner on the bearings; they have the likings of an Eskimo and are rather fond of blubber.

Don't forget that the Eskimo is uncivilized and takes his blubber raw; bearings are somewhat more refined, and have a taste for refined blubber.

Don't think when reference is had to blubber that it is a license to use animal oil in automobile work; the animal fats are acid-producing materials.

Don't forget that every form of acid will etch the polished surfaces of the balls and races of the bearings.

Don't read about ball bearings and not learn that half the value lies in the polished surfaces of the balls and raceways.

Don't overlook the efficacy of grease as a seal for bearings by means of which the bearings are protected, but the form of protection comes with using enough grease so that some of it will traverse out from the bearings, thereby heading off the influx of foreign matter.

Don't start off on a tour with a quart of lubricating oil promising yourself that you will stop at convenient points along the road and gather in a new supply as the occasion requires—there may not be any convenient points.

Don't take a whole week finding out the name of the brand of oil that you feel sure will protect your automobile from the ravages of time, and then go on the road with just enough of it to put in your eye, knowing full well that you will have to patronize a wayside garage and pay good money for whatever it affords, whether or not it is the lubricant you require.

Don't start out with an insufficiency of lubricating oil, travel 10 miles in the direction of no supply, discover that the oil is all gone, and then drive the automobile for the same distance with the bearings dry, promising yourself that it will be given a flood of oil when you get to the place where they keep it. The right thing to do is to tie the car to a convenient fence-post and hot-foot it 20 miles for the oil you require.

Don't whine about the upkeep of your car if it costs too much to maintain; the main reason why it breaks down is because you give it your choicest brand of neglect.

Don't forget that a car will run four times as long using one-quarter of the customary supply of oil if you take the trouble to dab the oil onto the bearings instead of over the outside.

Don't go around looking for a carbon remover until you have reduced the flow of lubricating oil to that which will serve for its intended purpose, thus limiting the accumulation of excess carbon to the minimum.

Don't be surprised if you succeed in so regulating your lubricating oil that it will do its intended work without precipitating an excess of carbon to foul up the piston rings and the combustion chamber surfaces.

Don't compel your motor to join you in the smoking habit; if you like it, smoke your head off; the motor and the public have more refined characteristics.

Don't buy stock at par in a mystery; if the lubricating system is so mysterious that you cannot make it out, sell.

Electrical Heat

A Formula That Will be of Value in Vulcanizing with the Current

THE amount of heat that will be delivered up by the electrical current will be directly proportional to the actual (hot) resistance of the (resistance) wires of the vulcanizer, as measured in ohms, and to the square of the current in amperes. The algebraic expression for this delivery of energy may be stated as follows:

Let,
W = energy in watts;
I = current in amperes;
R = resistance in ohms;
When,
$W = I^2R$.

This expression will be of no service to the automobilist more than to show him that there is no guess work about electric vulcanizers. The heat is available in quantity sufficient for the intended purpose, and all that the automobilist will have to do is to use it.

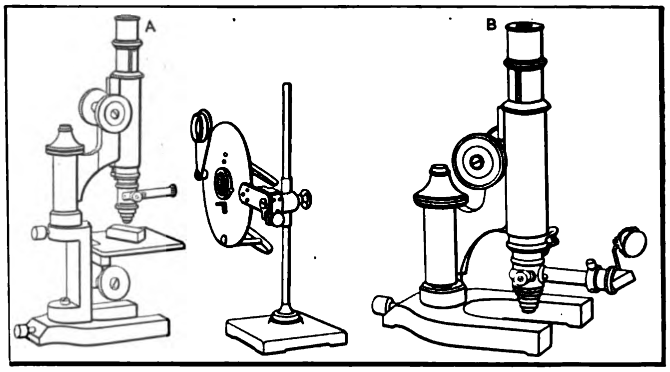
Metallography

Metallographical Problems Demand the Employment of Micro-Instruments of Precision and Simplicity

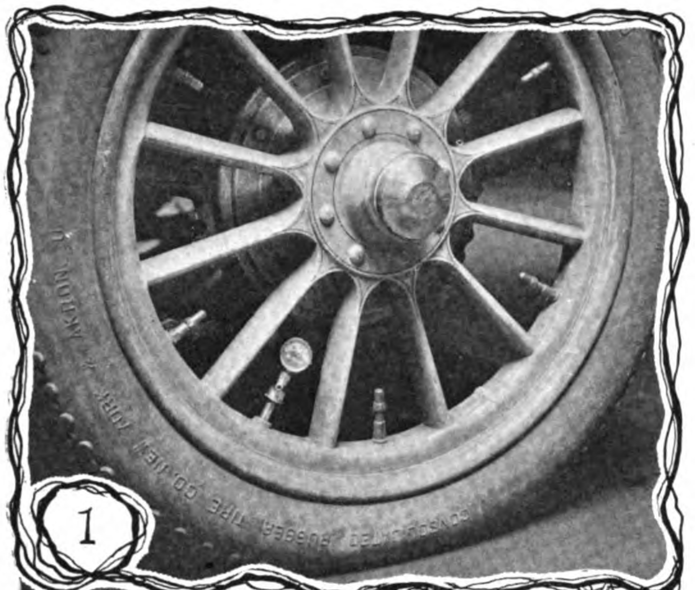
FORMERLY it was contended that metallography, through the use of the microscope, was a process for the metallographical expert, confining research to the advanced laboratory. To-day it is recognized that even a small brass foundry, if it is to turn out advanced work, must be equipped with a microscope of such design and construction that the foundry-man will be able to view the structures of the metals turned out and observe if the composition is suitable for the puropse.

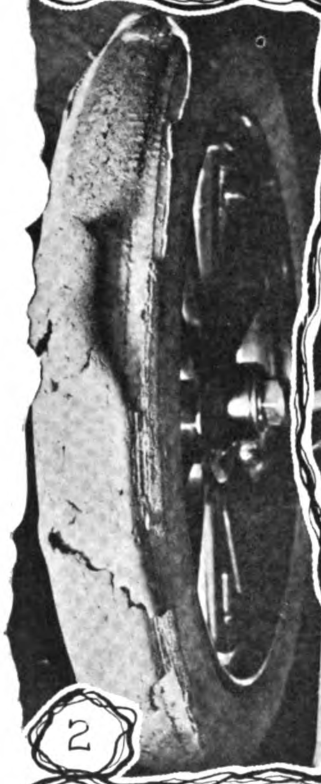
It is due to the work of Dr. William Campbell, the well-known metallographical expert, and professor of metallurgy at Columbia University, that Ernst Leitz, of Wetzlar, Germany, with a branch at 30 East Eighteenth street, New York City, is in a position to place at the disposal of factory experts a form of microscope that is now being looked upon with favor.

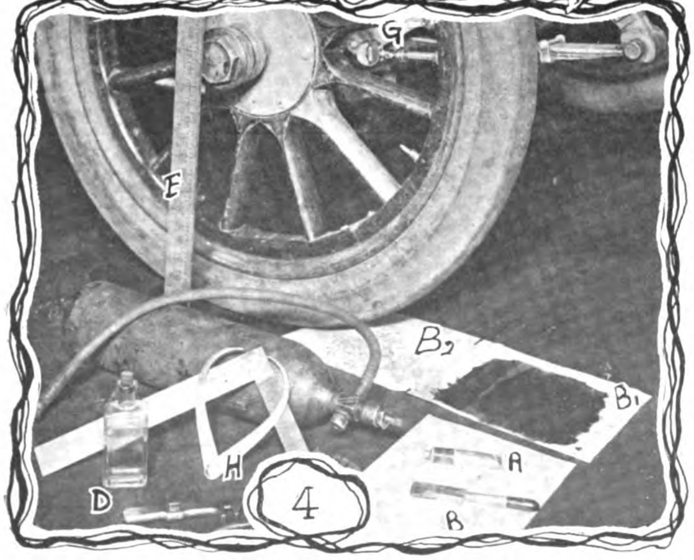
The Campbell instrument, as shown here, is mounted at (A) for laboratory research, employing the new opaque illuminator using a special form of illuminating stand, which is designed to afford perfect uniformity of the illuminated field, and a most powerful objective. The stage is adjustable by means of a rack and pinion so designed as not to disturb the relative position of the vertical illuminator and the source of light. There is a fine adjustment on the top of the column. The device for inclining has the virtue of maintaining parallelism between the surfaces to be examined and the front lens of objective. The instrument is arranged at (B) for the examination of large metal surfaces; in this form it is best suited for the man in the shop.



Microscope for Metallograpnic Researcn
(A) For laboratory work; (B) For examining large metal surfaces







Care and Repair of Tires

FLEXURE is a large factor in tire depreciation. If it will be remembered that fungus growths make the heaviest inroads on the strength of cotton fabric, it remains to observe that flexure is the next greatest damaging feature. No tire will flex excepting to swallow up road inequalities if it is big enough for the car on which it is placed, provided it is sufficiently inflated.

No tire is big enough for any car unless it can be inflated to roundness under the load. No matter how much pressure is put into a tire, it will not inflate to roundness unless it is big enough. There is no remedy that will be efficacious if the tires are not big enough. The autoist who puts his money into a car that is provided with insufficient tires will scarcely have to bother about how to keep his tire bills down; it will not be worth while—the bills will go up anyway. But if the tires are large enough to sustain under the load, then, in order to prevent flexure, they must be properly inflated. One of the strange things from the point of view of the autoist of limited experience is that a tire with an air pressure of perhaps 20 pounds per square inch looks almost as well inflated as one that is laboring under a pressure of 90 pounds per square inch; looks are deceiving, even in tires. In the meantime, a tire that is insufficiently inflated will flex out after a few hundred miles of running, whereas a tire maintained at a pressure of 90 pounds per square inch for a six-inch diameter size will run some thousands of miles, depending upon the quality of the tire and other considerations besides the question of air pressure.

The illustrations here offered were taken from actual life, and have for their object partly the education of the man who wants to know, but for the most part as information for the man who thinks he knows. Some of the illustrations portray a condition of tire abuse. Fig. 1 shows a 36 x 4 1-2-inch tire under a pressure of 30 pounds per square inch. The tire expert of the staff of THE AUTOMOBILE held the car up as it was leaving a garage, asked the chauffeur what he was running in his tires, and was answered, "About 65 to 70 pounds." The staff man, being a little keen on tires, put a gauge on them and found the one here illustrated to be inflated to 30 pounds pressure.

Fig. 2 is another tire that was found on an automobile in a garage, the latter being far from clean, with a good many dollars' worth of oil floating around the floor, and the appearance of the tire shows that some of this oil came into contact with the tread of the tire and succeeded in accomplishing the destruction noted. Fig. 3 shows a tread bruise, due to a slanting blow, as a car was being turned around in the street, the wheel coming into contact with the sharp edge of the curbstone. The tire, as a whole, was in good shape; its record showed 2,000 miles of travel, and a prompt repair in this case should add 2,000 miles more to the life of the tire.

Some inquiry seems to have shown that the average chauffeur is very willing to inflate his tires if the owner will furnish a bottle of carbonic acid for the purpose, as shown in Fig. 4. The chauffeur will even know how much pressure there will be in the tires if the owner will furnish a gauge by which he can record the same. In one garage, the other day, it was found that out

Fig. 1—A 36 x 4 1-2-inch tire under a pressure of 30 pounds per square inch. The chauffeur said that the pressure was from 65 to 70 pounds per square inch

Fig. 2—What happened to a tire that was soused in lubricating oil, of which a great quantity lay on the garage floor

Fig. 3—Inflating a tire with carbonic acid, opening the needle valve slowly, watching the gauge to avoid over-inflation

Fig. 4—Showing the simple forms of implements with which much valuable information can be obtained about tires

THIRD INSTALLMENT ILLUSTRATING PROFESSIONAL METHODS OF REPAIRING; DISCUSSING THE BEST WAY TO OBTAIN THE MAXIMUM RESULT

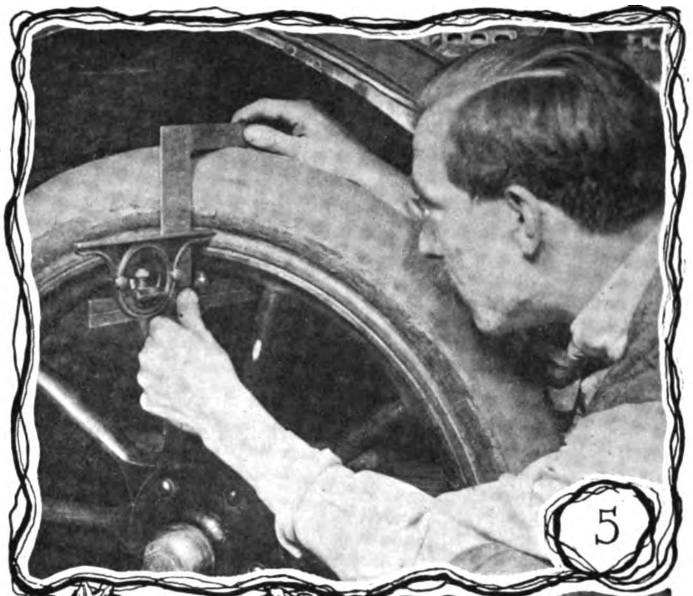
of ten automobiles but one carried a tire gauge. The particular chauffeur who was so fortunate as to be provided with the necessary facilities was making a good record for his owner. The question of the efficiency of carbonic acid for inflating purposes is one that has been debated from time to time, and while it is true that this compound has a finer molecular structure than atmospheric air, hence is more difficult to keep in, the fact remains that carbonic acid gas does stay in the inner tubes with sufficient persistence to serve the practical end, and the Editor of The Automobile, desiring to obtain the opinions of tire makers, wrote to them some time ago, and without exception they stated, "There is nothing about carbonic acid that will injure either rubber or fabric." Since this acid comes in convenient form, and makes tire inflating work more of a pleasure than pumping does, the fact that the tires have to be inflated a little more frequently is a matter of small moment. Tire gauges, as they come from abroad, are marked off to read in kilograms per square centimeter; the American gauges are marked off to read in pounds per square inch. The following is a table of equivalents by means of which the gauges that are marked "kilograms" may be interpreted in pounds per square inch:

Kilograms per square centimeter	Pounds per square inch
1	15
2	29
3	43
4	57
5	72
6	86
7	100

In the investigation of tire conditions in actual practice, the "staff man" used the simple implements as shown in Fig. 4, in which A is a tube of Prussian blue, B is a brush, and D is a bottle of turpentine. When a little of the blue is toned down with turpentine to a painting consistency, and spread over a piece of white paper, if the paper is laid upon the floor at a smooth point, and the wheel of the car is permitted to pass over it, the Prussian blue will transfer to the tread of the tire, after which by substituting a clean sheet of paper B2 and rolling the blue portion of the tire over it, an imprint will be made which shows the area of contact of the tire with the road.

Referring to Fig. 6 of a method of measuring the radial diameter of the tire section at the point of contact and at a diametrically opposite point, it will be observed that the difference in the radial diameter of the section may be found, and when this difference exceeds 3-5 of an inch it is claimed by some tire experts that the tires are either not inflated or they are not big enough for the car on which they are placed. In this connection, it may not be out of place to state that the man who wants to buy an automobile should insist upon it that demonstrations be made with precisely the same diameter tires as those that will be on the new automobile.

Fig. 7 shows the process of measuring a tire to find out how much it squashes down, due to weight, and while this operation is normally not a necessity, it is nevertheless one that might well be performed by the autoist who wants to know whether the tire equipment on the automobile he has his money in is big enough to keep him out of the poorhouse. Fig. 8 shows another operation in the measuring problem, which will explain itself.



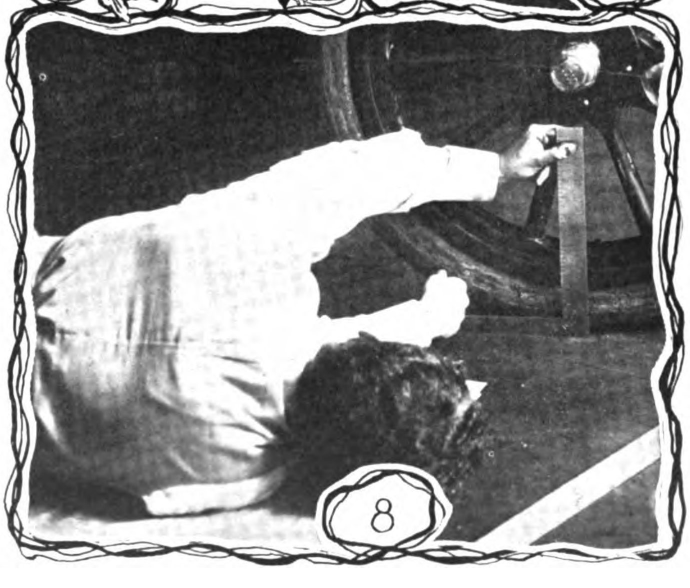


Fig. 5—Measuring the sectional diameter of the tire at a point opposite the point of contact to find the difference

Fig. 6—A good tire with a bad bruise which was brought about by trying to turn the car around in a narrow street without backing up

Fig. 7—Measuring the height of the tire from the floor in getting at the amount of flexure

Fig. 8—Measuring the distance from the point of contact of the tire to the rim to see how much the tire squashed down

Speed with Security

BY MARIUS C. KRARUP—A FOUNDATION FOR UNIFORM AUTOMOBILE LAWS BY WHICH HIGH AVERAGE SPEED BECOMES ALLOWABLE THROUGH SUPPRESSION OF NEEDLESS CAUSES OF TRAFFIC DISTURBANCE (FIRST INSTALLMENT)

Suppose there are 18 well-defined causes of traffic disturbances and all regulation, as prescribed by law, is directed against two of these, one being excessive speed and the other sheer mechanical incompetence of drivers (which is rare and not easily regulated), while among the 16 remaining causes many are of the highest importance, though not as yet generally understood, does it not stand to reason that intelligent action for the removal of these 16 neglected causes of trouble should bring about a condition of the traffic so hedged with security that speed regulation may be left to the individuals best able to judge the situation in each instance? The writer proposes a commission of specialists to formulate the requirements and draft a bill on which the legislators of all States may agree by reason of total absence of class bias from its provisions and also the suitability of these provisions for being completely enforced everywhere without hardship to any good citizen or class of citizens.

THOUGH automobile associations have existed for a number of years and have worked together with legislatures in drawing bills for the regulation of automobile traffic, the much desired condition under which all the States of the Union look upon the requirements in the same light and express them in the same words still bears the aspect of a utopian dream. May it be that these requirements have never been set forth without complication with class interests or that, such as they are in the fitness of things, they clash in some irreconcilable manner with true statesmanship, and the problems of the clash lead to many different solutions? An analysis penned with toleration toward divergent views and with frank effort for bringing under consideration all the factors really involved should go a little way in the direction where unity lies. On the other hand, to be too serious and to weigh with petulant insistence every little thing which may disturb somebody's peace of mind or which may tax a granny's ability to keep step with the procession of the world would seem to be superfluous, as even a casual glance at the traffic conditions brought about through the widespread employment of automobiles reveals a number of factors which legislators have apparently never considered and which in themselves are important enough to warrant viewing the subject under a new angle. And from this angle a set of regulations may be the upshot in which the legislators of all States can concur, if the automobile associations do their part in taking united action, laying their case before the Uniform State Law Commissioners at Washington, perhaps, somewhat on the lines which have been followed with regard to road improvement. Assuming that the object of regulation of traffic is in all cases the furtherance of tranquil conditions under which nobody's rights will interfere more than is necessary with the rights of others, the possible causes of disturbance which are to be removed may be divided into five classes, those originating with (A) the driver, (B) the vehicle and its makers, (C) pedestrians and other traffic members, (D) the State and its officials and (E) public opinion as vented in the public press.

A.—The driver may be of (1) an insolent disposition and constitutionally inclined to run roughshod over those upon whom he looks down as inferior beings or as persons unable to defend themselves. He may be (2) inebriated and thereby temporarily deprived of decency, common sense and the full use of his physical faculties. He may be (3) permanently deficient, having poor sight or hearing or being subject to nervous collapse in emergencies.

B.—The vehicle may (4) possess peculiarities affecting the driver's actions and faculties. It may be (5) faulty in its control elements. It may be (6) of appearance so odd as to scare horses or it may be (7) used in districts where any automobile scares horses or temporarily upsets the judgment or ruffles the temper of the drivers of other vehicles. It may (8) possess certain peculiarities through which its speed or the direction of its motion fails to be accurately or quickly perceived by the average person participating in the traffic.

C.—Pedestrians and drivers of vehicles in the traffic, including drivers of automobiles, may be (9) insolent and inclined to make trouble. They may stubbornly insist that the slow member of the traffic has as good a right to all of his slowness as the automobile driver has to some of his speed. They may be (10) inebriated. They may be (11) deficient, having poor sight or hearing, or both, or being subject to nervous collapse in emergencies. They may be (12) unaccustomed to the sight of automobiles.

D.—The State, through its officials, including legislators and magistrates, road supervisors and police, may be (13) poorly informed (14), venal or biased, with all the results flowing from such a condition in the way of bad laws, poorly enforced laws, exasperation of the traffic members, including the automobile drivers, contempt for all regulation, tricky legal quibbling on technicalities. The State may be (15) poorly organized for the enforcement of law.

E.—The public press which voices and shapes public opinion may be (16) following false channels, catering to class interests or failing to spread information of essentials when these lie beyond the horizon of the average reader and when an explanation of them would need to be carefully worked into intelligible form and occasionally repeated in other forms in order to become appreciated.

Among all the considerations mentioned, only those pertaining to the automobile as a vehicle are new in kind, but all of them are raised to a new potentiality through the speed of automobiles. It is therefore not illogical that speed has been the principal subject for regulation in the past. But the logic, while not bad, has been incomplete and one-sided. Speed in itself is universally desired. Even the most conservative prefer to travel at the rate of 40 miles per hour or faster in a railway train. The object of regulation should not be to kill speed, but to render it harmless and to subdue those too much infatuated with its charms, so that they will subordinate it to more important or urgent considerations when circumstances so require. The highest speed consistent with the safety of traffic and the tranquillity of the majority of citizens—and with some allowance for the peculiarities of those who are weak and incompetent—is the best. The object of regulation should therefore be that of raising speed to the maximum which may be attainable with safety and to remove all those special causes mentioned in the foregoing through which speed becomes a source of danger instead of an absolute advantage, and through which, therefore, the necessity arises for reducing speed.

Probably it will be generally admitted that this fundamental viewpoint has not been represented in legislative debates. The keynote in these was in the beginning frankly suppressive on one side and defensive, almost apologetic, on the other. Persecution, while it has been eaten down by its own corrosiveness in course of the years, is still only thinly veiled. All that remains of this unjust feeling of animosity against a form of transportation which is destined to become universal may probably be entirely removed when the progressive camp adopts as its slogan the suppression of all factors in the situation which tend to make traffic unsafe and insist on the other hand on receiving the benefit which such removal will justify in the way of increased speed and freedom from artificial restrictions.

Questions That Arise

SOME OF THOSE THAT COME UP IN EVERY-DAY AUTOMOBILING ARE ANSWERED BY THE MATTER WHICH IS BEING PREPARED BY FOREST R. JONES IN THE NEW EDITION OF THE "AUTOMOBILE CATECHISM" THAT WILL SOON GO TO PRESS

[263]—How do you test the front wheels to see that they will take the proper position for running straight ahead?

Place the wheels in position for running straight ahead. Push the car far enough forward to see that it runs in a straight line. Measure between their tires (or rims) at the back part of the wheel at the same distance from the floor as the center of the hub of the wheel. Use a stick cut to the right length and mark the spots on the wheels between which the measurement is taken. Then push the car forward until the front wheels make half a revolution and measure again between the spots previously marked. The spots will be at the front of the wheel after pushing the car forward. The distance between the spots should be the same as before.

Do not push the car backward just before measuring between the wheels, since that will give them a position different from that of running forward if there is any lost motion in the parts.

[264]—What effect has wear in the distance (transverse) rod upon the position of the front wheels?

It allows the wheels to spread apart in front, so that each has a tendency to run forward toward its own side of the road. This causes a side slipping of the tires and wears them out rapidly. The distance rod connects the knuckles which support the front wheels. It runs across the car parallel to the axle.

[265]—How do you clean a transmission chain and put it in running order?

One link is removable. It has pins fitted with screws or cotter pins which can be easily withdrawn.

Remove from the sprockets and place in gasoline or kerosene a few hours until the grease is cut free, then take it by the ends and run it back and forth through the gasoline to work out the dirt. Hang it up to dry and then submerge in a good machine oil, moving it about to allow the oil to work in around the pins, then apply a grease, such as axle grease, to retain the oil and prevent as much as possible the entrance of dirt and grit.

[266]—How can a broken chain be repaired?

Extra links and pins should always be carried for this purpose. If none are at hand, a short piece of large wire or a wire nail may be used temporarily for a pin. When using such a makeshift for a pin, care must be taken not to rivet it down so as to grip and bind the links together. This repair on the road is not easy in the absence of the proper links.

Wire may be used to replace a link by winding it over the pins to be connected. The pins must be kept at the proper distance apart to correspond with the pitch of the chain, else it will not run on the sprockets. The use of wire in this manner is difficult and only worth while under great necessity.

[267]—How should a double-chain drive be adjusted?

So that the distance between the driving and driven sprockets (between centers) is the same for both road wheels (on both sides of the car).

The distance between the two sprockets over which one chain runs can be measured by a stick cut to suitable length. This distance can be adjusted by means of the threads and nuts on the radii rods which run forward near the extremities of the rear axle, outside of the spring perches.

One of the chains may be tightened more than the other where the distance between sprockets is the same, as above, but this is preferable to an adjustment to make both chains equally tight if they are of different lengths. The latter adjustment tends to make the chain climb on the teeth of the sprocket wheel.

[268]—How can a band brake be relined?

Remove the old lining, which is generally fastened in place with rivets, and replace by another with new rivets. See that the band has an even curvature, either the same in diameter or slightly larger than that of the drum.

Copper rivets are better than those of harder material such as rivet iron. The lining should be countersunk for the rivet heads, so that they will not rub against the brakedrum. The drum is apt to be cut by a rivet which rubs against it, especially if the rivet is of hard material.

[269]—What materials are suitable for brake linings?

Woven cotton belting (cotton web), woven asbestos with a wire gauze woven in the asbestos, leather, wood fiber, etc. Copper and brass are satisfactory under some conditions, more especially when the brake is lubricated.

[270]—How would you put a new leather on the cone of a friction clutch?

Remove the old leather carefully and use it as a pattern for cutting out the new one. Trim the new leather to uniform thickness. A harness-maker can do this readily in a suitable machine.

Fasten one end of the new leather in place on the cone with rivets. Wrap the leather around the cone and cut it a quarter of an inch or so short, while holding it in place by hand. Rivet the other end in place. The remaining rivets can now be put in. The leather should fit snugly when pressed into place as the rivets are put in. Copper rivets in deeply counter-sunk holes are suitable.

If the leather is found to be too thick after being put in place, it can be turned down in an ordinary engine lathe (machinist's lathe).

It is not actually necessary for the clutch leather to be all one piece. Two pieces can be used with entire satisfaction. More rivets are required, however.

[271]—How do you adjust a loose bearing of the plain journal type?

Remove one of the shims, if any are used, and tighten the box till it just moves freely on the journals when there is no oil on it. (Shims are thin pieces of metal placed between the cap and body of the box.) It is far better to adjust with a little shake than have a pinching fit.

[272]—How can a cracked casting such as the metal shell around the water-jacket space, or some housing, or casting of the car be repaired?

There are various processes which can be applied according to the conditions of the case. Some of these are brazing, welding with oxy-hydrogen flame, oxy-acetylene flame, etc. Repair can also be made in the foundry in some cases by pouring molten metal against the broken part so as to melt part of it away and fuse the liquid metal into the remainder thus forming a complete piece. Another method is to put sal-ammoniac solution in the crack when the metal is iron or steel. This causes rust, which closes the crack more or less effectively. It may be remembered that sal-ammoniac is used in ordinary dry batteries. This method is a last resort.

It is advisable to consult those who make such repairs as a business.

A cracked water jacket can sometimes be successfully repaired temporarily by rubbing into the crack a cement made from yellow oxide of lead and glycerine, making sure that the latter is free from water.

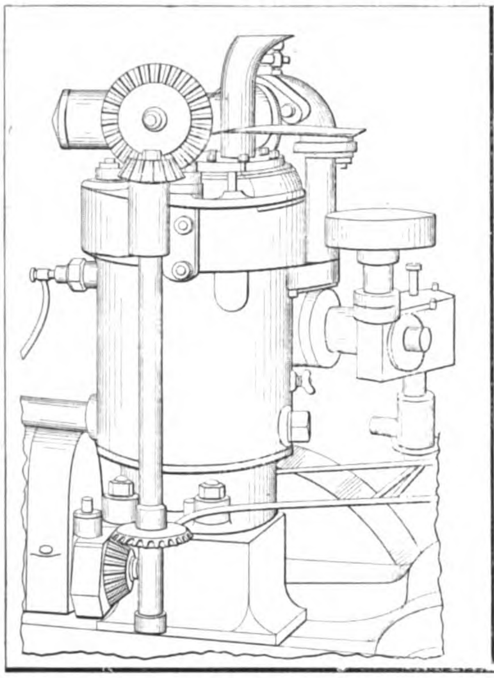


Fig. 1—The Blood disc valve engine

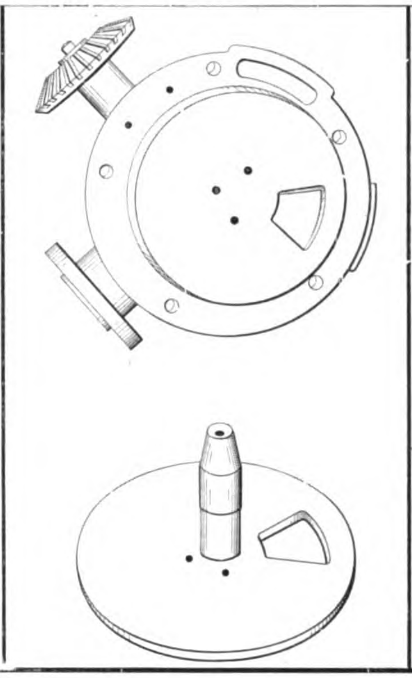


Fig. 2—Showing discs removed

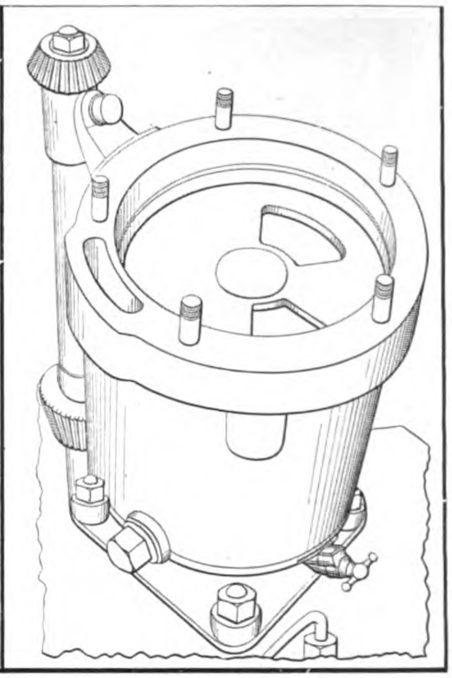


Fig. 3—Cylinder heads removed, showing bolts

Digest

Novel Disc-Valve Motor; Electric Lighting System; and Other Matters of Interest

A new idea in gasoline motors designed by Lieut. Blood appears in the *Automotor,* and an experimental single cylinder with a 4-inch-bore and 4 1-2-inch stroke has been made to demonstrate the principle.

As our illustrations show, the special feature consists of a flat disc having a single port cut through it, this disc fitting between corresponding ports above and beneath, through which the explosive mixture is admitted from the carbureter, and the exhaust gases are allowed to escape to the silencer. The disc is caused to revolve at half the speed of the crankshaft by means of bevel gearing—which could, of course, be replaced by skew gearing—and the disc has a ground face top and bottom, fitting closely upon the cylinder head beneath and the jacketed cylinder cover above.

Dynamo for car lighting—Of late great attention has been paid to the question of supplying illuminant for the car at night and the most favored types are acetylene and electricity. The reason that acetylene has a larger following than electricity is due to the compact form in which it is now put up, the necessity of frequent charging of storage batteries and the attending costliness of this latter operation. A dynamo permanently fitted to the car and driven by it avoids all charging drawbacks and is clean, compact and, if properly handled, always ready for service.

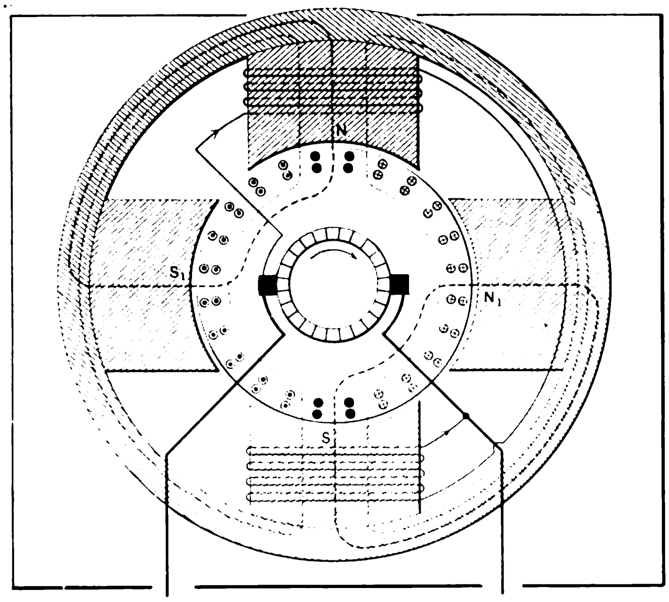


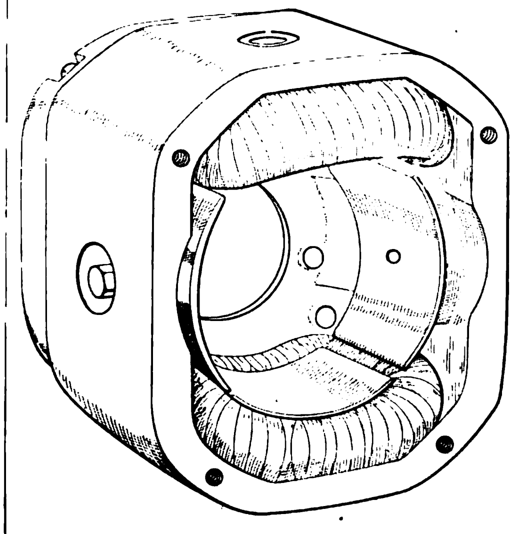
Fig. 7—Section through the dynamo showing the four poles and method of planting inductors in the laminæ of the armature

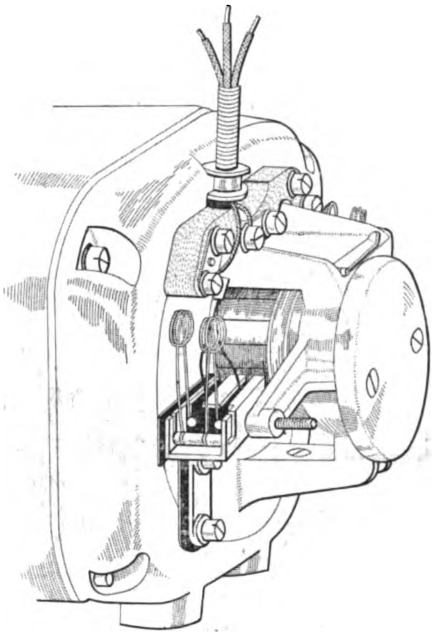
The dynamo here illustrated, the C. A. V., made by C. A. Vandervell, of Acton, England, has four magnet poles—two ordinary ones N1 and S1 and two subsidiary ones N and S. The latter are excited in the usual manner by means of their windings, but the former are unwound. The armature is drum-wound and the windings are helically staggered, so that those immediately under the subsidiary pole pieces are in communication with the brushes on the commutator ring, and the magnetic flux from their two windings passes diametrically from one subsidiary pole to the other and dividing right and left returns through the frame of the machine as clearly indicated by the dotted lines in Fig. 7.

The collecting brushes are of sufficient width to continually cover two of the commutator sections, and thus they short-circuit certain coils, which are represented in Fig. 7 by eight black dots.

These short-circuited coils instead of being in a neutral magnetic zone as in the case of the ordinary dynamo are situated in a region of great magnetic activity, as they are cutting the lines of force produced by the subsidiary coils N1 and S1. The short-circuit currents produced by these coils "cross magnetize" the armature and set up a magnetic flux at right angles to that of the subsidiary poles, which effect is greatly enhanced by the presence of the unwound ordinary poles.

In consequence of this the previously existing magnetic flux is "distorted" and instead of pursuing the path already traced by these dotted lines and passing from one subsidiary pole to the other through the armature it now passes only halfway through the armature and turns aside, as shown by the thicker dotted lines, thus having a quadrantal path. This change of flow takes place gradually as the speed of the machine begins to rise. While this effect is being accomplished, however, there is another force at work, for the coils of the armature which are not short-circuited are producing current in the usual way, and this is being collected by the brushes and delivered either to the batteries or the lamps as the case may be. Further, this working current has a magnetizing reaction which directly opposes the magnetization





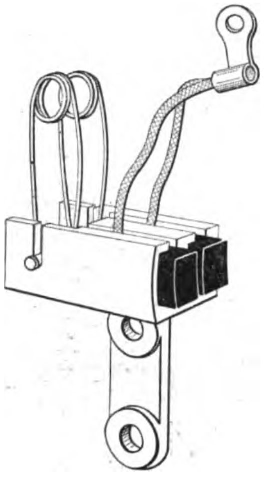


Fig. 4—Field piece with polar extensions. Fig. 5—Commutator end, showing the brushes. Fig. 6—Details of the brushes and holders

of the subsidiary poles, and as the demagnetizing reactions increase proportionally with the speed, the natural tendency of the output of current to increase also with the speed is directly opposed, the result being that there is a constant generation of current.

Three types of C. A. V. dynamos are made; first, 6 volts, 5 amperes, to be driven at from one and a half times to twice engine speed; second, 12 volts, 5 amperes, to be similarly driven; third, 12 volts, 5 amperes, to be driven at engine speed. The first type is suitable for light cars, and especially cabs, for which it seems to be eminently suitable. The dynamo is contained in a dirt, water, oil and dust-proof case, weighing only 16 pounds, and having in larger sizes dimensions of 11 inches x 7 inches x 6 inches can readily be installed on almost any car.

In Fig. 4 is given a sketch showing the disposition of the main and subsidiary poles in the frame, while Fig. 5 is an illustration of the armature end, brushes, etc. The latter are shown in detail in Fig. 6. The brushes themselves are a special grade of carbon and are contained in slides, where they are pushed against the commutator by means of the springs shown. They are connected up to the insulated bridge indicated by dotted shading in Fig. 5, where they are placed in communication with the switchboard through the main cable.

Supplanting Rubber

At Eight Sets per Year Pneumatic Tires Will Have to Go

AUTHENTIC data bearing upon the life of pneumatic tires is difficult to obtain. Just how many sets of tires an automobile will wear out in twelve months depends, of course, upon the sizes used considering the design, power and weight of the automobile; the miles traveled per year must also be figured in, and the character of the roads over which the automobile goes will influence tire life. Then, there is the personal equation to consider, also the skill of the owner, and the extent to which the needs of the tires are looked after. At all events it has been claimed that eight sets of pneumatic tires may be worn out in a single year by an automobile. There is one great compensating factor that must not be forgotten; the tires, not the automobile, wear out. In many attempts to substitute solid for pneumatic tires, the reverse has been true, that is to say, the automobile suffered instead of the tires. The tire that is to put the pneumatic *hors de combat* must last longer than the pneumatic; cost less to the user and not shorten the life of the automobile. Inventors might as well keep these details in mind while they go about the great task.

Aluminum Castings

Strength Depends Upon Thickness and Shape of the Castings

WHEN the strength of aluminum is being investigated it is necessary to take into account the shape and thickness of the casting as well as the mixture and the quality of the work done in the foundry. It is on this account that test proofs attached to the castings do not offer a means of determining the true strength of the metal. As a general proposition the strength of cast aluminum varies as follows with the thickness of the castings:

Thickness in inches	Relative tensile strength in pounds per square inch
0.10	108
0.20	100
0.30	98
0.40	94
0.50	90

In every attempt to eliminate sound by adding to the thickness of the aluminum walls, it is at the expense of strength of the metal as measured in pounds per square inch.

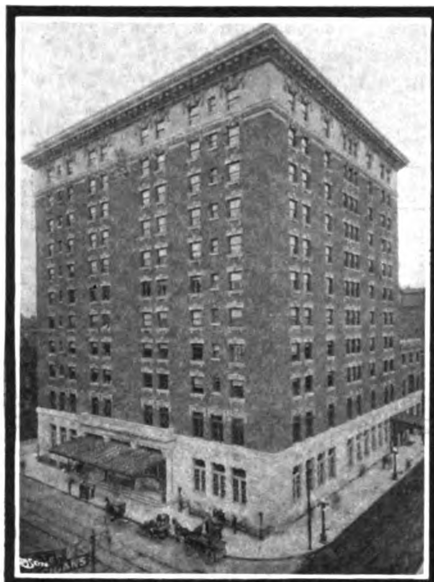
German Automobile Imports and Exports

For the first eight months of the present year up to the end of August the import of cars and parts has shown a slight increase in value over the same period in 1909, the figures for 1910 being $1,927,250, as compared with $1,741,000 in 1909. The exports, however, show a much larger increase. The value of cars and parts exported for the first eight months of this year shows a large increase over last year, the figures up to the end of August, 1910, being $4,897,500, and for the same period of 1909 $1,861,100.

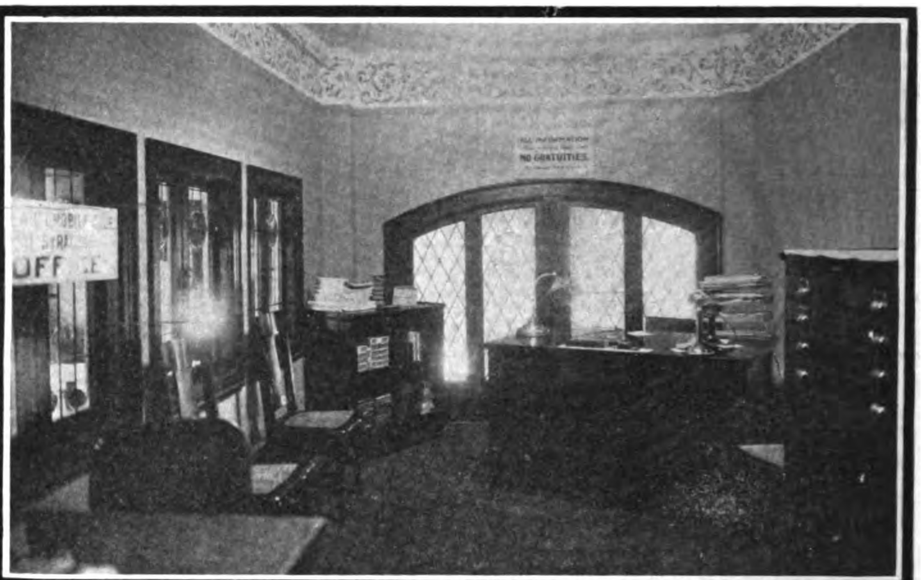
A series of technical dictionaries, on the Scholmann system giving the equivalents of technical terms in English, French, German, Italian, Spanish and Russian, are published by R. Olden-Bourg, Munich and Berlin. Whenever practicable the terms are also illustrated in the most universal language; that is, by drawings. The latest volume deals with iron-concrete construction.

Auto Club of Syracuse

HISTORY OF ORGANIZATION THAT HAS GAINED THE NAME OF "LIVE WIRE" BY ITS ACTIVITY IN MANY USEFUL LINES OF MOTORING



Where Club is Housed



Office of the Club

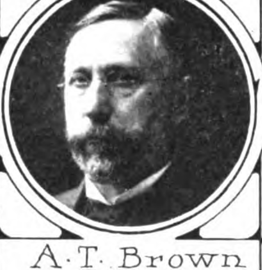
Dr C M Ryan
2nd V Pres

H.W. Smith
Pres

H P Denison
1st V. Pres.

Forman Wilkinson
Sec and Treas

J. W. Smith
Director



A. T. Brown
Director

W. L. Brown
Director

C C. Bradley Jr.
Director

B. E. Watson
Director

SYRACUSE, N. Y., Nov. 7—There are fifty-seven automobile clubs in the State of New York and there is not one among them which more clearly answers the definition of a "live wire" than does the Automobile Club of Syracuse. It is a club of achievement. Pioneer in the road sign movement now being taken up by clubs all over the country, strongly influential in the making of legislation, standing firmly for the compliance by all drivers with the laws fixed by the community for their control, a potent force for improved highways, putting forth special efforts for the convenience of tourists, the Automobile Club of Syracuse is for the automobile from A to Z.

The club was organized June 12, 1901, T. D. Wilkin being its first president. There were not many more than members enough "for a quorum." The first club run was held that year to Pleasant Beach, a nearby resort.

The club flourished until at the expiration of the term of the second president, Willett L. Brown, there were nearly 100 members.

The Syracuse club organized the New York State Automobile Association, which now has a membership of over 5,000. The club now has a membership of well over 600 and is taking in twenty and thirty at a meeting.

The early meetings of the club were held at The Yates, but with the growth of the organization permanent quarters were required, so some three years ago rooms were secured in the S. & A. K. building and Miss Grace Tickner was placed in charge as office manager.

Three months ago the Automobile Club of Syracuse removed to the Onondaga and has handsome permanent offices therein on the mezzanine floor overlooking the lobby, fitted with mahogany furniture and fixtures, forming a most attractive resort for the tourists who make the Onondaga their headquarters.

The present officers of the club are H. W. Smith, president; H. P. Denison, first vice-president; Dr. C. M. Ryan, second vice-president; Forman Wilkinson, secretary and treasurer, Miss Grace Tickner is office manager. The directors are B. E. Watson, C. C. Bradley, Jr., J. William Smith, A. T. Brown, and W. L. Brown. The club is regularly affiliated with the American Automobile Association as well as with the New York State Automobile Association.

"All roads lead to Syracuse," is the slogan of the club, and the organization has helped in no small degree to make the city the busy center it is. In the aggressive campaign, never-ceasing, that is waged for members, the following reasons are given why men should join the club:

"This club stands for organized opposition to unjust and discriminatory legislation affecting automobile interests; for the improvement of our streets and highways; for the observance of the State automobile law and city vehicle ordinances, and for the furtherance and protection of all legitimate interests of automobile owners."

The club's deeds back up its words all around, and in no field more thoroughly than in that of legislation. From 1906 to 1909 about twenty bills each year, taxing and restricting motor vehicles, were introduced in the State Legislature. If one ran only an electric the passage of the L'Hommedieu bill would have made it cost from $5 to $7 annually in taxes. The New York State Automobile Association, in fighting these measures, had no more spirited member than the Syracuse club. And in 1909 the Syracuse organization was one automobile club in the State that fought to defeat the Allds-Hamm bill, this measure having been favored by the State organization and fifty-seven other clubs. Governor Hughes backed up the Salt town judgment by vetoing the bill.

A work in which the club is profoundly interested is the locating of route and danger signs within a radius of fifty miles around Syracuse. They are being placed north as far as Watertown, south to Cortland, east to Oneida Castle and Richfield Springs and west to Auburn and Weedsport. The Automobile Club of Auburn intends to vigorously prosecute this work next season, just as the Rochester and Buffalo clubs are now doing, following the lead of Syracuse.

The signs are made to last, being composed of sheet steel, enameled in white with dark blue letters. Besides route and distance signs, there are "dangerous hill," "danger," "railroad and trolley crossing" signs. "Gasoline for sale here" signs are now being distributed through the countryside for tourists' convenience, and everything is marked as erected by the Syracuse club.

In 1909 over 600 road signs were placed. This year there were over 700. The club now employs two or three men constantly in placing these signs. It has been the ambition of the club in this sign work to so wholly post Syracuse and environs that tourists will need to visit the club headquarters merely for a social call. And this ambition is being realized.

The club has taken the liveliest interest in the good roads movement. Last year among other donations, it raised $350 to help complete repairs to Free Bridge at Cayuga Lake.

The club is, first and foremost, a business organization, and the social part comes later, though there are delightful times at the banquets which are held at the annual meetings. For a long time the organization had too much business afoot to hold club runs, but a new era was established in July of this year, when the sociability run for the B. E. Watson trophy was held to Rexford Falls and return. Nearly a hundred machines participated and such a success was it that it was determined to repeat it next year.

Since its inception the Syracuse club has had annually an "orphans' day," when the little inmates of city institutions for the parentless have been taken upon enjoyable outings.

In January of this year the club started its official monthly paper, *The Spark Plug,* a snappy publication that is flourishing.

The Syracuse club has had a lot to do with the success of the two shows the Syracuse Automobile Dealers' Association has held and has lent its efforts toward this end without stint.

There are two road signs prominently shown through this section which are positively unique and Secretary Wilkinson is the "composer." Both are signed by the club. One, at the entrance of a town, on all the main highways, reads, "Please drive carefully through this town." At the exit of the town the autoist is confronted with a pleasant "Thank you."

All in all a "Live-Wire" club like that of Syracuse is worth infinitely more than all the dead ones that ever died. For had they been like that of Syracuse they wouldn't have died.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL-CLIMBS, ETC.

Nov. 19-26	Oakland, Cal., Idora Park Snow, Under Management of Oakland Automobile Dealers' Association.
Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 14-28, 1911	Philadelphia, Annual Show, Philadelphia Licensed Automobile Dealers' Association, Third Regiment Armory.
Jan. 15-21, 1911	Detroit, Wayne Gardens, Detroit Automobile Dealers' Association.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11, '11	Chicago Coliseum. Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Feb. 24-27	New Orleans, La., Annual Show, New Orleans Automobile Club.
Mch. 4-11, 1911	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.
Mar. 25-April 1	Buffalo, N. Y., Fourth Power Boat and Sportsmen's Show, Sixty-fifth Regiment Arsenal, Buffalo Launch Club.
Mch. 25-Apr. 8	Pittsburg, Annual Show, First week, pleasure cars; second week, commercial trucks. Automobile Dealers' Association of Pittsburg, Inc.

Races, Hill-Climbs, Etc.

Nov. 7-11	Five-day Reliability Run of Chicago Motor Club, 200 Miles a Day.
Nov. 10-12-13	San Antonio, Tex., Track Meet.
Nov. 11-12	Savannah, Ga., Road Race, Savannah Automobile Club, and Grand Prix, Automobile Club of America.

THE AUTOMOBILE

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TEACHING the automobilist how to take care of his tires, in view of the cost to him if he fails to do so on his own account, would seem to be like carrying coals to Newcastle. Unfortunately, there resides in the tire situation a complex problem, the nature of which remains to be understood; nor can it be claimed that those who should know most about the situation are taking overmuch time in the exposé of the same. If a task is to be performed, and it remains undone, despite a pressing necessity, the natural inference is that the master of the job is as yet in the coming. In the meantime, rather than to float with the tide, it would seem to be a better plan to struggle with the "beast," with the expectation that if he cannot be mastered, he may be winded. THE AUTOMOBILE makes a special effort this week, opening up a new line of thought and presenting to the owner a system for the investigation of his tires that will help him to arrive at fitting conclusions from time to time, and permit him to locate defects in the tread long before they would be noticeable, as a matter of direct observation. The imprint method of investigating the condition of tires requires nothing more than a few strips of paper, a modicum of Prussian blue, and a little time.

* * *

OWNERS of automobiles make a great mistake when they assume that articles in a technical paper are too technical for them to bother with. The word "technical" is much abused. Its proper definition should be given as follows: "A terse explanation of the use of a mechanism." Much of the matter that passes current as "technical literature" is, of course, a mere jumble of meaningless words; they being valueless, the author attempts to bolster them up by the application of algebraic formulæ, and it is no wonder that those who are busy enough making their automobiles go decline to waste any time upon "word jumbles"; but when technical literature, so-called, is limited to a clear and understandable statement of the underlying facts, the man who desires to limit the cost of operating his automobile can well afford to throw his prejudice away and exercise his common sense. Every fact ceases to have a technical significance as soon as it is generally understood; the only reason why it is regarded as technical is because its proper understanding is not broadly disseminated. There is no more simple way of describing a thing than to clearly state the object of its existence, how it is made, and how it must be operated to obtain the good there is in it. If this is technical literature—and it must be—it remains for the automobilist to expend a dollar's worth of time reading it, so that he can save himself a thousand dollars'.

* * *

WHAT is speed? History proves that when security is realized to the fullest extent, the question of speed dies out. Four thousand years B.C., when men were prancing around on "Shank's mares," the first war chariot was an adequate illustration of speed in the absence of security. It was not a case of the chariot going very fast so much as it represented the inability of men to get out of the way. A few years ago when horse-cars were relegated to the scrap pile, and the "trolley-car" came into vogue, there was ample evidence of speed without security. To-day there is hardly a man who would consider himself as doing anything but wasting time were he to utilize the services of a trolley-car when within striking distance of a subway train. When the automobile first attracted the notice of the public and racing cars made the excellent speed of 20 miles per hour, the public at large persisted in the belief that a racing driver would have to keep his mouth closed, on the ground that if he opened it the wind pressure would be so great that he would not be able to close it again. Racing drivers have since discovered that they have good control of their facial muscles when riding at something like a mile in 28 seconds. In the meantime, there is scarcely a citizen in America who would not invite an automobile to whip up the speed were it traveling at any pace under 20 miles per hour. When the whole situation is adequately canvassed, the conclusion is reached that speed with safety is not a fixed quantity. Safety comes with the better understanding of the public, and the perfection of the braking mechanisms, so that speed may be notched up from time to time as the public learns how to "step lively," and the controlling systems employed show greater capabilities.

* * *

"STAND-PATTERS," those who are in favor of "automobile legislation" of the character of which the Callan Law is a working specimen, also the type of Law that the automobilists of the State of New Jersey groan under, may now go to grass. The automobilists who have heretofore trusted their "good friends" (who also make a good living out of it) are wearied of "framed" legislation. What the situation demands is honest treatment; nor is it to be supposed that honesty, cut on the bias, will suffice.

Standardization Work

Iron and Steel Division of S. A. E. Committee on Standards Meets and Fixes Specifications; Division on Pyrometers to Meet; Aluminum and Copper Alloys to be Considered Soon

IRON and Steel Division of the Standards Committee of the Society of Automobile Engineers met last week at the offices of the Society, 1451 Broadway, New York, the following being present: Howard E. Coffin, president of the society; Henry Souther, W. P. Barbá, E. L. French, M. T. Lothrop and Coker F. Clarkson, secretary.

The division took up consideration of the specifications for materials for automobile construction. As a result of the meeting, the standard form of specimen used in testing automobile materials will probably be changed; and instructions as to the use of the test-specimens and testing machines will be issued.

Specifications for recommendation to the society, of the following steels and irons were taken up in detail and acted upon: .15 carbon steel, .25 carbon steel, .45 carbon steel, .80 and .95 carbon steel (primarily for springs), .20 carbon 3 1-2 per cent. nickel steel, .30 carbon 3 1-2 per cent. nickel steel, .30 carbon chrome nickel steel, .20 carbon chrome nickel steel, .45 carbon chrome nickel steel, .15 carbon chrome nickel steel, .20 carbon chrome vanadium steel (primarily for case-hardening), .45 carbon chrome vanadium steel, silico-manganese steel, valve metals, steel castings, gray iron castings, malleable iron.

The following points will be considered at the next meeting of this division: pyrometer and heat control; description and definition of heat-treatments. tabulation of physical results of heat treatments.

A standard order of statement of the different elements in the metals will be recommended, something as follows: (1) carbon, (2) manganese, (3) silicon, (4) phosphorus, (5) sulphur, (6) chromium, (7) vanadium. The elements are now given in the forms of various laboratories and mills in many different ways, and standardization will eliminate much confusion and loss of time.

This week two other divisions of the S. A. E. standards committee are holding meetings at the Society's office. These divisions are those on aluminum and copper alloys, constituted of F. W. Cooke, Thomas J. Fay, George M. Holley, Wm. H. Barr, H. W. Gillett, J. J. Aull, Geo. W. Dunham, R. S Fretz. and S. P. Wetherill, Jr.; and on plain, ball and roller bearings constituted of H. W. Alden, David Fergusson, W. P. Kennedy, A. P. Sloan, Jr., W. A. Frederick, Henry Hess, Elwood Haynes, A. L. Riker and Howard Marmon.

Steel Corporation Moves Up

American Patent Rights of the Héroult Process for Electrically Refining Steel Purchased

WHEN the question of the electric refining of steel was first broached as a scientific possibility, those who devote themselves to commercial work said that it was a laboratory trinket with the remotest, if any, commercial possibility. In the course of time the Héroult process of steel-making was perfected abroad, and in the last few years electrically refined steel has been taking the place of crucible steel for the better class of work, and with a better understanding of the questions of cost, and the possibilities of the electric furnace, commercial steel makers have revamped their views to a mervelous extent. It was in the Spring of 1896 that real practical work began in some of the German mills involving the electric furnace, and we now learn that the United States Steel Corporation has just purchased the American patent rights of the Héroult process, although it is fair to state that electric furnaces are in use at the present time at the Gary plant of the steel corporation. Some of the notable advantages of the electric furnace in steel making were pointed out in THE AUTOMOBILE from time to time, and of late the evidences indicating the fine quality of this fabric have been so overwhelming that those who watched the questions of quality of material were constrained to believe that something should be done in America in order that it would be possible to keep abreast of the progress that is being made in foreign lands. The purchase of the Héroult patent rights and the introduction of this successful system of steel refining represent a distinct inclination on the part of American steel fabricators to keep pace with the times unless perchance the patent papers are filed away in a stout safe and electrically refined steel by this process, if it is to be had at all, must be imported from Germany.

A.L.A.M. Meeting

Col. Charles Clifton Enters on Seventh Annual Term as President of Association of Licensed Automobile Manufacturers

COL. CHARLES CLIFTON, who has served the A. L. A. M. as its chief executive for six terms, was unanimously re-elected to that office at the annual meeting of the association Thursday. All the other officers were re-elected as follows:

S. T. Davis, Jr., vice-president; L. H. Kittredge, secretary; George Pope, treasurer, and Alfred Reeves, general manager.

The Executive Committee is composed of the following: Charles Clifton, S. T. Davis, Jr., Thomas Henderson, Hugh Chalmers and Herbert Lloyd.

The Association Patents Company, a subsidiary of the A. L. A. M., chose the following officers: Charles Clifton, president; Thomas Henderson, vice-president and Alfred Reeves, secretary and treasurer.

Reports read at the meeting showed that trade during the past year has been 100 per cent. greater than it was in the preceding year. Conservatism in manufacture is to be the keynote of 1911, according to the association.

A resolution was passed to have the Licensed Dealers' Association of New York co-operate and affiliate with the manufacturers in the National Automobile shows in future.

The meeting was the largest yearly gathering of the organization ever held, forty-three members being present as follows: James Joyce, American Locomotive Co.; John S. Clarke, Autocar Co.; O. Y. Bartholomew, Bartholomew Co.; Frank Briscoe, Brush Runabout Co.; G. A. Lambert, Buckeye Mfg. Co.; W. C. Leland, Cadillac Motor Car Co.; C. C. Hildebrand, Chalmers Motor Co.; H. W. Nuckols and Herbert Lloyd, Columbia Motor Car Co.; M. S. Hart, Corbin Motor Vehicle Corp.; C. G. Stoddard, Dayton Motor Car Co.; B. A. Becker, Elmore Mfg. Co.; G. H. Stilwell, H. H. Franklin Mfg. Co.; E. H. Broadwell, Hudson Motor Car Co.; G. A. Matthews, Jackson Automobile Co.; Alfred N. Mayo, Knox Automobile Co.; S. T. Davis, Jr., Locomobile Co. of America; H. A. Lozier, Lozier Motor Co.; F. F. Matheson, Matheson Motor Car Co.; Horace DeLisser, Maxwell-Briscoe Motor Co.; Wm. T. White, Mercer Automobile Co.; Wm. E. Metzger, Metzger Motor Car Co.; Rufus Walker, Jr., Moline Automobile Co.; Geo. M. Dickson, National Motor Vehicle Co.; C. C. Hanch, Nordyke & Marmon Co.; M. J. Budlong, Packard Motor Car Co.; L. H. Kittredge, Peerless Motor Car Co.; Charles Clifton, Pierce-Arrow Motor Car Co.; George Pope and A. L. Pope, Pope Mfg. Co.; H. O. Smith, Premier Motor Mfg. Co.; R. E. Olds and R. W. Owen, Reo Motor Car Co.; Geo. J. Dunham, Royal Tourist Car Co.; G. E. Mitchell, Alden Sampson Mfg. Co.; R. H. Salmons, Selden Motor Vehicle Co.; F. B. Stearns, F. B. Stearns Co.; Wm. R. Innis, Studebaker Automobile Co.; W. White, Waltham Mfg. Co.; John N. Willys and Geo. Bennett, Willys-Overland Co.; Thomas Henderson, Winton Motor Carriage Co.; Alfred Reeves, general manager.

S. A. E. Growing

Society Elects 22 Members at Meeting held recently

THE following were elected, last week, members, associates and juniors of the Society of Automobile Engineers:

Ludlow B. Alexander, Bosch Magneto Co., New York City
Clement Booth, Standard Roller Bearing Co., Philadelphia, Pa.
Arthur Clayden, Editor "The Automobile Engineer."
Clarence H. Froelich, Velie Motor Vehicle Co., Moline, Ill.
J. H. Gould, McCord Mfg. Co., Detroit, Mich.
Julian A. Halford, W. A. Wood Auto Mfg. Co., Kingston, N. Y.
Robert Jardine, Royal Tourist Car Co., Cleveland, O.
Frank M. Stinson, Locomobile Co. of America, Bridgeport, Conn.
Walter Wardrop, Editor "Power Wagon," Chicago, Ill.
Henry A. Bugio, Philadelphia Steel & Forge Co., New York.
Victor W. Kliesrath, Bosch Magneto Co., New York City.
Charles E. Lozier, Columbia Steel Co., Elyria, O.
Hugo C. Mootz, Ohio Motor Car Co., Cincinnati, O.
Joseph W. MacKay, Wetherill Finished Castings Co., Philadelphia, Pa.
Francis Miller, Bellevue, Campbell Co., Kentucky.
Carl E. Pearson, National Coil Co., Lansing, Mich.
Milton Rupert, R. D. Nuttall Co., Pittsburg, Pa.
Robert Skemp, American Sheet & Tin Plate Co., Pittsburg, Pa.
Arthur Brandes, Ohio Motor Car Co., Cincinnati, O.
Lee H. Hazard, Velie Motor Vehicle Co., Moline, Ill.
Arthur L. Myers, McCord Mfg. Co., Detroit, Mich.
Lawrence R. Moran, Hudson Motor Car Co., Detroit, Mich.

Few Penalties in Chicago Run

29 Starters in C. M. C.'s 1000-Mile Contest

MOLINE, ILL., Nov. 7—The first day of the Chicago Motor Club's 1,000-mile reliability, which started from Chicago this morning, brought about the penalization of three cars out of the twenty-nine that started. Lewis Strang, in the Case, drew fifty points because a pin sheared off the magneto coupling. Randall in one of the two Hupmobiles got one point for a carbureter adjustment and Brown in No. 1, Abbott, was penalized three points for adjusting a push rod.

Considerable tire trouble was experienced. The roads in the main were good. To-day's run was 193 miles, and to-morrow's will be 205 miles with the night stop at Quincy. Score to date:

1—Abbott-Detroit	Brown	3 points
2—Haynes	Irby	Perfect
4—Cunningham	Emery	Perfect
6—Halladay	Daubner	Perfect
7—Haynes	Williams	Perfect
8—Henry	Padley	Perfect
9—Imperial	McKersher	Perfect
10—Glide	Cassell	Perfect
11—Abbott-Detroit	Robins	Perfect
12—Cino	Donnelly	Perfect
	IN THE ROADSTER CLASS	
100—Falcar	Vansicklen	Perfect
101—Midland	Nulling	Perfect
102—Grout	Hallser	Perfect
103—Hupmobile	Randall	1 point
104—Moline	Vandervoort	Perfect
105—Lion	Bloomstrom	Perfect
106—Moline	Wycke	Perfect
107—Case	Jones	Perfect
108—Imperial	Wells	Perfect
110—Speedwell	La Chappelle	Perfect
111—Halladay	Caument	Perfect
112—Staver	Montclamier	Perfect
113—Staver	Duif	Perfect
114—Case	Strang	50 points
115—Krit	Hambermicht	Perfect
116—Brush	Lincoln	Perfect
117—Haynes	Wagner	Perfect
118—Hupmobile	Hearn	Perfect
119—Moline	Salisbury	Perfect

In the October 6 issue of THE AUTOMOBILE it was stated that the Model O Pullman is equipped with 34 by 4 tires. The correct size of tires used in that model is 34 by 3 1-2.

Short News of Interest

—The American Motor Sales Company, Erie, Pa., has secured the agency for the "Thomas Flyer" in that territory.

—An agency for the Cartercar has been opened in Philadelphia. The Johnston Motor Car Co., 326 N. Broad street, secured the agency.

—James C. Clinton, of Detroit, has been appointed manager of the Louisville branch of the Studebaker Automobile Co. He succeeds Daniel T. Patton, who resigned.

—The Liberty Automobile Tire & Supply Company, of Pittsburg, has secured Earley Singel, formerly of the H. H. Franklin Company, of Syracuse, N. Y., for general manager.

—The Roy Thompson Automobile Company, 122 East Seventh street, Cincinnati, distributers of Warren-Detroit automobiles, will move soon to 117 East Seventh street and will open a repair shop.

—Recent incorporations of interest to the automobile world are: Detroit Metal Forming Company, $25,000; Bennett Axle & Transmission Company, $150,000; Auto Brass Manufacturing Company, $6,000.

—At the annual meeting of the Louisville Automobile Dealers' Association the following officers were elected: Prince Wells, president; E. G. Reimers, vice-president; Hubert Levy, secretary and treasurer.

—T. A. Davies and Harry W. Smith have taken the agency for the Lozier car in Seattle. C. S. Cummings, until recently manager of the Metropolitan Motor Car Co., will be associated with them in an advisory capacity.

—H. T. Boulden, of the Franklin Agency, in Cincinnati, has been appointed district manager for the Franklin Company. Mr. Boulden will have supervision of all the Franklin agencies in Southern Ohio, Indiana, Kentucky and Tennessee.

—Gimbel Brothers' New York establishment has installed a system of electric delivery and transfer trucks, including thirty-six of the former type and thirty of the latter. The cars are all Studebakers equipped with Westinghouse motors.

—The E. J. Welch Auto Co. of Fitchburg, Mass., is about to open a new garage. The building is two stories, fireproof, and has floor space of 15,000 square feet. The company will handle several cars and a full line of parts and accessories.

—The Firestone Tire and Rubber Co. has issued a booklet covering full instructions as to the use of its quick detachable and demountable rims. The booklet is illustrated with numerous cuts to show each step in the process.

—The H. J. Koehler Sporting Goods Company, distributors of the Hupmobile in New York State east of Buffalo and throughout New England, will open December 1 a salesrooms in Boston at 1074 Boylston street. The new branch is to be managed by W. H. Shutt.

Receivership to End

Creditors Petition Court to Sell Matheson M. C. Co. to Matheson Auto Co.

THE receivership under which the Matheson Motor Car Co. has been operated since last July is likely to be raised on Saturday, when a petition in which more than 90 per cent. of the creditors of the concern have joined to sell it in bulk to the Matheson Automobile Co. of New York is returnable to the Circuit Court of Luzerne County, Pa.

Should the court entertain the petition and grant it, the receivership would terminate automatically, as the subject-matter would pass into the hands of an operating company.

BRIEF ITEMS CULLED HERE AND THERE FOR QUICK READING—INTERESTING ALIKE TO MAKER AND USER

—N. H. Miniter, formerly of the Factory Sales Corporation and the Eiseman Magneto Company, has been appointed special factory representative of the Stromberg Motor Devices Company at Chicago.

—The Cumback Motor Company, of Detroit, has been incorporated with a capital stock of $100,000. R. A. Bailey is president and treasurer; R. O. Cumback, vice-president and manager, and W. S. Bailey, secretary. The company will manufacture a light delivery truck of 1,000 pounds capacity.

—W. E. Roby, who has been connected with the tire business in Minneapolis since automobiles have become a prominent factor in Minneapolis' life, has made known his intention of retiring from the Diamond Rubber Company's Minneapolis branch. The change will take effect January 1, 1911.

—The Findlay Motor Company of Findlay, Ohio, gave a reception Friday at the factory which the people of Findlay and adjacent cities attended in considerable numbers. The first of the Ewing motor trucks made by the company was on display. The car was the same that will be shown at the Palace show in New York.

—The Avery Company, Peoria, Ill., makers of the Avery truck, tractors and other agricultural machinery, has completed an addition to its plant, comprising two buildings, aggregating over 1000 feet in length and 200 feet wide and two stories or more in height. These buildings are designed for machine shops and new machinery is now being installed.

—The Marshall Oil Co., Marshalltown, Iowa, have just taken possession of their new office building, which is one of the finest of its kind in Iowa. The building is of pressed brick, with stone trimming; two stories in height, and so arranged that every desk has ample sunlight and every modern convenience. The company puts out the French Auto Oil and other brands.

—The Thomas high gear car which recently completed a 2000 mile trip through the East, with all the transmission gears eliminated with the exception of the high and reverse, started as a non-competing car in the big 1000 mile reliability contest of the Chicago Automobile Club. The car was used to carry press representatives and members of the Technical Committee.

—The highway between Fairmount and Camillus, N. Y., which has been closed the greater part of the Summer, is now open to automobilists, affording a splendid macadam drive all the way to Auburn. It has been announced that just east of Chittenango a new road on the Genesee turnpike will be opened at once, this being the natural course for tourists going east.

A. M. C. M. E. A. Show

Eight Companies Added to List of Exhibitors; Fifty in All Now on the List

EIGHT additional motor car companies signed contracts during the past week for space to exhibit at the A. M. C. M. E. A. show at the Palace, Dec. 31 to Jan. 7. The list includes the following: C. Baeder Co., New York agents for the Lexington Motor Car Co.; Crawford Automobile Co., Cunningham Sons and Co., Coleman Motor Car Co., C. W. Kelsey Mfg. Co., Oliver Motor Car Co., Victor Motor Truck Co., Roader Car Co.

The total list to date consists of 50 concerns. Active preparations to arrange the building for the exhibition are being carried on and a comprehensive scheme of decoration has been adopted. The promoters announce that about a dozen more manufacturers have agreed to participate but their contracts have not reached headquarters as yet.

Garden Being Fixed Up

100,000 Feet of Floor Space Barely Sufficient for 83 Members and Accessory Makers

NEVER before since the big automobile shows began to be held in the Garden was there so much space available for exhibition purposes as for the forthcoming show. Nevertheless, every inch of the 100,000 feet has been allotted. The preparatory work for the big show is progressing rapidly. Even those most familiar with the old Garden and its multitude of exhibitions will be amazed at the wondrous transformation. Several months ago contracts for the steel construction, which will be equal to that of a good-size building, were given out together with other contracts for decorating, sign-making, carpenter work, etc. The skeleton steel construction will be erected entirely independent of support from the walls of the Garden. Only the wood floors of the galleries and crossbeams will be connected with its walls. The big steel girders which will support the galleries will rest on forty grillages, of steel and concrete. Each grillage will uphold a load of forty tons. These grillages were laid under the floor of the big show building last summer to allow the concrete sufficient time to mature. In all more than 200 tons of steel will be used. If stood on end, one on top of another, the steel columns would reach an altitude of 2,000 feet. One hundred thousand feet of lumber will be used in the construction throughout the building. Two monster freight elevators will be erected to hoist the cars to the galleries.

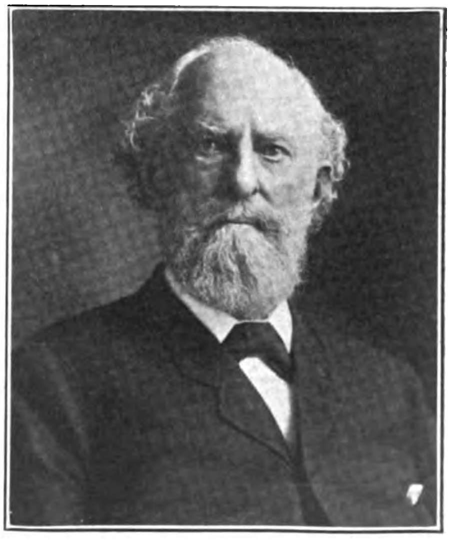
Importers in A. L. A. M.

Licenses granted to Daimler and Hotchkiss Import Companies and Morgan Truck

LICENSE under the Selden patent has been granted to the Daimler Import Co., of New York, the concern that brings in the Mercedes car. Similar action has also been taken by the A. L. A. M. with regard to the Hotchkiss Import Co., which handles the Hotchkiss, and to the R. L. Morgan Co. of Worcester, Mass., manufacturers of trucks.

Corbin, Captain of Industry, Passes Away

Philip Corbin, president of the American Hardware Corporation of New Britain, Conn., died at his home Nov. 3, aged 86. Mr. Corbin was intimately associated in every progressive line of endeavor of New Britain and was the founder of the Corbin Motor Vehicle Corporation, among a dozen other large enterprises. Of late years he had not taken an active part in the administration of any of the companies he fostered except the hardware concern. He was a native of Connecticuit and worked his way from the station of farm hand to the position of a captain of industry through his earnestness, persistence and ability. The funeral was held Monday, during the hours of which business was practically suspended in New Britain.



The late Philip Corbin

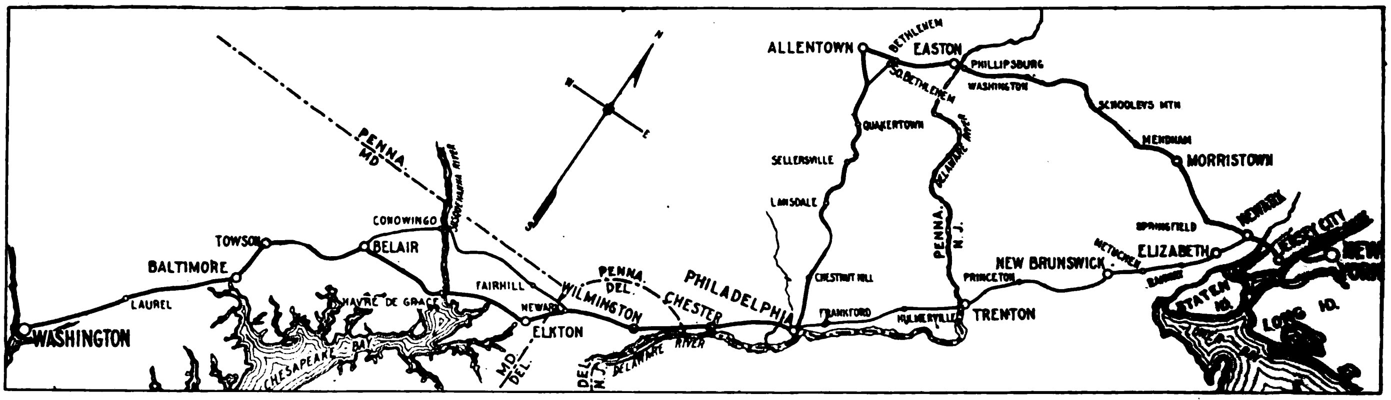
From Metropolis to Capitol

BY HENRY MACNAIR—NEWS OF THE ROAD, AND THOUGHTS INSPIRED BY A RECENT MOTOR JOURNEY

TRAVEL by automobile without accelerating one's think-motor to a correlative speed is like trying to take a snapshot on a wet plate—one gets merely light-struck, so to speak, and carries away no sharp, clean-cut picture of the things worth seeing along the way. Most of us from environment or heredity or want of propelling force have not reached the dry-plate stage, where we are capacitated to receive impressions when traveling at focal-plane speed, yet the introduction of the hand-book or "Baedeker" feature into The Automobile Blue Blook has not been made without hope of appeal to the mental wet-plates of the tonneau. Not only should this feature prove of great interest to the ever-increasing multitude of motor tourists but it will be a "first aid" to those who wish to prepare their mental films to a high degree of sensitiveness before venturing among unfamiliar sights and scenes.

Among the interesting trips which will be featured in next year's Blue Book is that from New York to Washington. There is much of interest to be seen in the journey, if one can forget the unfriendly stretches of bumpy roads beyond "Mason and Dixon's Line." Presuming that time is not a factor, Philadelphia is approached in a rather roundabout way, in order to get the best of everything. Leaving via Twenty-third street ferry we pass through Jersey City and across the "meadows" of marsh and sedge grass into Newark. The few blocks of cobblestone—the *bête noir* of city travel—are soon passed and we are on a stretch of macadam which leads through Morristown, where the immortal George spent the winter of '79, and all the way over picturesque hills and along winding brooks to the Delaware. Part of this road is brand new and is finished in the most approved style of the road builder's art. At the forks of the Delaware river we cross a toll bridge (not forgetting that our New Jersey numbers are good only in New Jersey) and enter Easton, which is the site of Lafayette College and a manufacturing center. The visitor's interest will be further aroused at Bethlehem, an ancient Moravian village settled by Count Zinzendorf in 1740. A swing around the city past the old academy and church buildings is of interest and also a side trip across the Lehigh to South Bethlehem where Charles M. Schwab's Bethlehem Steel Company has its magnificent plant. In Allentown, a few miles on, is a monument commemorating the saving of the old Liberty Bell.

Philadelphia, the Quaker City, next invites our attention, but regrettably is one of the few American cities whose hotels hold out no welcoming hand to visiting motorists. It rests its claim for notability, among other things, on its Independence Hall. where rests the Old Liberty Bell, and on its glorious Fairmount Park. Our route out of the city is over the Schuylkill and out to Darby over some very much neglected streets with never a sign to welcome the coming or speed the parting motor guest. When the smooth road is finally reached the keen edge of enjoyment is dulled by the mile-apart toll-gates reaching to Wilmington, where we cross the historic Brandywine. Here is the famous Dupont Powder Works, and here, too, the old Swede's Church dating from 1698, recalling the first Swedish colony in America. From Wilmington magnificent macadam stretches to Newark, where Delaware, more progressive than Pennsylvania or Maryland, permits the wayfarer to go untaxed. Just beyond Newark we cross the "Mason and Dixon's Line," and at the gateway of the South we are welcomed by the worst 20-mile stretch of our journey, which, we were told, is "very bad when wet and worse when dry." Fortunately we encountered it when at its best, being neither too wet nor too dry, but nevertheless breathed a sigh of relief when the mighty Susquehanna came in view. Crossing on a transformed railway bridge with a heavy enough toll ($1) to make us appreciate its worth, we enter Havre de Grace and enjoy the best meal of our trip at a little inn, whose modest charge of 50 cents warms the cockles of our heart toward the man who has not put up his prices on the long-suffering motorist. By leaving the Old Pike at a village called "Fork," we take a pretty "valley road" to Towson, and thence on the inevitable toll-road into Baltimore, whose distinctive features are its Washington Monument, the residence of Cardinal Gibbons and Johns Hopkins University, ranking with the universities of the Old World. Baltimore has an unbroken record of peace, having been only threatened by attack during the Revolution and lying outside of the theater of combat during the Civil War. On the other side of the scales is the memorable conflagration of 1904, which devastated an area of 150 acres and caused a property loss of $17,000,000. Baltimore, of course, has its churches, its parks, its libraries and its manufactures, but it would take days to explore its list of interesting points. We, therefore, leave its old monument in our rear and take a circuitous route, necessitated by street conditions, to Relay. Only five miles of jouncy road mars our trip as we pass through some quaint old villages into Washington, where we circle the Capitol and go up Pennsylvania Avenue to the "White House," the real center of things Washingtonian, though, of course, L'Enfant laid out his splendid network of broad driveways with the Capitol as a center. However, Washington is another story, and after a rest at the really good hotel of the city, the tourist will be ready to explore its many points of beauty and historical interest.



Map of the route "From Metropolis to Capitol," crossing four states, also showing direct New York-Philadelphia connection

Among the Makers

JOHN W. STODDARD COMMANDS APPRECIATION OF EMPLOYEES; PHILADELPHIA GETS AN ELECTRIC COMPETITION; MANGANESE SERVES A VERY IMPORTANT PURPOSE

DAYTON, O., Nov. 7—John W. Stoddard, who recently retired from the presidency of the Dayton Motor Car Company, was presented with an ornate bronze tablet by the employees of the three factories comprised in the plant as an appreciation of his kindly relations with them for many years.

The presentation was made by Superintendent R. Thurston Houk and came as a surprise to Mr. Stoddard. The tablet contains a relief bust of Mr. Stoddard surrounded with appropriate symbols illustrating the various stages of his career; commencing with law books, running through agricultural implements and being completed with a touring car.

The tablet is inscribed "Presented to John W. Stoddard by the factory employees of the Dayton Motor Car Company in appreciation of his long years as a considerate employer and in recognition of those sterling qualities which have made him admired by all men."

Tablet presented to John W. Stoddard, founder of Dayton Motor Car Company, by his employees

Electrics to Run

Philadelphia "North American" Promotes Unique Competition

GRACEFULLY and quietly, after the order of electric automobiles, a column of about fifty contesting cars will leave from in front of the Philadelphia *North American* Building at 10 o'clock Friday morning for a tour of the streets of the Quaker City, comprising about 50 miles.

The run is the first ever staged for electric pleasure cars and will be conducted by the Quaker City Motor Club racing officials. The contest will have the roadability feature of secret time devised by Harry C. Harbach, secretary of the club. The referee will be R. E. Ross, chairman of the contest committee of the club, who has acted as referee in the Fairmount Park road race and other important sporting events. G. Hilton Gantert will start the cars and Paul B. Huyette will have charge of the timing.

No entrance fee is charged and the *North American* has offered two prizes, plates costing $150 each, for the cars most closely approximating the secret time. One of the prizes will be given to the male driver and the other to the woman driver who come closest to the time selected. It is expected that a dozen or more women will enter the competition, as half a dozen of them have up to this time stated their intention to drive cars in the contest, the driving of electrics being a popular pastime among Quaker City's ladies.

The course will be through the streets of the city and will take in some of the suburbs. From Broad street the way selected lies through Fairmount Park, Ardmore, Bryn Mawr and return by a different route.

The secret time will be determined by the contestants themselves. Each will write a time upon his starting card when given the word to go and these times will be added and divided by the number of contestants submitting estimates and the result will be the figures nearest which will lie the prizes. Secret checking stations will be established to prevent speeding in some parts of the course and loafing in others.

The entry list up to last Saturday night is as follows:

No.	Car	Entrant	Driver
1	Baker	Reamer & Haines	H. H. Kirkpatrick
2	Baker	Reamer & Haines	C. A. Haines
3	Babcock	F. W. Eveland	John B. Hill
4	Babcock	F. W. Eveland	Miss E. M. Cuddy
5	Detroit Electric	Thos. F. Grugan	Thomas F. Grugan
6	Woods Electric	Mrs. T. F. Simmons	Mrs. Thos. F. Simmons
7	Studebaker	Studebaker Auto. Co.	J. W. MacMullin
8	Columbus Electric	Columbus Buggy Co.	H. F. W. Rasmussen
9	Clark Electric	A. F. Clark	A. F. Clark
10	Detroit Electric	J. C. Parker & Son Co.	R. L. Heberling
11	Detroit Electric	Anderson Carriage Co.	W. Reese Parker
12	Detroit Electric	H. E. C. Nennich	John Geiss
13	Woods Electric	Miss A. M. Kelly	W. H. Metcalf
14	Woods Electric	J. C. Bartlett	J. C. Bartlett
15	Woods Electric	Woods Elec. Garage	Arnold Neirring
16	Waverley Roadster	Waverley Electric Co.	George A. Fort
17	Waver'y Runabout	F. B. Rutherford	F. B. Rutherford
18	Waverley Roadster	T. Munroe Dobbins,	Emlen S. Hare
19	Detroit Electric	G. Heide Norris	C. B. Hoffer
20	Waverley Victoria	Mrs. C. M. Campbell	Mrs. C. M. Campbell
21	Detroit Electric	Lincoln K. Passmore	J. Allan Passmore
22	Woods Elec. Vict'a	Woods Elec. Garage	Leonard H. Worne
23	Detroit Electric	Wm. H. Horstmann	William H. Horstmann
24	Detroit Electric	Dr. Mary W. Griscom	Dr. Mary W. Griscom
25	Studebaker	Miss M. E. Morrison	Miss M. E. Morrison
26	Woods Electric	Dr. A. A. Apple	Dr. A. A. Apple
27	Detroit Electric	Abram C. Mott	R. T. Alford
28	Rauch and Lang	Gen. Motor Car Co.	S. S. Crawford
29	Woods Electric	Dr. E. B. Fanning	Dr. E. B. Fanning
30	Waverley	Waverley Electric Co.	Harry Peyton
31	Waverley	Waverley Electric Co.	Mrs. George A. Fort

Steel Bronze

So-called Manganese Bronze is Devoid of This Element

MANGANESE, used in the melting down of the charge that enters into "steel-bronze," is eliminated in the furnace, but it does perform a valuable service since it distributes the iron content, preventing the same from forming into "shot" and rendering the metal unfit for its intended service. But when manganese is used the shot formation is aborted and the good steel-bronze resulting has physical properties as follows:

Physical Properties

Tensile strength in pounds per square inch	71,000
Elastic limit in pounds per square inch	38,190
Elongation per cent. in two inches	31
Reduction of area in per cent	30.4
Diameter of test proof in inches	2
Distance in inches between enlargements of test proof	1

Note.—The above is an average test of Parsons manganese bronze which was taken from the propeller hub of Monitor No. 7, U. S. N. Manganese bronze, so-called, is used quite extensively in automobile work. An example of an excellent application will be found in the crankcase construction of "Locomobiles"; they are of this metal.

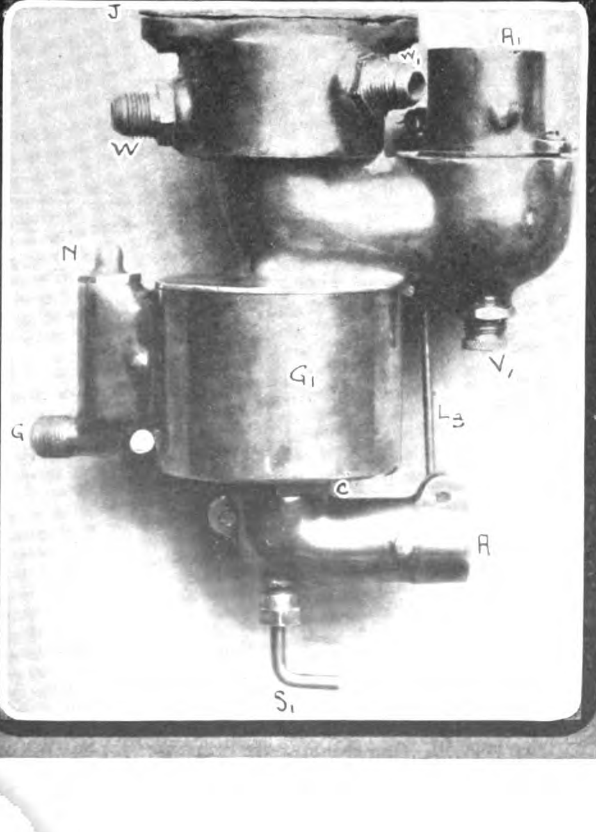
Mayer Carbureter

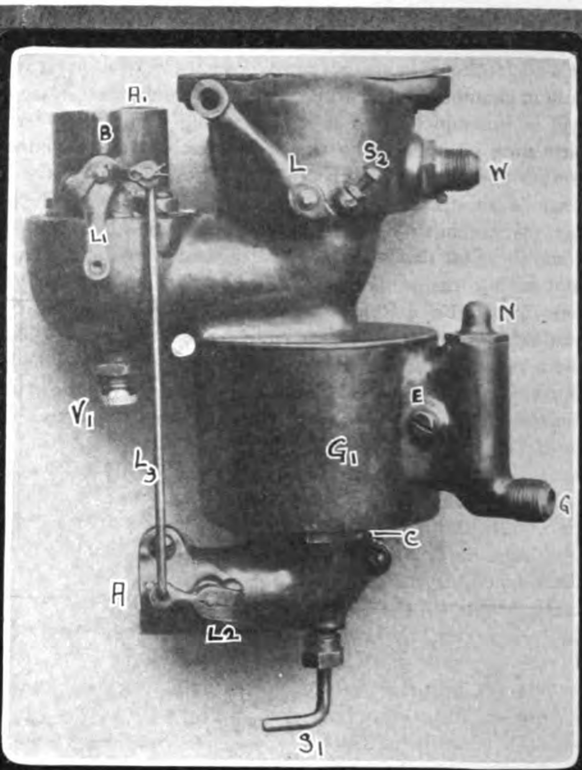
In order to obtain a good understanding of the general appearance of the Mayer type of carbureter, reference may be had to Figs. 1, 2 and 3 of the respective sides of the carbureter and the same dissembled. The performance in service will depend as in carbureter work in general upon the harmony of relation of the carbureter itself to the motor to which it is applied, not forgetting that even the muffler may detract from the performance of the motor and effect the good working of the carbureter. In trying to arrive at a conservative conclusion of the good that resides in a carbureter the path is beset with difficulties, the magnitude of which can only be arrived at if the whole equipment is subjected to an exhaustive test, so that the service as rendered by the caurbureter will be gauged in the light of the handicaps under which it works.

The accompanying tests were made on a six-cylinder motor under conditions of back pressure due to the muffler used, of a strangling power to diminish the power of the motor to a quite noticeable extent, especially at the higher speeds at which power is given. The back pressure was 1 pound per square inch at 500 revolutions per minute of the motor, gradually increasing to 6.75 pounds per square inch at 1,500 revolutions per minute. This does not seem to be a large back pressure, but it is, nevertheless, due to the fact that it is a large proportion of the mean effective pressure, the latter being approximately 70 to 75 pounds per square inch in the motor cylinders and the ratio of back pressure to mean effective pressure under these conditions is not far from 12. In other words, this

Lever Side of Carbureter

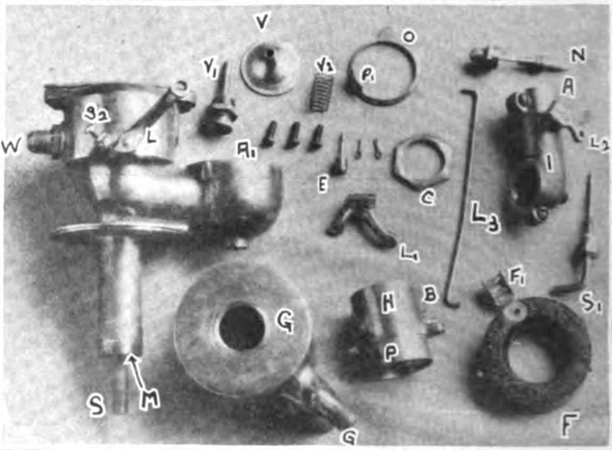
A—Air intake. A1—Supplementary air. J—Gasket point. W1—Ware outlet. W—Water inlet. V1—Air valve adjustment. G1—Float chamber. G—Gasoline inlet. N—Needle valve. L3—Lever for closing air for starting. C—Locking nut. S1—Jet adjustment.





Opposite Side of Carbureter

A—Regular air intake. A1—Supplementary air intake. L—Throttle lever. L, L1, L2—Levers for closing air for starting. V1—Air valve adjustment. B—Ball to hold lever L1 open or closed. G1—Float chamber. E—Float pivot pin. N—Needle valve. G—Gasoline inlet. C—Locking nut. S1—Jet adjustment. W—Water inlet. S2—Set screw for throttle adjustment



Carbureter in Parts

A—Air intake. A1—Supplementary air intake. N—Needle valve. L—Throttle lever. L1, L2, L3—Levers for closing air ports for starting. F—Cork float. F1—Float lever. E—Float pivot pin. C—Locking nut for float chamber. W—Water inlet. S—Jet. M—Air intake. G—Float chamber. V1—Extra air inlet adjustment. V—Extra air valve. V2—Extra air valve spring. O—Fixed supplementary air sleeve. P—Fixed supplementary air port. P1—Fixed supplementary air control cover. H—Supplementary air tube.

back pressure has a magnitude of substantially 1-12 of the mean effective pressure and it means that approximately 1-12 of the power of the motor is thwarted, due to back pressure. But this is not all. If the exhaust is impeded in its migration from the combustion chamber to the atmosphere the conditions of scavenging will be incomplete, and it is but a step from a state of incomplete state of scavenging to a condition of poor carburetion. The reason for this lies in the fact that however good the mixture may be as it comes from the carbureter if it is diluted by products of combustion it will fall below its normal level of value and the first thing that the average automobilist does is to blame it on the carbureter, forgetting the while that the gas as it comes from the carbureter is poisoned by the products of combustion that are kept from leaving the combustion chamber because a poor muffler serves as a cork, so to say.

The motor that was used in this test was of the six-cylinder, water-cooled, four-cycle type with a bore of 4 1-2 inches and a stroke of 5 1-2 inches. The motor had been run on the block for a sufficiently long time to reduce friction; it was then delivered to a well-equipped laboratory and tested out in conjunction with the testing of the carbureter as here referred to. The timing of the motor was as follows:

Exhaust valves open 40 degrees before center.

Exhaust valves closed 5 degrees after center.

Inlet valves open 7 degrees and 50 minutes after center.

Inlet valves closed 30 degrees after center.

Ignition was accomplished by a magneto with a maximum brake of 5 7-16 inches as measured on the circumference of the flywheel and during operation a mercury manometer was attached 1 foot from the end of the exhaust manifold with the result as follows:

R.P.M.	Brake Pull	H.P.	One Side HG Inches	Lbs. per sq. in. Back Pressure
400	75	71.1	1	.98
500	73	20.8	1½	1.48
600	73	25.0	2	1.96
700	71	28.4	2¼	2.2
800	69	31.5	2¾	2.7
900	65	33.4	3¼	3.2
1,000	62	35.4	3⅝	3.35
1,100	57	35.7	4¼	4.16
1,200	52	35.7	5	4.9
1,300	50	37.0	5½	5.4
1,400	43	34.4	6	5.88
1,500	42	36.0	6¾	6.6

The conclusions to be drawn are:

(*a*) The most favorable position for the break of the magneto is 6 7-8 inches on the circumference of the flywheel.

(*b*) That the valve timing within wide limits has a negligible effect on the maximum power.

(*c*) That the Mayer Model M carbureter gives the maximum power.

(*d*) That the aggregate power lost in driving the water pump, oiler and the interrupter is too small to be measured on the laboratory dynamometer.

(*e*) That to develop the maximum power the muffler must be taken entirely off as the cut-out does not afford a sufficiently clear passage for the exhaust.

(*f*) That the back pressure in the muffler is excessive, being a maximum of 6 1-3 pounds.

(*g*) That the compression is altogether too high (19 per cent.). The clearance volumes vary from 19 to 24 per cent. in different motors.

(*h*) That it appears possible by taking special care in the construction of the motor and having all the clearance volumes exactly the same (about 23 per cent.) and by devoting attention to the carbureter and the inlet manifold to secure an intimate mixture of fuel and air and a perfect charge distribution to boost the maximum horsepower up to 60.

Under the conditions as above indicated, including the conclusions drawn by the tester, the results obtained from the Mayer carbureter were uniformly good and as determined by tests, of which results are here given, that the performance under speed-changing conditions are thoroughly good, particularly if the proper size of carbureter is selected, taking into account the characteristic of the motor, remembering that what will do in one case may not do so good in another.

MAYER MODEL M CARBURETER

R.P.M.	Brake Pull	H.P.
400	72	16.5
500	71	20.2
600	70	24.0
1,300	64	47.5
1,400	64	51.2
1,500	59	50.6

1 1-4-INCH MAYER WITH AIR INTAKE OFF AND VALVE OUT

R.P.M.	Brake Pull	H.P.
400	74	16.9
500	72	20.5
600	70	28.0
1,300	62	46.0
1,400	58	46.1
1,500	57	48.7

1 3-4-INCH MAYER, MODEL M, WITH REGULAR OPEN MANIFOLD

R.P.M.	Brake Pull	H.P.
1,200	61	42.0
1,300	60	44.50
1,400	57	45.6
1,500	55	47.0

CHECKED RUN

R.P.M.	Brake Pull	H.P.
400	77.0	17.6
500	78.0	22.3
600	75.5	26.2
700	72.5	29.0
800	74.0	33.8
900	69.0	35.5
1,000	68.0	38.8
1,100	67.5	42.5
1,200	65.0	44.5
1,300	64.0	47.5
1,400	61.0	48.8
1,500	56.0	47.9
1,600	55.0	50.4

Five runs were made with a 1 1-4-inch carbureter and the most consistent chosen throughout the range. The carbureter was adjusted and was not touched throughout complete test run from 600 to 2,000 revolutions per minute.

Speed	Brake load gross	Brake load net	B.H.P.
600	51	24	14.4
700	52.5	25.5	17.8
800	52	25	20
900	52	25	22.5
1000	51.75	24.75	24.75
1100	51.5	24.5	26.9
1200	50.5	23.5	28.2
1300	49.75	22.75	29.5
1400	48.75	21.75	30.4
1500	47.75	20.75	31.1
1600	47.125	20.125	32.1
1700	46.5	19.5	33.2
1800	45.5	18.5	33.4
1900	44	17.0	32.3
2000	43.5	16.5	33.0

M. A. M. Elects 2-Dozen

Membership Growing Rapidly; Importance of Close Association Being Recognized

TWENTY-FOUR new members elected to the Motor and Accessory Manufacturers at a recent meeting of that organization. This brings the total roster of the association up to 200 members.

The names of those just chosen are as follows: Apple Electric Company, Borne-Scrymser Company, Carpenter Steel Company, Chicago Telephone Supply Company, Covert Motor Vehicle Company, Crucible Steel Company of America, Dover Stamping & Manufacturing Company, Eisemann Magneto Company, The Ferro Machine & Foundry Company, Frost Gear & Machine Company, Isaac G. Johnson & Company, The Kellogg Manufacturing Company, The Miller Rubber Company, Newark Rivet Works, Reichenbach Laboratories Company, Russel Motor Axle Company, A. Schrader's Son, Inc., The F. W. Spacke Machine Company, Standard Thermometer Company, The Stein Double Cushion Tire Company, Stevens Manufacturing Company, The White & Bagley Company, The Willard Storage Battery Company, and O. W. Young.

Demountable Solid Tires

Torrilhon, in France, Makes Demountable Solid Tire Application

AFTER demountable rims in connection with pneumatic tires have become a common appliance, the French firm of Torrilhon has sought to give the same convenience to commercial vehicles employing solid-rubber tires. The demountable rim carrying the rubber bandage has a series of oblong steel studs on its inner face. The fixed rim carries two circular grooves cut at intervals to receive the studs on the dismountable rim. The central rib dividing the two grooves on the fixed rim is a little shorter at one end of each of its sections than the two others. Thus when the demountable rim is placed in position it is given a slight circular movement to bring the studs in a locked position between the two outer ribs, effectively preventing all lateral motion. In each of the spaces left free after the rim has been placed in position is slipped a steel key, the inner extremity of which is provided with a heel received in a depression provided for it on the face of the fixed rim. A nut is screwed onto the outer end of the key and secured by a split pin. The wheel has been supplied by the Torrilhon company for some of the omnibuses in service in Paris.

French Economy Results

Fuel and Lubricating Oil Determinations of the French Military Trials

COMPLETE official figures on fuel and lubricating oil consumption in connection with the French military trials have just been issued by the Automobile Club of France. Unlike last year's event the trials were not really a competition, there being no classification according to merit, and all being capable of finishing in the winning class. It was necessary to fulfill the army requirements for regularity and economy, but no opportunity is given of differentiating between the best and the worst of the vehicles fulfilling those requirements. Thus, although the same firms were represented and the vehicles had undergone little change, it is not possible to make close comparisons with the results obtained a year ago.

The event was a regularity and fuel economy test over a distance of 1,570 miles, the fuels used being gasoline, benzol and alcohol. At the head of the following table will be found the two vehicles which, in their respective classes, proved to be the most efficient last year. It is interesting to note that the average distance covered on a gallon of lubricating oil by the sixteen successful vehicles is 142 miles. The explanation of the high oil consumption of certain trucks, particularly the Panhard, is that last year two vehicles were put out of business through stinting of oil, with a desire to figure well on the economy test. This year the drivers took no chances, especially as there was nothing to be gained by ultra economy.

The vehicles averaged 9.7 miles to the gallon of gasoline, 10.4 to benzol, and only 8.2 on carburetted alcohol. In making comparisons it should be remembered that no important changes could be effected on the carbureters to suit the different fuels. It was impossible to change the jet, regulate the air, the amount of heat, or the weight of the float, but it was not possible to substitute a different carbureter for each fuel. The trials were held in satisfactory weather, and generally over good roads.

Fuel Consumption of 16 Successful Trucks in French Military Trials

			Lubricating Oil 1570 Miles		Gasoline 560 Miles			Benzol 560 Miles			Carburetted Alcohol 450 Miles		
	Total Weight. pounds	Useful Load. pounds	Total in Gallons	Miles per Gallon	Average Speed m.p.h.	Total Gallons	Miles per Gallon	Average Speed m.p.h.	Total Gallons	Miles per Gallons	Average Speed m.p.h.	Total Gallons	Miles per Gallon
*Saurer	12,658	5796	....	368	14.6	....	9.4	....	....	10.8	....	....	8.1
*Delahaye	14,524	7896	....	194	11.0	....	11.1	....	....	11.15	....	....	10.5
DeDion Bouton	13,299	8427	6.2	254	9.5	49.5	11.3	9.8	47.9	11.7	9.6	49.0	9.2
DeDion Bouton	13,161	7444	4.9	320	9.5	54.5	10.3	9.8	50.0	11.4	9.7	49.0	9.2
Peugeot	13,106	7903	8.8	178	10.4	54.5	10.3	9.5	53.0	10.6	10.4	54.3	8.3
Peugeot	13,346	8143	8.8	178	10.4	55.1	10.1	9.5	50.8	11.0	10.5	53.0	8.5
Delahaye	13,855	8593	7.5	209	8.6	63.0	8.9	8.2	65.0	8.6	7.7	62.4	7.2
Delahaye	13,822	8553	8.8	178	8.6	68.8	8.2	8.2	67.0	8.4	7.8	69.2	6.9
Panhard-Levassor	12,323	7609	15.0	145	9.6	49.8	11.2	9.5	51.0	10.9	9.8	49.4	9.1
Panhard-Levassor	12,336	7640	18.5	85	9.7	50.4	11.1	9.5	49.6	11.3	9.8	50.5	8.9
Panhard-Levassor	13,653	8703	19.8	79	9.8	56.1	10.0	9.8	58.3	9.6	10.2	51.2	8.8
Panhard-Levassor	13,564	8670	16.3	96	9.7	54.5	10.3	9.9	55.5	10.1	10.2	56.2	8.1
Berliet	11,827	7465	7.5	209	8.5	62.6	9.0	8.8	59.4	9.5	8.5	63.8	7.1
Berliet	11,838	7473	7.5	209	8.5	63.5	8.8	8.8	53.6	10.4	8.5	58.2	7.6
Berliet	14,651	9801	14.3	110	8.3	75.2	7.5	8.5	54.0	10.4	8.3	55.8	8.0
Berliet	14,631	9781	15.6	100	8.2	76.5	7.3	8.5	56.3	10.0	8.3	70.6	6.4
Vinot-Deguingand	10,987	6864	5.9	266	9.8	45.5	12.3	9.5	44.4	12.6	9.8	41.8	10.7
Vinot-Deguingand	10,832	6710	9.7	162	9.8	46.4	12.1	9.7	46.0	12.2	10.3	45.4	9

*1909 Winner.
Useful load includes weight of body.

Use of Benzol Abroad.—The growing use of benzol as a fuel for motors in France, checks the demand for gasoline and should redound to the advantage of American automobilists. The fact remains that benzol is a good prospect for American consumption.

Fig. 1—Wheel complete, with the two solid tires in place

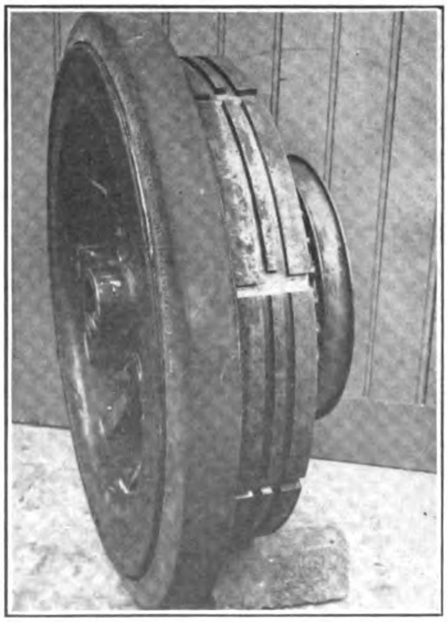


Fig. 2—Wheel with one tire in place and the space for the other showing

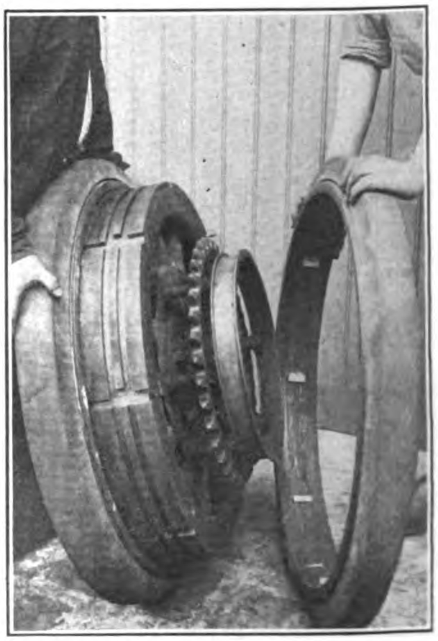


Fig. 3—Wheel with one tire in place and the other being put on

Bergdoll "30" for 1911

NINE DISTINCT BODY DESIGNS ARE INCLUDED, THE IDENTICAL CHASSIS SHOWING MANY FINE POINTS OF DESIGN

THE Louis J. Bergdoll Motor Company, of Philadelphia, is making its real debut in motor car manufacture. The Bergdoll "30," which is making its 1911 bow to the public, is the result of two years' experimental work, and embodies in a popular-priced car all the practical features and advantages of the best foreign and domestic development. Fifty-odd taxicabs that were turned out by the company last year have been run an average of 8000 miles. The company gives a broad guaranty of material and workmanship with every car turned out of its well-equipped factory.

Bergdoll bodies are constructed on the popular straight-line style. The standard finish is in Richelieu blue with pin striping of turquoise. The running gear is done in primrose yellow and the upholstery and fittings are of adequate style and construction. A special feature of the car is the extra provision that is made to insure plenty of leg-room, the long body lending itself to this phase.

The most important mechanical factors in the Bergdoll "30" may be described briefly as follows: The motor has four cylinders of reverberatory air-furnace iron, cast en bloc to secure lightness, compactness and satisfactory water-jacketing. The cylinders are 4 by 4 1-2 inches, thus indicating horsepower of 25.60. The intake valves are of large size and are located in the heads of the cylinders with exhausts at the sides. The crankshaft is of nickel-steel, heat-treated and tested to five times the stress of usual service conditions. The connecting rods are drop forged with long bearings of Parsons white bronze, with sheet-metal liners for taking up wear.

Throughout the motor, transmission and running gear, large annular ball bearings are used and in following out this idea of big bearings in the construction of the Bergdoll, the fact may be noted that at each end of the crankshaft bearings of greater size than those usually recommended by manufacturers are to be found.

The system of lubrication is automatic, maintaining a constant level for splashing oil in the crank chamber, with an overflow into a reservoir below. A continuous supply of oil is carried to the engine base by a pump operated by camshaft. An ingenious partition in the engine base prevents excess oil at either end while traversing a grade. One filling is said to be sufficient for 300 miles. The supplementary system includes oil and grease cups throughout the chassis where required.

The carbureter is automatic and practically fool-proof. It is of the single-jet type with auxiliary air inlet, needle valve and air valve being adjusted to insure a mixture for the varying speeds. Warm water from the circulation passes around the mixing chamber. Strained gasoline is carried to the carbureter through a seamless copper tube.

The crankcase is of cast aluminum, the upper half of which contains the cylinders, crankshaft bearings, oil pump, magneto, water pump and unisparker. The lower half forms the oil reservoir.

The clutch is of the multiple disc type and the transmission, which is selective, gives three speeds forward and reverse. The circulatory system is founded upon a centrifugal pump, which passes the water through the cylinder jackets to the Livingston radiator of cellular type.

Worm-and-gear with ball-thrust bearings is the style of the steering gear. The column is of wide diameter, with control levers on top of a 17-inch wheel. One advantage claimed for this type is that a quarter rotation of the mechanism will bring a new section of the gear into action, thus increasing the life of the whole steering system.

Guaranteed springs are rather novel in motor car construction, but the Bergdoll company specifically covers this element of the car. The springs are of chrome-vanadium steel, semi-elliptical in front and three-quarter elliptical in the rear, which are said to secure easy riding and durability.

The axles of the Bergdoll are somewhat out of the ordinary. The front axle is an I-beam section in one piece, heat-treated, drop-forged with two large annular bearings at each spindle. The entire weight at this point is carried on a ball three-quarters of an inch in diameter, placed at the top of the vertical column of the knuckle.

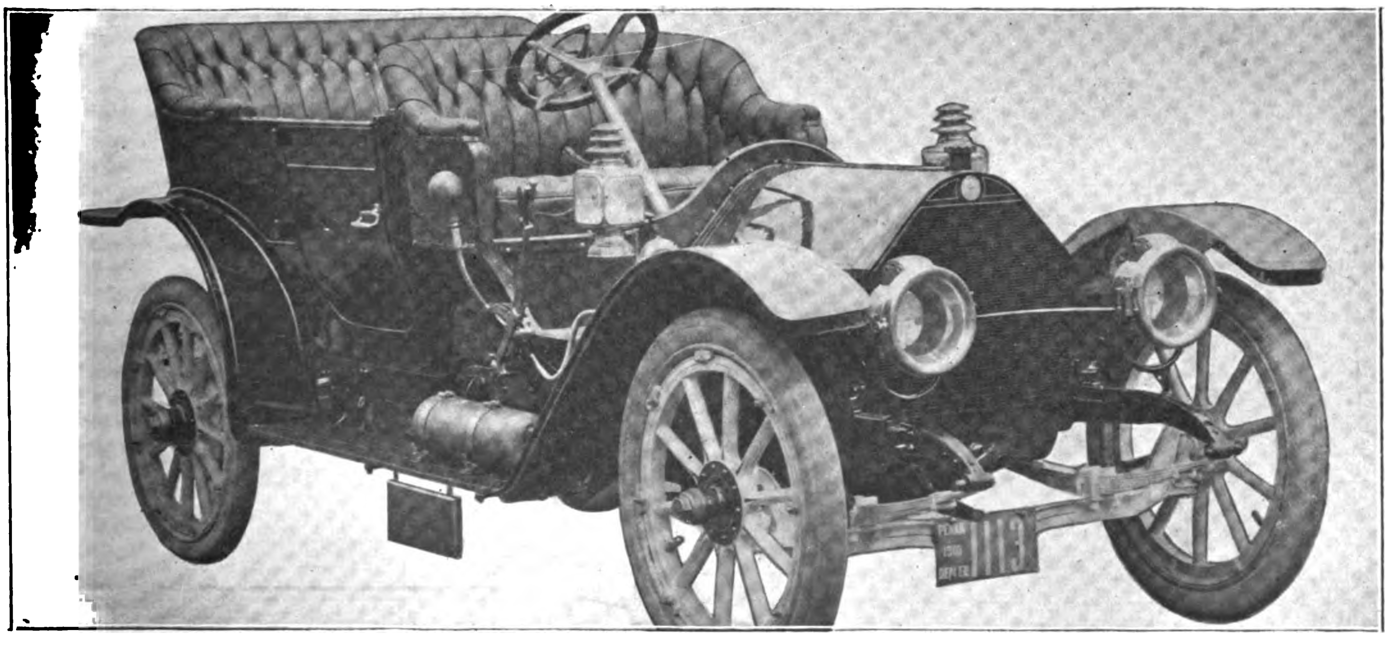


Fig. 1—The Bergdoll "Thirty" touring car, possessing fine lines and built for comfort

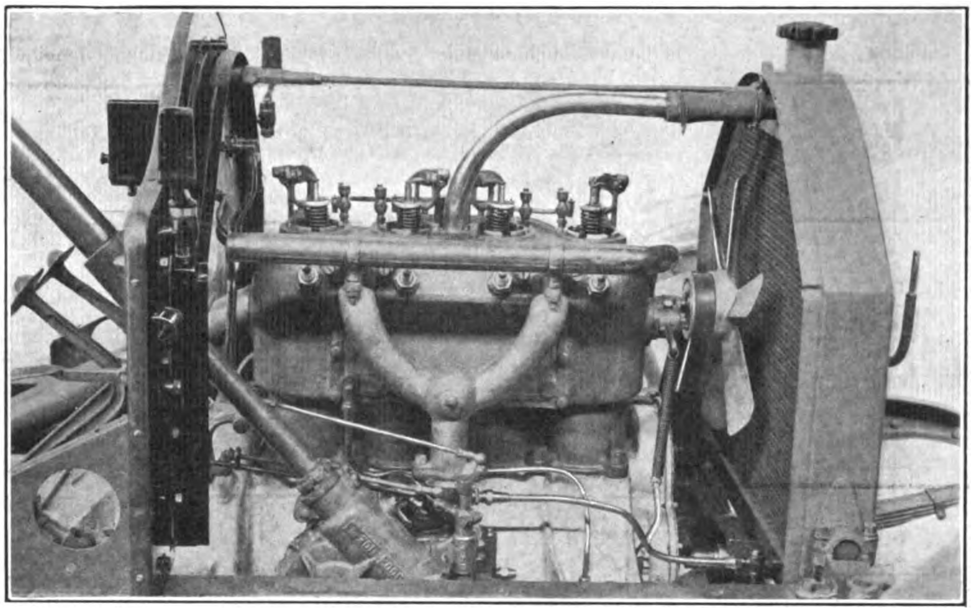


Fig. 2—Showing the inlet side of the Bergdoll "Thirty" Motor

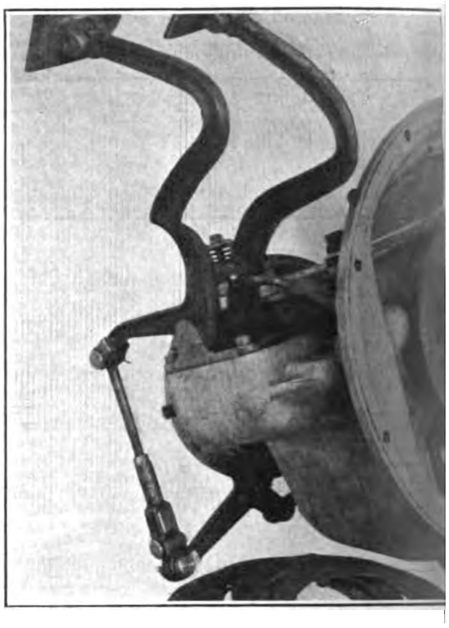


Fig. 3—Illustrating the mechanism

The rear axle is of full-floating type, with a housing of pressed steel in a single piece the entire length of the axle. A large cover over the rear part of the housing allows easy inspection of the pinion shaft and gear, differential and bevel gears and other mechanical parts. The shafts and gears of various kinds are made of 3 1-2 per cent. nickel-steel, appropriately heat-treated. Ten large annular ball bearings and three thrust bearings are used in this axle. The gear ratio is 3 11-14 to 1.

Cold-pressed steel, twenty to thirty point carbon, is the material from which the frame is made. The foot brake is located on the driving shaft behind the transmission. It is of the contracting type, with 3-inch face band, lined with Thermoid. The emergency brake is internal expending and self-equalizing. Both brakes are double-acting.

The car is equipped with artillery wheels, 34 inches in diameter. The hubs and brake-drums are bolted to the alternate spokes of the rear wheels. Continental tires and Continental quick detachable and demountable rims are used on all Bergdoll cars.

Ignition is by two systems. The new Atwater-Kent uni-

SPECIFICATIONS FOR BERGDOLL

MODELS	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		Lubrication
			Type	Seats	Cyl.	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery	
Bergdoll "30"...	$1500	25.6	Tour'g.	5	4	4	4½	Block.	Cellular.	Cent'fl...	At.-Kent	Dry.....	Splash
Bergdoll "30"...	1500	25.6	R'ster...	3	4	4	4½	Block.	Cellular..	Cent'fl...	At.-Kent	Dry.....	Splash
Bergdoll "30"...	1600	25.6	T. Ton.	4	4	4	4½	Block.	Cellular.	Cent'fl...	At.-Kent	Dry......	Splash
Bergdoll "30"...	1600	25.6	Fd. Tg..	5	4	4	4½	Block.	Cellular..	Cent'fl...	At.-Kent	Dry.....	Splash
Bergdoll "30"...	2000	25.6	Taxi...	4	4	4	4½	Block.	Cellular..	Cent'fl...	At.-Kent	Dry.....	Splash
Bergdoll "30"...	2000	25.6	Coupé..	2	4	4	4½	Block.	Cellular..	Cent'fl...	At.-Kent	Dry.....	Splash
Bergdoll "30"...	2500	25.6	Col. cp..	3	4	4	4½	Block.	Cellular..	Cent'fl...	At.-Kent	Dry.....	Splash
Bergdoll "30"...	2500	25.6	Limous.	5	4	4	4½	Block.	Cellular..	Cent'fl...	At.-Kent	Dry.....	Splash
Bergdoll "30"...	2600	25.6	Land't..	5	4	4	4½	Block.	Cellular..	Cent'fl...	At.-Kent	Dry.....	Splash

*Weight of

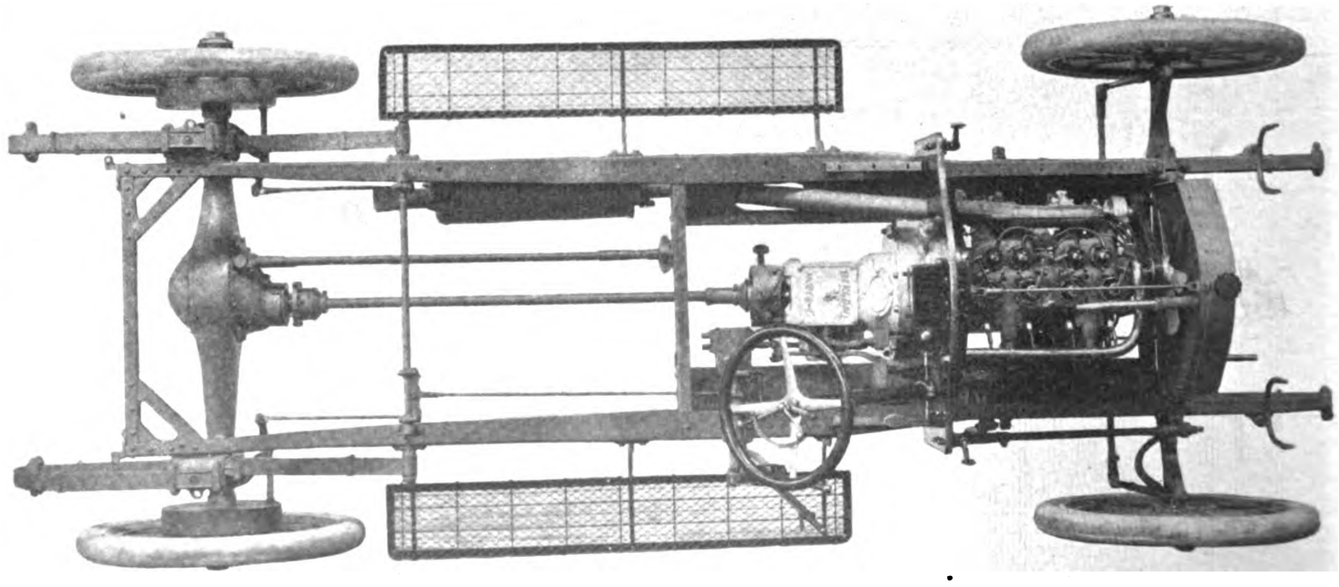
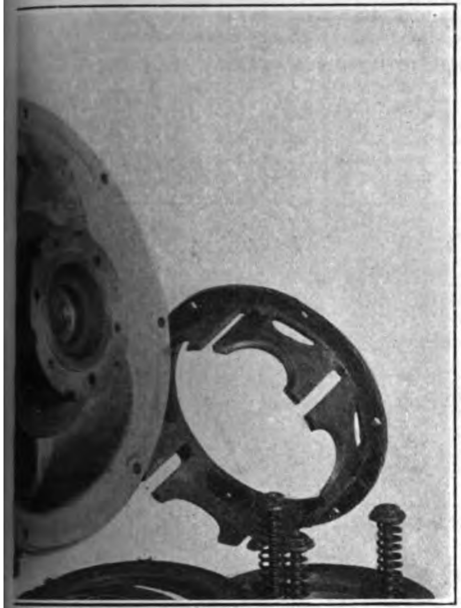


Fig. 4—Looking down upon the chassis; simplicity and compactness are evident



f the Bergdoll clutch

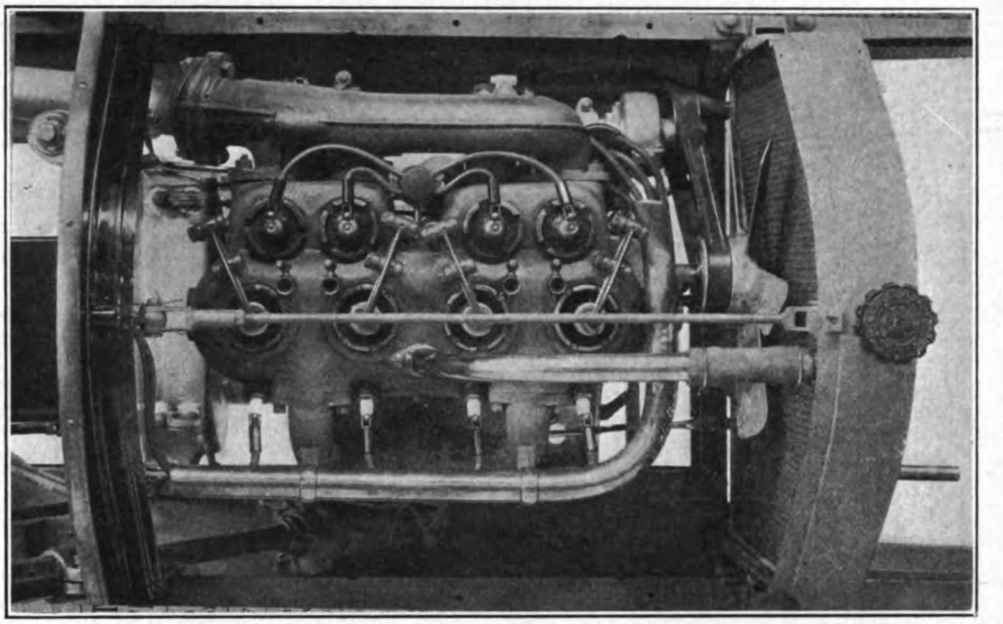


Fig. 5—Showing the top of the motor, disclosing its valves and spark plugs

sparker with coil and batteries is supplied as the regular equipment, and Bosch magneto and an independent set of spark plugs are furnished as special equipment. Both systems are high tension. In the uni-sparker insulated wires carried in tubes along the top of the motor connect the device with the spark plugs. The magneto wires are laid through vertical brass tubes.

CARS AS OFFERED FOR 1911

Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
	Type	Speeds	Location	Drive				Crankshaft	Trans-mis'n	Axle		Front	Rear
M'l. disc.	Selecti'e.	3	S-frame	Shaft...	115	56	Chan. st.	Ball....	Ball....	Ball....	1450*	34x3½	34x3½
M'l. disc.	Selecti'e.	3	S-frame	Shaft...	115	56	Chan. st..	Ball....	Ball....	Ball....	1450*	34x3½	34x3½
M'l. disc.	Selecti'e.	3	S-frame	Shaft...	115	56	Chan. st..	Ball....	Ball....	Ball....	1450*	34x3½	34x3½
M'l. disc.	Selecti'e.	3	S-frame	Shaft...	115	56	Chan. st.	Ball....	Ball....	Ball....	1450*	34x3½	34x3½
M'l. disc.	Selecti'e.	3	S-frame	Shaft...	115	56	Chan. st.	Ball....	Ball....	Ball....	1450*	34x4	34x4
M'l. disc.	Selecti'e.	3	S-frame	Shaft ..	115	56	Chan. st.	Ball....	Ball....	Ball....	1450*	34x3½	34x3½
M'l. disc.	Selecti'e.	3	S-frame	Shaft...	115	56	Chan. st.	Ball....	Ball....	Ball....	1450*	34x3½	34x3½
M'l. disc.	Selecti'e.	3	S-frame	Shaft...	115	56	Chan. st.	Ball....	Ball....	Ball....	1450*	34x4	34x4
M'l. disc.	Selecti'e.	3	S-frame	Shaft...	115	56	Chan. st.	Ball....	Ball....	Ball....	1450*	34x4	34x4

chassis.

Continental quick detachable, demountable rims; Continental tires; Livingston cellular radiator; Schwartz artillery wheels, the double ignition system; Gray and Davis lamps and the compact rear axle construction are some of the points emphasized by the makers of the Bergdoll, in introducing the car, and steel alloys are used in the parts subjected to greatest strain.

The factory of the company is located at Thirty-first and Dauphin streets and has a floor space of 115,000 square feet. The painting and finishing departments are downtown.

The officers of the company are as follows: Louis J. Bergdoll, president; E. C. Johnson, vice-president; William E. Haupt, second vice-president; Charles A. Bergdoll, treasurer; Philip S. Malickson, secretary.

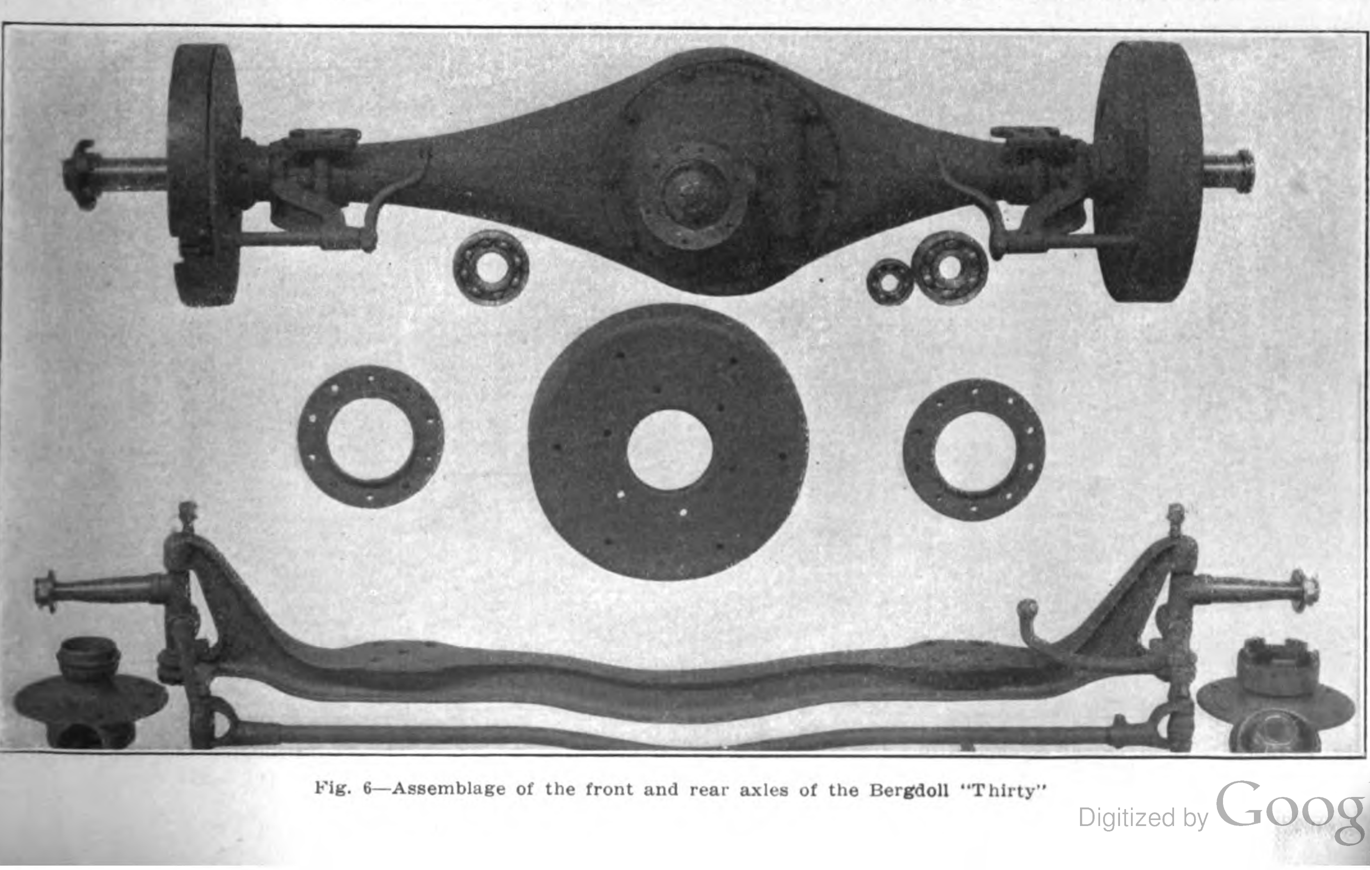


Fig. 6—Assemblage of the front and rear axles of the Bergdoll "Thirty"

Delco Ignition System

SHOWING THE UNITS OF THE IGNITION SYSTEM; ILLUSTRATING ITS APPLICATION ON A CADILLAC MOTOR AND DESCRIBING ITS WORKINGS

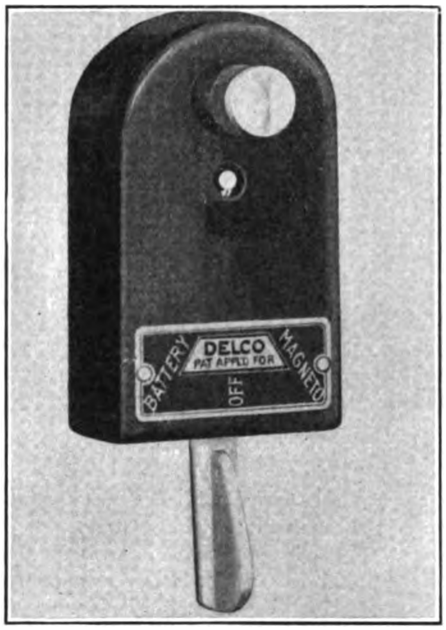


Fig. 1—Delco switch equipped with a mechanical lock and with easy-starting device

REFERRING to the illustrations, Fig. 1 is the dashboard switch which provides a means for throwing in either the battery or magneto, and a neutral position for opening the ignition circuit. Fig. 2 presents the scheme of installation of this system as it applies to a Cadillac motor, in which the details of the relay are shown in Fig. 3, and those of the distributor are plainly set forth in Fig. 4. Fig. 5 shows the distributing coil.

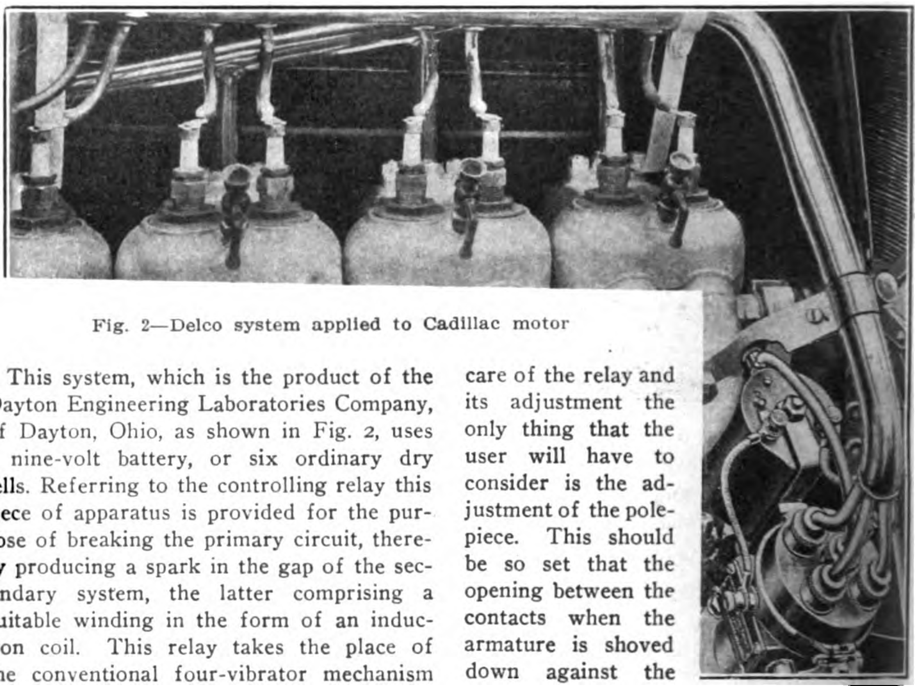


Fig. 2—Delco system applied to Cadillac motor

This system, which is the product of the Dayton Engineering Laboratories Company, of Dayton, Ohio, as shown in Fig. 2, uses a nine-volt battery, or six ordinary dry cells. Referring to the controlling relay this piece of apparatus is provided for the purpose of breaking the primary circuit, thereby producing a spark in the gap of the secondary system, the latter comprising a suitable winding in the form of an induction coil. This relay takes the place of the conventional four-vibrator mechanism as employed in the standard multi-coil systems, and its proper function is that as ordinarily performed by a master vibrator. The difference between this controlling relay and the regular form of master vibrator lies in the fact that with the master vibrator there are a series of sparks, whereas in the controlling relay there is but one spark for each contact of the commutator. In this system there are no moving parts excepting in connection with the relays, and it is pointed out by the maker that in the care of the relay and its adjustment the only thing that the user will have to consider is the adjustment of the pole-piece. This should be so set that the opening between the contacts when the armature is shoved down against the pole-piece will be equal to about the thickness of one sheet of book paper, a matter of perhaps [illegible] inch. A simple way of fixing upon this necessary adjustment is to screw the pole-piece outward, that is, in the direction opposite to the hands of a clock until the motor stops firing, then go the other way four or five notches.

A condenser is used just as in other systems, it being located in a protected position, requiring no care.

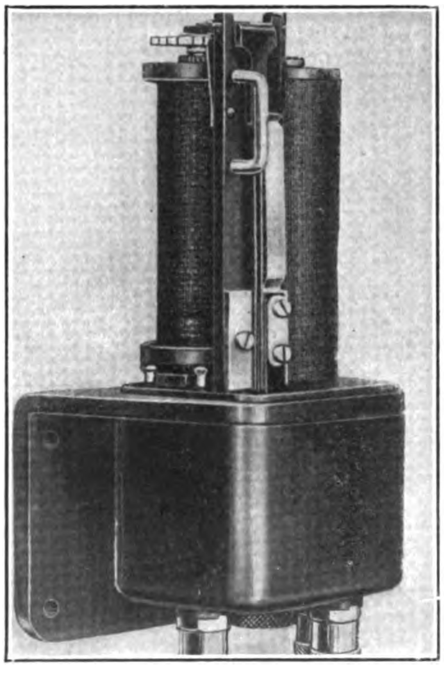


Fig. 3—Delco relay or circuit breaker with cover removed

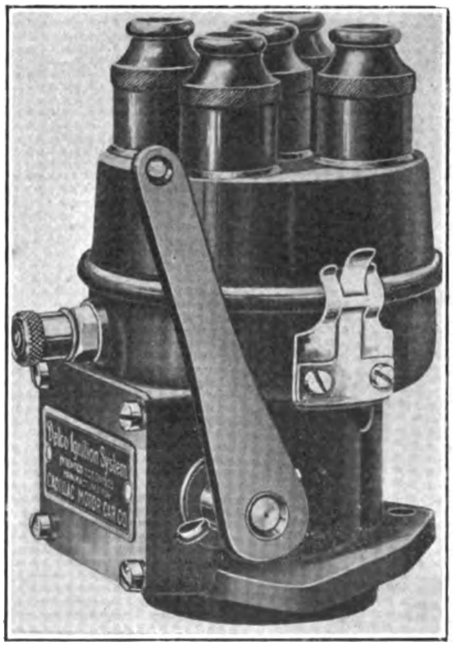


Fig. 4—Delco high-tension distributor; waterproof; no moving wires

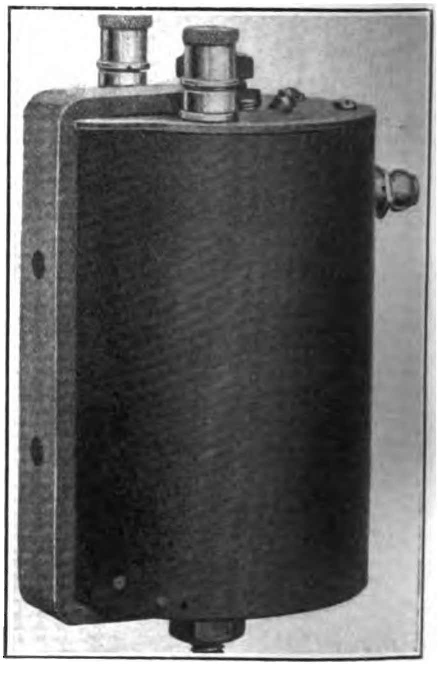


Fig. 5—Distributing coil with the cover removed

Vol. XXIII New York—Thursday, November 17, 1910—Chicago No. 20

THE AUTOMOBILE

Bruce-Brown Wins Grand Prize

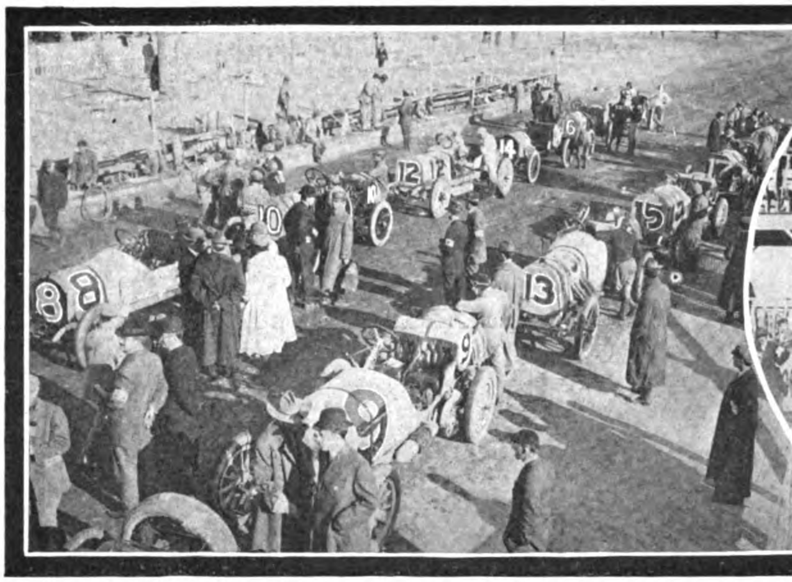
BY MARGIN OF A SECOND—MARMON ANNEXES SAVANNAH TROPHY, AND KNIPPER CAPTURES TIEDEMAN CUP

The Winning Car

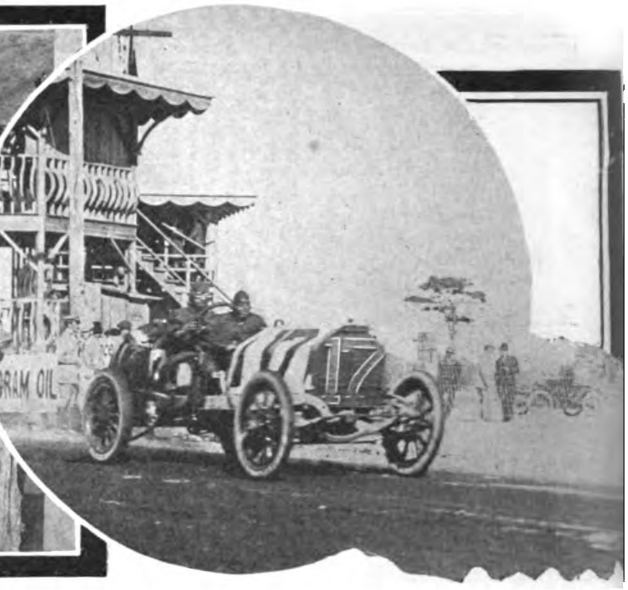
Governor Brown, of Georgia, and Mayor Tiedeman, of Savannah, congratulating Joe Dawson, of Marmon fame and winner of Savannah Trophy

SAVANNAH, GA., Nov. 12—David Bruce-Brown, driving car No. 15, won the Grand Prize of the Automobile Club of America in the closest finish ever recorded in a road race, here or elsewhere. The distance was 415.2 miles, the longest race of its kind ever run, and his time was 353 minutes 5 seconds and a small fraction. Six out of the fifteen starters completed the full course, while nine fell out at one stage or another and from varying causes.

Bruce-Brown drove a wonderful race. His first ten laps were done between 14 and 15 minutes, and most of them varied only a few seconds one way or the other from 14:20. He conserved the life of his mount better than the other drivers, and simply sailed along at a very fast pace from one end of the race



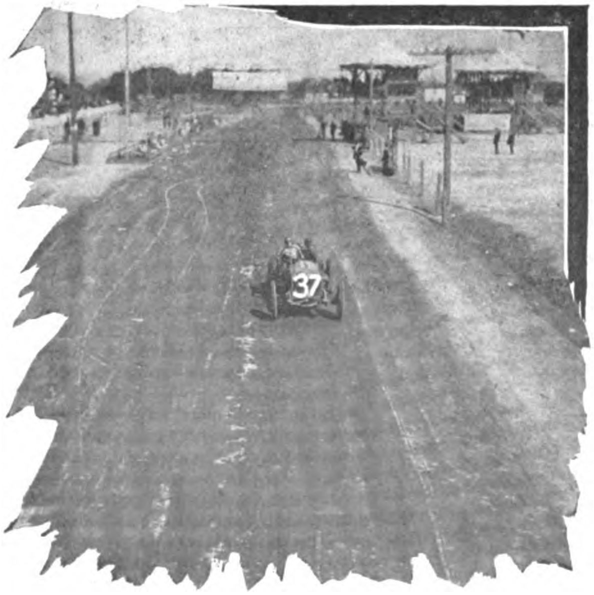
Lining up for start of the Grand Prize



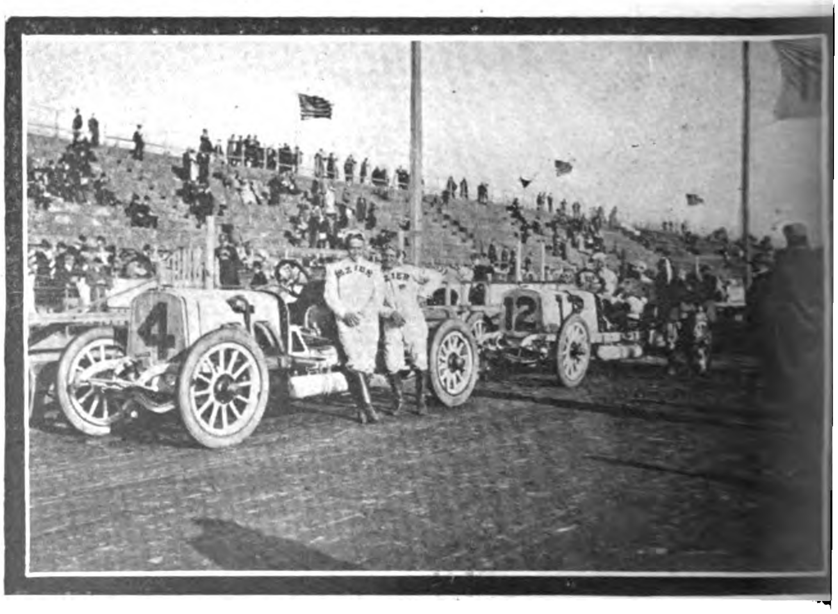
Marquette-Buick shooting past the Grand Stand

STATISTICAL TABLE SHOWING STANDING DURING EACH OF THE 24 L

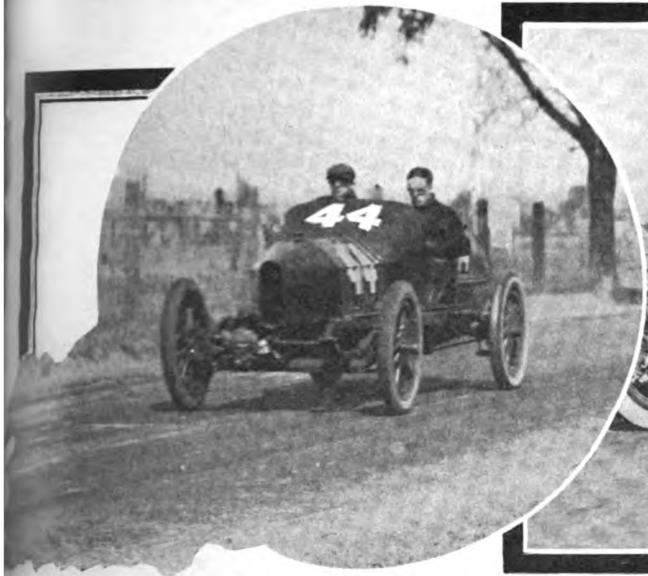
No.	Car	Driver		Lap 1	Lap 2	Lap 3	Lap 4	Lap 5	Lap 6	Lap 7
			Miles	17.3	34.6	51.9	69.2	86.5	103.8	121.1
15	Benz	Bruce-Brown	Total time	14.28	28.49	42.57	57.12	71.33	85.59	100.26
			Lap time	14.28	14.21	14.08	14.15	14.21	14.26	14.27
9	Benz	Hemery	Total time	14.18	28.09	41.59	55.50	69.49	83.49	98.04
			Lap time	14.18	13.51	13.50	13.51	13.59	14.00	14.15
17	Marquette-Buick	Burman	Total time	15.58	30.38	46.33	63.19	78.20	93.11	109.25
			Lap time	15.58	14.40	14.55	16.46	15.01	14.51	16.14
4	Lozier	Mulford	Total time	20.23	37.43	53.42	69.53	85.47	101.49	118.24
			Lap time	20.28	17.20	15.59	16.11	15.54	16.02	16.35
12	Lozier	Horan	Total time	16.27	32.30	48.34	64.34	80.42	96.49	113.07
			Lap time	16.27	16.03	16.04	16.00	16.08	16.07	16.18
14	Marmon	Harroun	Total time	16.35	32.53	49.05	65.05	81.05	96.54	112.59
			Lap time	16.35	16.18	16.12	16.00	16.00	15.49	16.05
19	Fiat	DePalma	Total time	15.03	30.14	45.23	60.10	74.54	89.34	104.10
			Lap time	15.03	15.11	15.09	14.47	14.44	14.40	14.36
10	Fiat	Nazarro	Total time	14.31	29.09	43.28	57.33	71.23	85.14	98.56
			Lap time	14.31	14.38	14.19	14.05	13.50	13.51	13.42
6	Pope-Hartford	Basle	Total time	16.38	32.48	52.14	68.37	84.59	101.12	117.25
			Lap time	16.38	16.10	19.26	16.23	16.22	15.53	16.13
16	Fiat	Wagner	Total time	14.21	28.24	42.70	56.44	71.05	85.81	99.58
			Lap time	14.21	14.03	13.56	14.24	14.21	14.26	14.27
18	Benz	Haupt	Total time	14.30	28.56	43.32	57.37	71.47	85.33	102.07
			Lap time	14.30	14.26	14.36	14.05	14.10	13.46	16.34
7	Alco	Grant	Total time	15.53	31.25	46.49	62.23	77.55	93.27	108.54
			Lap time	15.53	15.32	15.24	15.34	15.32	15.32	15.27
3	Marquette-Buick	A. Chevrolet	Total time	14.19	28.44	42.54	63.20	79.00	96.37	115.07
			Lap time	14.19	14.25	14.10	20.26	15.40	17.37	18.30
13	Pope-Hartford	Disbrow	Total time	17.31	34.02	50.17	66.32	84.16	100.46	117.17
			Lap time	17.31	16 31	16.15	16.15	17.44	16.30	16.31
8	Marmon	Dawson	Total time	14.59	29.34	44.05	58.35	Crankshaft.		
			Lap time	14.59	14.35	14.31	14.30			



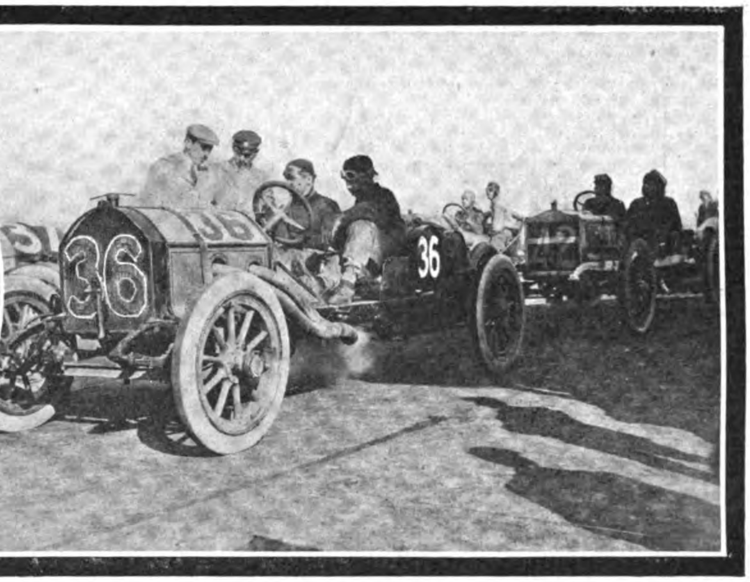
Showing home stretch with Falcar in the foreground



Lozier pair ready for the big race



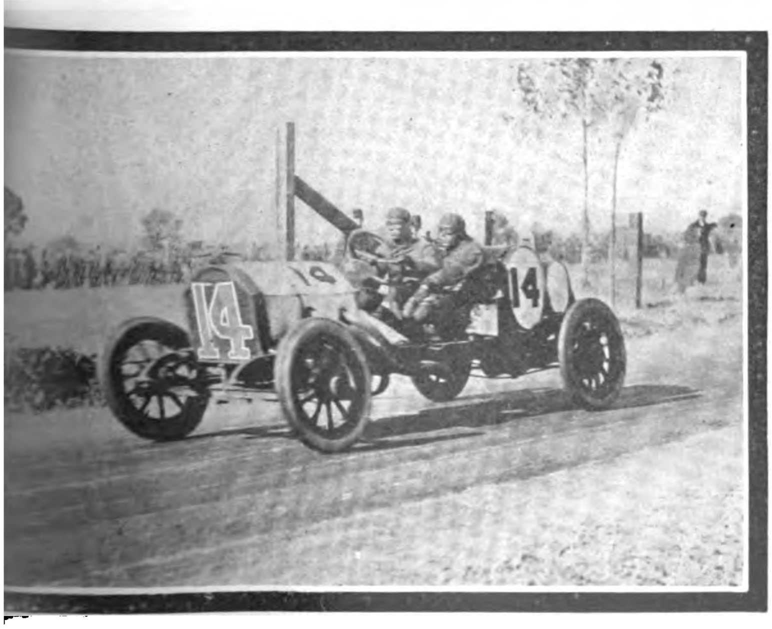
Lancia, winner of the Tiedeman Trophy



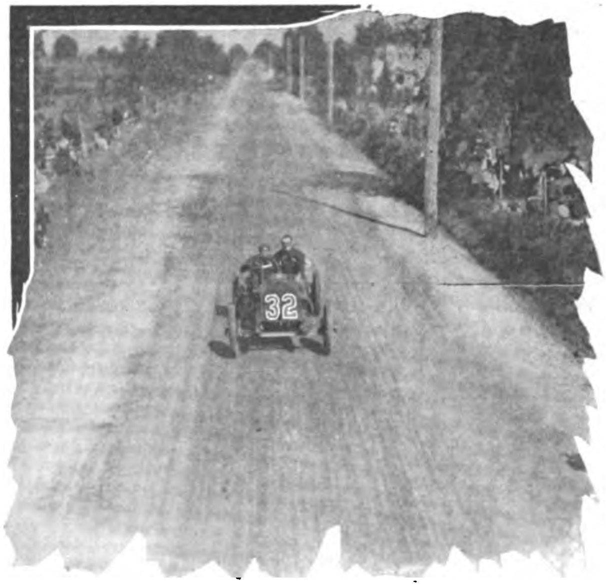
Marmon Car which won the Savannah Trophy

THE 15 CARS THAT STARTED IN THE GRAND PRIZE AT SAVANNAH

Lap 9	Lap 10	Lap 11	Lap 12	Lap 13	Lap 14	Lap 15	Lap 16	Lap 17	Lap 18	Lap 19	Lap 20	Lap 21	Lap 22	Lap 23	Lap 24
155.7	173.0	190.3	207.6	224.9	242.2	259.5	276.8	294.1	311.4	328.7	346.0	363.3	380.6	397.9	415.2
129.04	143.18	163.48	178.01	192.02	206.05	222.15	236.32	250.37	264.52	279.08	293.59	308.36	323.16	337.53	353.05
14.18	14.14	20.30	14.13	14.01	14.03	16.10	14.17	14.05	14.15	14.16	14.51	14.37	14.40	14.37	15.12
31.24	146.46	161.16	175.48	193.26	209.33	223.40	237.54	252.21	266.30	281.00	295.36	310.24	324.50	339.12	353.06
19.13	15.22	14.30	14.32	17.38	16.07	14.07	14.14	14.27	14.09	14.30	14.36	14.48	14.26	14.22	13.54
39.40	156.21	172.02	186.22	202.13	216.39	231.06	248.56	263.41	278.09	296.05	313.22	327.56	342.28	357.00	371.23
14.24	16.41	15.41	14.20	16.51	14.26	14.27	17.50	14.45	14.28	17.56	17.17	14.34	14.32	14.32	14.23
49.03	164.31	180.06	195.49	213.08	228.44	244.24	260.06	275.47	291.45	307.43	323.34	339.09	354.39	370.27	386.12
15.17	15.28	15.35	15.43	17.19	15.36	15.40	15.42	15.41	15.58	15.58	15.51	15.35	15.30	15.48	16.45
45.15	161.15	177.15	193.19	209.34	228.44	244.49	261.00	277.14	293.25	309.36	325.55	342.04	358.08	374.09	390.02
15.56	16.00	16.00	16.04	16.15	19.10	16.05	16.11	16.14	16.11	16.11	15.19	16.09	16.04	16.01	15.53
45.14	161.24	177.33	193.41	210.43	226.47	242.32	258.22	274.12	290.09	306.11	323.48	340.52	357.29	374.03	390.22
16.12	16.10	16.09	16.08	17.02	16.04	15.45	15.50	15.50	15.57	16.02	17.37	17.04	16.37	16.34	16.19
32.56	147.10	161.27	175.36	189.57	205.50	220.34	235.15	249.44	264.01	278.17	292.32	306.36	321.24	Cylinder.	
4.25	14.14	14.17	14.09	14.21	15.53	14.44	14.41	14.29	14.17	14.16	14.15	14.04	14.48		
9.04	143.02	157.31	175.04	189.13	203.20	218.00	232.49	250.14	274.53	Chain.					
6.07	13.58	14.29	17.33	14.09	14.07	14.40	14.49	17.25	24 39						
6.09	172.44	189.15	205.48	222.14	238.40	255.26	272.08	288.51	333.10	Valve.					
2.03	16.35	16.31	16.33	16.26	16.26	16.46	16.42	16.43	44.19						
8.11	142.17	161.06	175.09	192.03	220.24	245.40	261.43	Turned over.							
4.06	14.06	18.49	14.03	16.54	28.21	25.16	16.03								
9.54	143.37	157.20	171.09	Left course.											
3.50	13.43	13.43	13.49												
9.51	155.23	Stripped gear.													
5.27	15.32														
rankshaft.															
ylinders lifted.															



Grand Prize Marmon which made good showing



One of the perfect stretches, showing small Marmon

to the other. His first lap was done in 14:28, his fastest 14:01, slowest 20:30, and his final round in 15:12.

It was a beautiful exhibition of steady driving at high speed and the winner did not show in the lead until the twenty-third lap when he was left out in front by the cracking of a cylinder in De Palma's Fiat. Prior to that time he had maintained a place close to the pace, but did not once show in front until it was time to win.

The rate of speed of the winner was 70.55 miles an hour, a new American road record, but failed to equal that of the Florio course.

Hemery jumped into the lead at the start, with Marquette-Buick (Chevrolet) a close second and Fiat 16 (Wagner) third. The Fiat and the Marquette-Buick changed places in the second round. This order was maintained through the third lap. Tire trouble gave the Buick a setback in the fourth and Bruce-Brown stepped along into third place behind Wagner. There was no change in the order in the fifth, but in the sixth Haupt displaced Bruce-Brown for third honors. Nazarro's Fiat, going at a perilous rate of speed and making the fastest lap of the race, closed on the leaders, finishing only 52 seconds behind. Wagner, Fiat 16, was a close third. They ran the same way in the eighth. A stop at the pits for fuel and water lost the lead to Hemery and Wagner's Fiat took up the running for two laps with Nazarro second and Bruce-Brown third. Haupt was coming with a rush and when Wagner was forced to stop at the pits he pushed to the front in the eleventh lap with Nazarro second and Bruce-Brown third.

At this stage of the race four cars were out of it on account of mechanical troubles and in the thirteenth lap Haupt met with mishap while leading the field. His car became unmanageable while traveling at high speed and shot off the course, turning a somersault and projecting the driver and his mechanic into a clump of bushes with terrific force. The yielding character of the bushes broke the fall of the men and neither was seriously hurt. Precisely what caused the trouble is problematical as the car was badly jarred by the accident.

This left Nazarro in front and De Palma, coming with a swoop, ran into second place with Bruce-Brown third once more. From then to the sixteenth round the order remained the same. Nazarro stopped in the seventeenth and De Palma succeeded to the lead, a few seconds ahead of the Italian pilot, upon whom Bruce-Brown was closing.

For the next five laps De Palma held his advantage, Nazarro going out with a broken chain after disregarding the white flag of the technical committee. Bruce-Brown was a close second until half-way through the twenty-third lap when De Palma's car cracked a cylinder and retired. At the end of the twenty-third round Bruce-Brown was in the lead by less than two minutes from Hemery, with Burman's Buick third. Hemery drove fast in the last lap and only failed to catch Bruce-Brown by a matter of 1:42 seconds. The Buick was third, Lozier (Mulford) fourth, Lozier (Horan) fifth and the sturdy Marmon (Dawson) sixth.

The Fiats, of which so much was expected, failed to finish. Nazarro made a prominent showing, covering 18 laps before succumbing to a broken chain. Wagner's car turned turtle in the seventeenth and De Palma cracked a cylinder when apparently in winning shape.

Haupt's Benz also succumbed while leading in lap 13. The Pope-Hartford pair both fell out with mechanical troubles, one suffering from valve trouble and the other with an engine difficulty. The Alco entry did splendidly as far as it went, running very evenly lap after lap. While it was not prominent at any stage, Grant was evidently pursuing the same tactics as he had used in his two winning Vanderbilt races and but for stripping his gears might have proved a factor.

The two light car races which were run on Friday resulted in victories for the favorites. Marmon 36, handled with much skill by Dawson, won the Savannah Trophy race from end to end. The race was 16 laps of the 17.3-mile course and Dawson made every post a winning post. He was sharply pushed in several stages of the running but always managed to swing past the stands with some sort of a margin. The time of the winner was 4:23:39.98 for the 276.8 miles, about 62 miles an hour. The Mercer entry which finished second driven by Washington A. Roebling II ran a gallant race. Mr. Roebling drove to get the most out of his mount and several times had the veteran Dawson doing the prettiest the Marmon could in order to keep ahead. The Mercer also made more than a mile a minute. A Fal, driven by Hughes, was a good third, having experienced considerable tire trouble. Another Marmon was running at the end and two Fals dropped out in the ninth round, one of them having been very prominent up to that mark.

The Tiedeman Trophy race at 11 laps for cars of 161-230 displacement was taken by the Lancia entry (Knipper). This car led all the way and won by a comfortable margin from E-M-F 45 (Witt), the car that showed great speed at Atlanta in its class. Three Maxwells finished the whole journey without mechanical troubles of any kind and were going about as fast as the winner at the end. Another E-M-F, No. 41, and the Cole pair, Nos. 43 and 47, did not finish.

SAVANNAH TROPHY, 16 LAPS (276.8 MILES), FOR CARS OF FROM 231 TO 300 CUBIC INCHES PISTON DISPLACEMENT

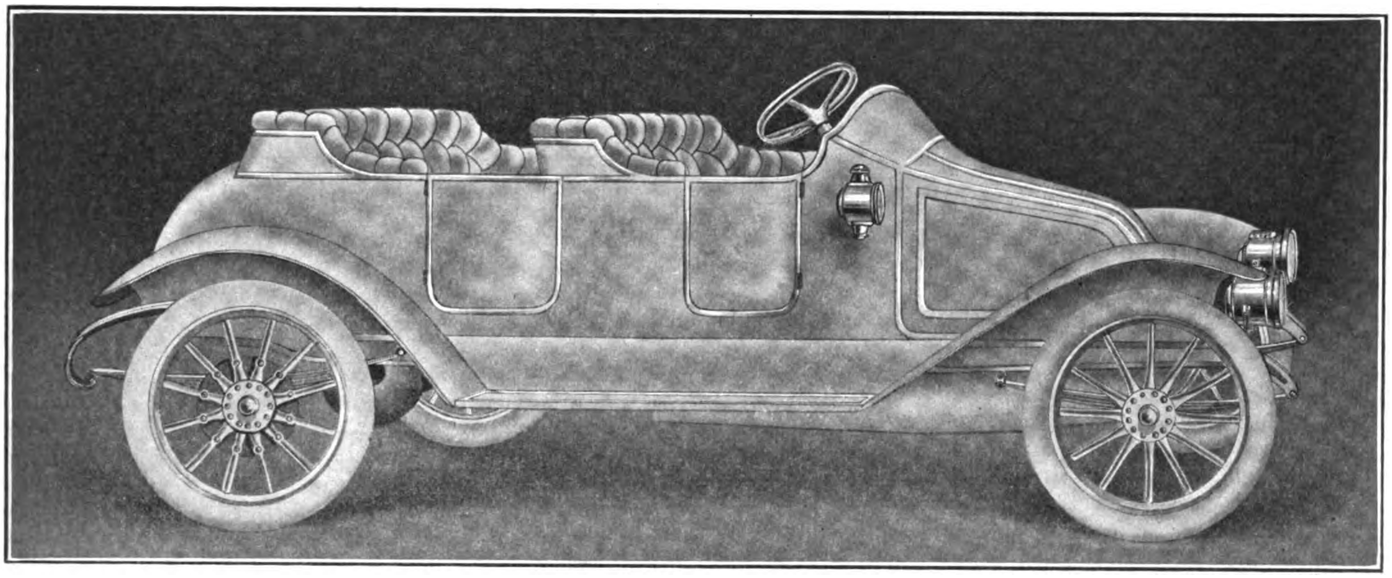
No.	Car and Driver	Cyl.	Bore and Stroke	Laps......	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
				Miles.....	17.3	34.6	51.9	69.2	86.5	103.8	121.1	138.4	155.7	173.0	190.3	207.6	224.9	242.2	259.5	276.8
36	Marmon	4	4 23/61 x 5	Tot. time..	16:20	32:30	49:15	65:48	82:10	98:40	115:08	131:38	148:19	164:58	181:37	198:02	214:33	230:48	247:08	263:39.08
	Dawson			Lap time..	16:20	16:10	16:45	16:33	16:22	16:30	16:28	16:30	16:41	16:39	16:39	16:25	16:31	16:15	16:20	16:21
33	Mercer	4	4⅜ x 5	Tot. time..	17:19	33:55	50:36	67:08	83:32	100:02	116:29	134:51	151:42	168:13	184:46	201:26	218:03	234:25	250:47	275:25.25
	Roebling			Lap time..	17:19	16:36	16:41	16:32	16:24	16:30	16:27	18:22	16:51	16:31	16:33	16:44	16:37	16:22	16:22	24:38
31	Fal	4	4⅛ x 5¼	Tot. time..	18:01	35:32	53:01	70:52	88:29	105:59	123:38	141:13	158:48	176:10	193:39	211:08	228:29	246:05	268:35	286:11.34
	Hughes			Lap time..	18:01	17:31	17:29	17:51	17:37	17:30	17:39	17:35	19:35	17:22	17:29	17:29	17:21	17:36	22:30	17:36
32	Marmon	4	4½ x 4½	Tot. time..	16:59	36:12	66:29	95:23	112:02	128:39	145:08	161:39	178:16	194:51	211:31	228:07	244:44	Running.		
	Heineman			Lap time..	16:59	19:13	30:14	28:57	16:39	16:37	16:29	16:31	16:37	16:35	16:44	16:36	16:37			
35	Fal	4	4⅛ x 5¼	Tot. time..	17:12	33:52	50:32	67:11	83:49	100:28	117:01	133:40	Broken tie rod.							
	Gelnau			Lap time..	17:12	16:40	16:40	16:39	16:38	16:39	16:33	16:39								
37	Fal	4	4⅛ x 5¼	Tot. time..	17:40	34:50	51:50	69:01	86:01	105:55	123:05	140:10	Broken rear wheel.							
	Pearce			Lap time..	17:40	17:10	17:04	17:07	17:00	19:50	17:10	17:05								

TIEDEMAN TROPHY RACE, 11 LAPS (190.3 MILES) FOR CARS OF FROM 161 TO 230 CUBIC INCHES PISTON DISPLACEMENT

No.	Car and Driver	Cyl.	Bore & Stroke		1	2	3	4	5	6	7	8	9	10	11
				Miles......	17.3	34.6	51.9	69.2	86.5	103.8	121.1	138.4	155.7	173.0	190.3
44	Lancia	4	4 x 4⅛	Total time.	18:10	35:45	53:15	70:42	88:08	105:44	123:18	140:38	158:28	176:52	199:22.67
	Knipper			Lap time..	18:10	17:35	17:30	17:27	17:26	17:36	17:34	17:20	17:50	18:24	18:30
45	E. M. F.	4	4 x 4½	Total time.	18:30	36:40	54:57	73:08	91:08	109:08	127:10	145:05	162:52	185:30	206:34.22
	Witt			Lap time..	18:30	18:10	18:17	18:11	18:00	18:00	18:02	17:55	17:47	22:38	21:04
48	Maxwell	4	4¼ x 4⅛	Total time.	19:46	38:57	58:16	77:51	97:26	116:50	137:25	161:31	180:53	200:11	210:19.06
	Costello			Lap time..	19:46	19:11	19:19	19:35	21:35	19:24	20:35	24:06	19:22	19:22	19:18
42	Maxwell	4	4¼ x 4⅛	Total time.	20:35	40:42	60:26	80:05	101:18	121:19	141:01	160:34	180:09	199:48	219:23.24
	Wright			Lap time..	20:35	20:07	19:44	19:39	21:13	20:01	19:41	19:33	19:35	19:39	19:35
46	Maxwell	4	4 x 4	Total time.	20:14	40:04	60:05	80:31	100:39	121:13	141:40	169:27	194:13	215:22	236:07.35
	Dooley			Lap time..	20:14	19:50	20:01	20:26	20:08	20:34	20:27	27:47	24:46	21:09	20:45
41	E. M. F.	4	4 x 4½	Total time.	19:18	46:11	Cracked cylinder.								
	Cohen			Lap time..	19:18	26:53									
43	Cole	4	4 x 4	Total time.	20:55	40:35	Cracked cylinder.								
	Knight			Lap time..	20:55	19:40									
47	Cole	4	4 x 4	Total time.	19:35	Broken crankshaft.									
	B. Endicott			Lap time..	19:35										

Devoted to Electric Subjects

EDISON NICKEL-IRON STORAGE BATTERY; SULPHATION OF LEAD-LEAD BATTERIES; EFFECT OF THE COLD ON CAPACITY; STYLE IN ELECTRIC VEHICLES



SUGGESTION OF A TOURING ELECTRIC AUTOMOBILE WITH THE BATTERY LOCATED UNDER THE HOOD IN FRONT

ELECTRIC vehicles capable of going 100 miles are as readily obtainable as a pound of sugar or furniture for a house; they have all the virtues of the same able electric motors that are so advantageously used on trolley cars and the heavy trains that so enjoyably transport millions of citizens from their homes to their places of business and back again day after day with scarcely ever an interruption of any kind. The motors are noted for their great torquing ability, speed-changing facility and ease of control. Speed is but a matter of gear ratio, power has no limit placed upon it, and longevity is at home in this form of equipment.

What seems to be most in need is the suitable placing of a battery large enough to furnish all the current that will be needed in the propulsion of the automobile, and a type of car that will compare favorably with gasoline automobiles for that class of customer who prefers comfort, even luxury, letting the price come as it may. There are now available all the types of electric vehicles, excepting those of the more pretentious touring types, and with batteries that are capable of furnishing the requisite quantity of current; it is suggested that the last prop be knocked out from the clumsy procrastinator who stands in the way of a wider range of use of the electric vehicle.

In the design of a touring type of electric vehicle, there are many points to be considered, but there is no ground for assuming that all the good work that has been done on gasoline types of automobiles should be disregarded in the newer work. The place where the motor resides in gasoline cars has been selected because of its accessibility, and the constant loading effect it has on the front end of the automobile. These reasons hold equally in electric work; the battery, as the source of power, should have the place of honor, and in the "suggested" model as here presented the battery is located under the hood, the latter being of the type that can be raised in order that access may be had to the battery.

This particular car is of the shaft-drive type, the motor coming just where the transmission gear would be in a gas car. In an electric vehicle the motor does two things, it takes electric energy from the battery and transforms it into its mechanical equivalent and it also serves as the speed-changing unit. The motor would take up no more room than is required for a transmission-gear system, nor is it more necessary to have access to the motor than it would be to get at and work upon the transmission gear. This is proven by the sturdiness of the motors that work so well under trolley cars.

Back of the motor the construction would be precisely the same as that for a gas car; the reasons for having it similar are just as they normally stand—the chassis, in view of the road conditions, speed, load to be borne, etc., being the controlling element. There may be many reasons why some other form of automobile will better serve the intended purpose, but the point that is here being made is that the electric vehicle should be on a more graceful basis than it is; automobilists should not have to go against their inclinations and tastes when they attempt to take advantage of the favorable and enjoyable characteristics of the electric method of propelling automobiles.

Electric Cars in Road Run

COLUMN OF THIRTY-NINE PLEASURE VEHICLES START IN PHILADELPHIA "NORTH AMERICAN" EVENT THROUGH QUAKER CITY STREETS

PHILADELPHIA, Nov. 11—Ranging along a mile or more of highways in Philadelphia and adjacent counties, a column of 39 electric pleasure cars paraded for 50 miles to-day in the first run ever given exclusively for this class of automobiles. The run was promoted by the Philadelphia *North American* and at 10 o'clock the head of the column of contesting cars was set in motion from in front of the home of the big newspaper.

The cars moved away from the starting line without the sputter and noise that always accompanies the start of a gasoline car event and at intervals of 10 seconds, thus the contestants were always in sight of one another.

Officials of the Quaker City Motor Club had charge of the administration of the run and acted with their usual precision and skill. R. E. Ross was referee; G. Hilton Gantert, starter, and Paul B. Huyette had charge of the timing and scoring.

In the column were twelve Woods cars, three Bakers, three Babcocks, nine Detroits, four Studebakers, one Clark, six Waverleys, and a Rauch & Lang. Nine of the contesting cars were driven by women, all of which finished the whole course.

The way was laid out through North Broad street to Fairmount Park, over part of the course of the Fairmount Park Road Race to Ardmore and Bryn Mawr. Stop for luncheon was made at the Merion Cricket Club on the Lancaster Pike, where an hour's control was established. A delightful buffet luncheon was served in the balcony dining room of the club.

The return trip was made early in the afternoon, the cars checking in at the North American Building between 3 and 4 o'clock. There were originally 41 entries in the run, but two cars failed to start. One of these had been shipped by freight and was lost in the maze of 27 freight depots of which Philadelphia can boast.

Of the 39 that participated, all but three completed the full course. The roads selected embraced every variety of good road possessed by Philadelphia as well as short stretches of highway that could not be so designated. There were five considerable hills on the way, one of which was about 10 per cent. gradient and another a very long 4 per cent. rise. In Fairmount Park the little hills are numerous, but no account is taken of them because the surface of the roadways was so perfect.

All the way on the out trip the contestants faced a stiff northwesterly wind which proved so strong that in places it was difficult to coast down a gentle grade.

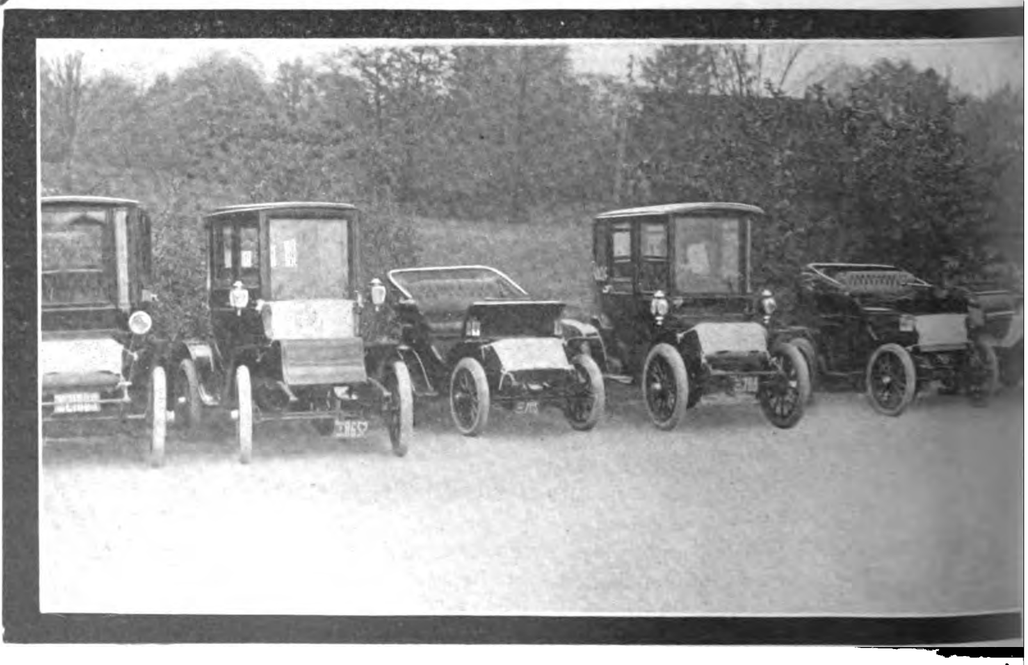
Throughout the trip the cars demonstrated their sturdy qualities as hill climbers and from one end of the run to the other the long line of electrics attracted much attention.

The prize winning and losing had nothing whatever to do with the performance of the cars. It was sheer guess and the plan by which the winners were determined was as follows: When each car checked out the entrant handed to Mr. Huyette a sealed envelope containing the number of hours, minutes and seconds in which he or she estimated that the trip ought to be made. These times were added together and averaged and the result was 4:12:24 2-3 elapsed time. Of course, in order to participate in the prizes, the contestants were obliged to complete the run within the rules. These were simple and informal and did not require difficult things of the cars.

Four handsome prizes were hung up by the *North American*, two cups for the male contestants whose running time was nearest to the average figures and two for the ladies.

Mrs. B. L. Townsend, entrant of a Baker car, made the distance in 4:14:20 and won a gold mesh purse of handsome design. Mrs. E. V. Stratton, in a Waverley, was next nearest to the secret time and was awarded a silver mesh purse. Her elapsed time was 4:16:45. The men's prizes were won by Dr. C. W. Hough-

Dr. Mary Griscom,
Detroit Electric, No. 24



Scene at the handsome grounds of the Merion Cricket Club.

ton, who drove a Studebaker in 4:14:45, and by the Waverley Electric Company in 4:20:28. Dr. Houghton was given a magnificent cup and a smaller one was given to the company.

OFFICIAL TABULATION OF RESULT OF "NORTH AMERICAN'S" ELECTRIC PLEASURE VEHICLE RUN

No. Car	Entrant	Driver	Handicap Start 10 A.M. M.S.	Finish H.M.S.	Elapsed; 1 hr. ded. (lunch) H.M.S.	Contest's est'd time H.M.S.
1—Baker	Reamer & Haines	H. H. Kirkpatrick	..	3:01:20	4:01:20	4:12
2—Baker	Reamer & Haines	C. A. Haines	10	2:59	3:58:50	3:30
3—Babcock	F. W. Eveland	John B. Hill	20	2:55:30	3:55:10	4:37:30
4—Babcock	F. W. Eveland	F. W. Eveland	30	3:21:20	4:20·50	4:40
5—Detroit Electric	Thomas F. Grugan	Thomas F. Grugan	40	2:57:30	3:56:50	3:12
6—Woods Electric	Mrs. Thos. F. Simmons	Mrs. Thos. F. Simmons	50	3:04:50	4:04	4:37
7—Studebaker	Studebaker Co.	J. W. MacMullin	1	2:48	3:47	5:25
9—Clark Electric	A. F. Clark	A. F. Clark	1:20	*2:55		3:15
10—Detroit Electric	J. C. Parker & Son Co.	C. B. Hoffer	1:30			x3:15
11—Detroit Electric	Anderson Carriage Co.	W. Reese Parker	1:40	2:39:30	3:37:50	3
12—Detroit Electric	H. E. C. Nennich	John Geiss	1:50	3:06	4:04:10	4:28
13—Woods Electric	Miss A. M. Kelly	W. H. Metcalf	2	3:05:45	4:03:45	4:25
14—Woods Electric	J. C. Bartlett	J. C. Bartlett	2:10	3:06:15	4:04:05	4:08:32
15—Woods Electric	Woods Electric Garage	Arnold Neirring	2:20	2:48:30	3:46:10	4:10
16—Waverley roadster	Waverley Electric Co.	George A. Fort	2:30	3:47	4:44:30	4:25
17—Waverley runabout	F. B. Rutherford	F. B .Rutherford	2:40	3:41:07	4:38:27	4:32
18—Waverley roadster	T. Munroe Dobbins	Emlen S. Hare	2:50	3:46:52	4:44:02	4:18
19—Detroit Electric	G. Heide Norris	R. L. Heberling	3	2:15	3:12	3:08
21—Detroit Electric	Lincoln K. Passmore	J. Allan Passmore	3:20	3:34:50	4:31:30	3:30
22—Woods Electric	Woods Electric Garage	Leonard H. Worne	3:30	3:02:30	3:59	4:05
23—Detroit Electric	William H. Horstmann	William H. Horstmann	3:40	3:28:30	4:24:50	4:44
24—Detroit Electric	Dr. Mary W. Griscom	Dr. Mary W. Griscom	3:50	3:03	3:59:10	3
25—Studebaker	Miss M. E. Morrison	Miss M. E. Morrison	4	3:22:50	4:18:50	4:58
26—Woods Electric	Dr. A. A. Apple	Dr. A. A. Apple	4:10	2:54	3:49:50	4:35
27—Detroit Electric	Abram C. Mott	R. T. Alford	4:20	Did not check in Merion.		2:50
28—Rauch & Lang	General Motor Car Co.	S. S. Crawford	4:30	2:49:30	3:45	4:10
29—Woods Electric	Dr. E. B. Fanning	Dr. E. B. Fanning	4:40	4:57	5:52:20	5:45
30—Waverley	Waverley Electric Co.	Harry Peyton	4:50	3:25:18	4:20:28	4
31—Waverley	Mrs. George A. Fort	Mrs. George A. Fort	5	3:32:15	4:27:15	4:32
32—Woods Electric	Mrs. J. C. Bartlett	Mrs. J. C. Bartlett	5:10	3:06:30	4:01:20	4:10
33—Waverley	Mrs. E. V. Stratton	Mrs. E. V. Stratton	5:20	3:22:05	4:16:45	5:26
34—Studebaker	Dr. C. W. Houghton	Dr. C. W. Houghton	5:30	3:20:15	4:14:45	5
35—Woods Electric	A. C. Chatman, 3d	A. C. Chatman, 3d	5:40	3:09:25	4:03:45	4:20
36—Waverley	James S. Chamberlin	James S. Chamberlin	5:50	3:43:25	4:37:35	4:20
37—Woods Electric	Mrs. W. P. Smith	Mrs. W. P. Smith	6	3:01:30	3:55:30	4:30
38—Woods Electric	Margaret T. Harper	T. L. Harper	6:10	3:02	3:55:50	4:19
39—Woods Electric	Dr. Caroline M. Purnell	Dr. Caroline M. Purnell	6:20	3:10	3:54:40	4:10
40—Babcock	Phila. Electric Co.	W. A. Mainwaring	6:30	Did not check in Merion.		4:15
41—Baker	Mrs. B. L. Townsend	O. H. Hasselbaum	6:40	3:21	4:14:20	4:07

*Did not go all course
xChecked in Merion, but did not finish run.

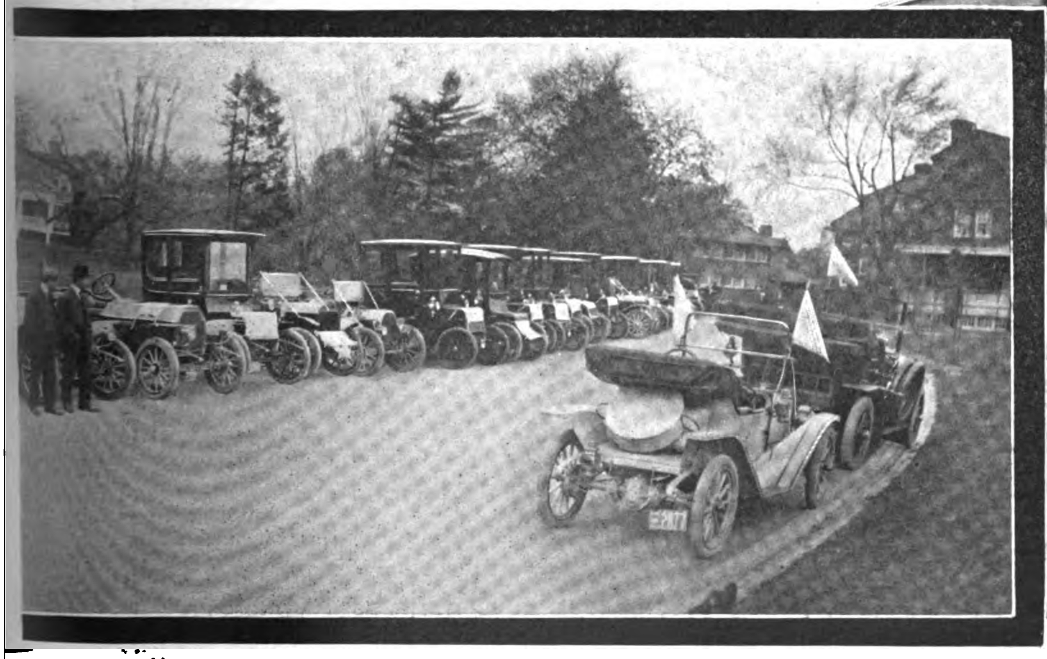
The fastest time was by a Detroit car, which covered the course in an average of 16.6 miles an hour. Two of the Detroit cars were among the missing at the finish of the run and the Clark entry furnished the other unfortunate.

No official observers accompanied the cars, as the whole course was under direct observation and the rules were so broad and elastic that minor technical and mechanical faults were not considered.

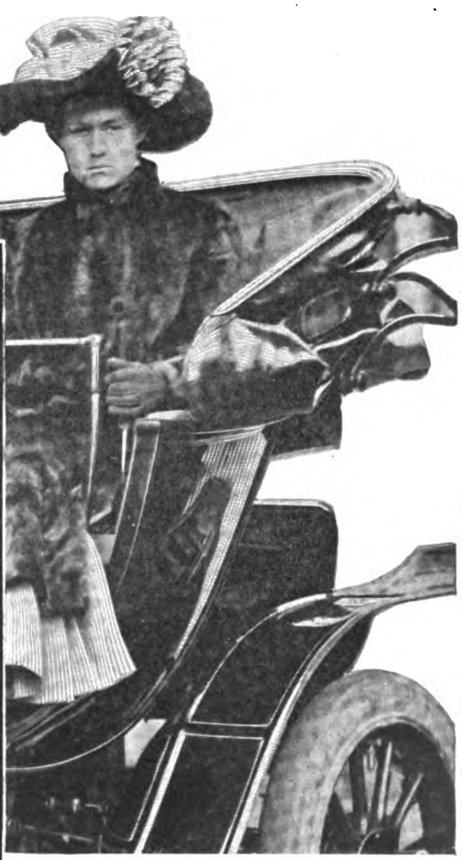
Car No. 29, a Woods, attracted considerable attention at the start and finish and at the mid-control. This car is of 1905 model and except for the fact that its battery was short it performed creditably, although it finished at the end of the procession.

The whole idea of the run was to demonstrate the capability of the electric automobile under conditions that closely approximated actual service, and after it was over contestants, agents and promoters expressed themselves as being thoroughly satisfied with the result.

They said that the field of the electric is distinct from that of the gasoline car and the presence of so many women in line explains a portion of their line of reasoning. They also pointed out that the electrics are specially useful for town car service.



where the participants in the electric run stopped for lunch



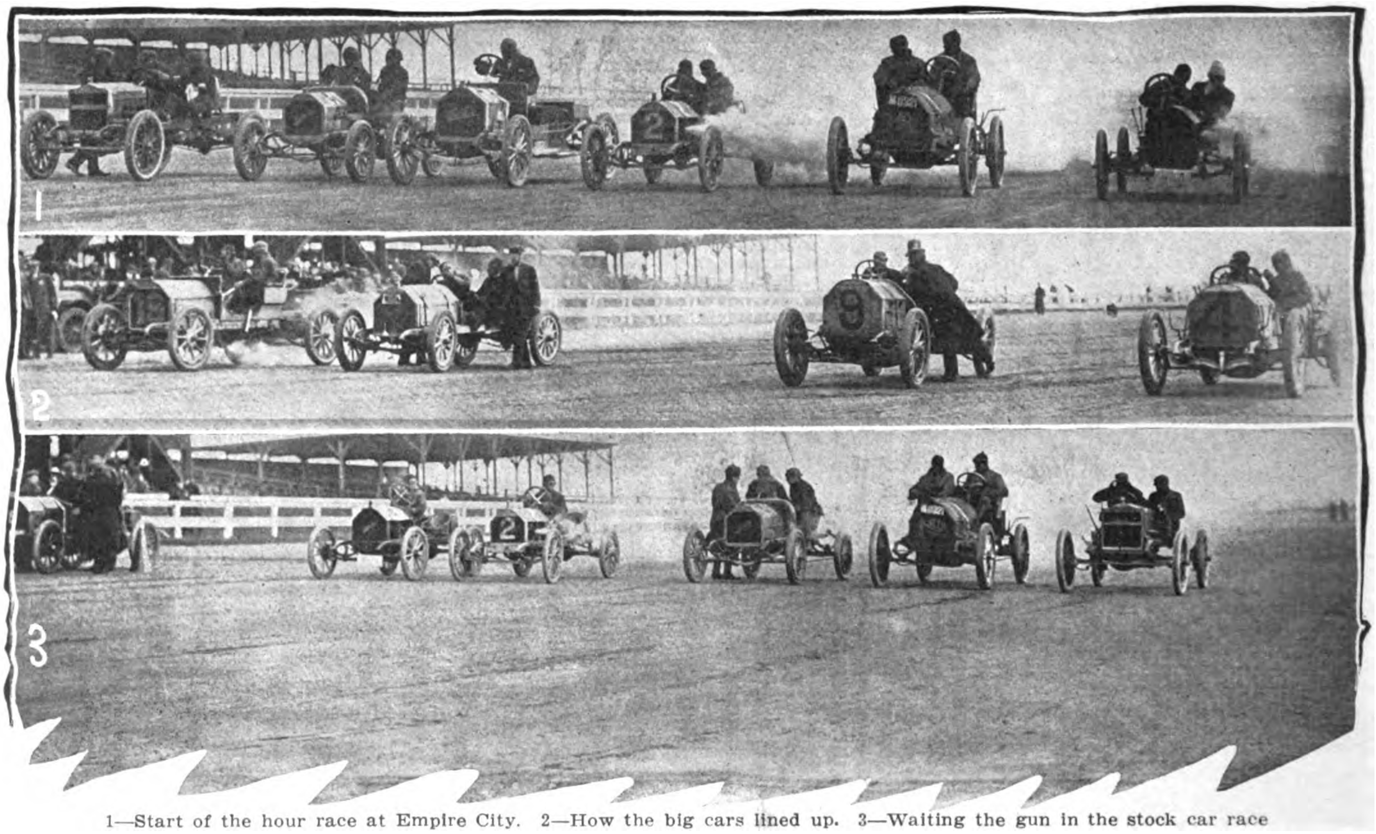
Mrs. E. V. Stratton,
Waverley, No. 33

Yonkers Meet Closes Season

MT. VERNON AUTO CLUB CONDUCTS SUCCESSFUL RACE PROGRAM DESPITE POSTPONEMENTS AND ADVERSE WEATHER CONDITIONS

DESPITE two postponements, cold weather and a 40-mile gale of peculiarly penetrating character, the fall race meeting of the Mt. Vernon Automobile Club at Empire City race track, near Yonkers, proved a success. Motor enthusiasts to the number of about 3,000 braved the weather to attend and they were rewarded by seeing some good sport.

The first event carded was an hour race in which six cars participated. They were a Maxwell, Black Crow, Buick, two Hupmobiles and a Reo. In addition to a purse of $250, which was divided among the first three, the Splitdorf Magneto Trophy went to the winner. The race was exceedingly well contested throughout. The Maxwell jumped into the lead at the start with the Black Crow of Rost's in closest attendance. After three rounds, the Reo suffered a broken wheel at the head of the stretch and it required half an hour to replace the part. The car was started again and at the end of the hour had made 15 laps.



1—Start of the hour race at Empire City. 2—How the big cars lined up. 3—Waiting the gun in the stock car race

The little Hupmobiles did not have enough power to keep up with the bigger cars and were lapped after the eleventh mile. They continued to the finish, however, and made 38 miles each without mechanical difficulty. In the meantime it was a royal struggle between the leaders. The Maxwell, hard-driven was forced further to the front for a dozen miles, opening up a gap of nearly a lap from the Black Crow and Buick. These cars took a spurt after 30 miles had been done and gradually closed upon the pacemaker. The time was too short to catch the Maxwell, however, and the red car came to the wire first by about two furlongs. The Black Crow, running very smoothly, took second place from the Buick which fell back in the final spurting.

The Vanderbilt Cup Mercedes, driven by Spencer E. Wishart had too much power for the field in the second event at ten miles, winning from a Stearns, another Mercedes and an Allan-Kingston.

The Reo which met misfortune in the first event captured the ten mile stock chassis race after a battle with the Buick. The winner's margin was 1 second. Maxwell, 16, finished third.

The five-mile free-for-all handicap drew a big field, but the Vanderbilt Cup Mercedes from scratch was working well and picked up the field handily. The last two races on the card for amateurs and club members were consolidated and run off as one race. The Stearns entry and a Mercedes entered by Harold Mendel had a neck and neck struggle for first honors, while the Black Crow, driven by Otto F. Rost was a bang-up third, ten seconds back of the leaders. The Overland wind-wagon gave an exhibition. The summaries:

ONE HOUR RACE, SPLITDORF MAGNETO TROPHY

Car	Driver	Distance
Maxwell	C. W. Lowa	44 1-2
Black Crow	O. F. Rost	44 1-4
Buick	E. L. Haas	43

TEN MILES FOR CARS OVER 300 CUBIC INCHES

Car	Driver	Time
Mercedes	S. E. Wishart	10:52
Stearns	M. McBride	11:35
Mercedes	H. Mendel	11:45

TEN MILES FOR CARS UNDER 230 INCHES

Reo	P. Haycock	13:52
Buick	P. von Bartmer	13:53
Maxwell	C. W. Lowa	14:46

FIVE MILES, FREE-FOR-ALL, HANDICAP

Mercedes	S. E. Wishart	5:23
Stearns	E. L. Haas	5:46
Mercedes	H. Mendel	5:51

TEN MILES, CLUB MEMBERS, HANDICAP

Stearns	E. L. Haas	10:55
Mercedes	H. Mendel	10:56
Black Crow	O. F. Rost	11:05

Lead Battery Trouble

Sulphate Smothers the Active Salts; Chemical Asphyxiation Takes Place

POSITIVE plates of lead-lead batteries are ready to be discharged when all the salts of lead are reduced to peroxide of lead. In actual practice, it is an unfortunate fact that from 30 to 50 per cent. of the peroxide of lead is so isolated by lead sulphate that it is never reduced to sulphate, and the capacity of the battery is therefore limited by the value of the unconverted peroxide. In a word, sulphate of lead forms over the peroxide of lead and smothers further action, hence the suggestion of chemical asphyxiation. It was pointed out by Professor Robertson that the smothering action of the lead sulphate is greatest when the rate of discharge is maximum; this fact accounts for the reduced weight efficiency of batteries that are placed to do vehicle work, in which the rate of discharge is necessarily high. In vehicle batteries, on this and other accounts, the plates are made relatively thin, and an attempt is made to increase the "fluffiness" of the active material in order to afford better paths for the sulphion of the electrolyte which must reach every particle of the active material before it can be converted into sulphate of lead. It is a great misfortune that "rubbish" salts of lead (isolated particles of a mud-like consistency) accumulate at a too rapid rate, clogging up the passageways and ultimately rendering the battery useless.

Play It on the Piano

The Man Who Uses a Dirty Rag to Clean off the Automobile Body Is Requested to Try It upon His Piano at Home—By W. L. Stewart

THE average automobile owner or dealer has a very faint idea as to the method pursued in producing that beautiful mirror-like effect on the finished body of an automobile, and a much smaller percentage of them have any idea as to the method to be pursued in preserving that finish which is of so much interest to the man that prides himself on the appearance of his car, or the dealer who realizes the importance of the beauty of the car in making the sale. The following is the process used by the large manufacturing concerns in finishing a car:

The body is first sand-papered, after which it is given a coat of oil which is allowed to dry for 24 hours. Then the priming coat of lead and oil, then another drying spell of 24 hours, after which it is gone over with hard putty. Next comes a coat of filler, which is allowed to dry for 24 hours; the last item is repeated four to five times, with 24 hours' drying time between each coat.

Then the surface is sand-papered down smooth and the first coat of color applied and allowed to dry for 24 hours, after which the second coat of color is put on.

Then follows one coat of rubbing varnish, which, after being thoroughly dried, is rubbed down with pulverized pumice stone, then the body is striped or finished with any ornamental design that is required, after which the second coat of rubbing varnish is put on, allowed to dry and is then rubbed down, after which the finishing coat is applied and is left to dry.

The above complete, you have a finished surface equal to a mirror.

Now the question is how to preserve that beautiful luster.

Everyone tells you how to protect your tires. How to protect your engines. How to prevent this trouble, and how to prevent that trouble.

But as yet no one has ever attempted to enlighten you on one of the most important items in the trouble line, one that creeps on you unawares and when once there takes from $50 to $100 to repair it. The item in question is the appearance of your car, one that has as much if not more to do with your final decision in selecting your car than any other.

To prevent your car from assuming a dull, faded and unattractive appearance it requires your most careful attention.

The occupants of a highly polished car are the ones that enjoy the ride. The friend that comments on your car remarks the appearance first of all.

The writer on a recent visit to one of the downtown garages came very forcibly in contact with the advisability of the owner keeping his car in first-class condition as to its appearance.

There were two cars on the floor, same model, same make; one had been taken care of and the other neglected. The owners of the cars wanted to sell them and in the trade that ensued the man that owned the car that was clean and well-kept received $300 more for his car than the man with the car that was dirty, scratched and ill-kept. The dealer explained that the good-looking car caused him no trouble or delay in selling it and getting back the money allowed on the new car. While in the case of the neglected car, it was a plain case of having his money tied up tor from four to eight weeks while the car was being repainted and refinished at a cost of from $75 to $150 or possibly more. It easily pays to keep a car in good condition as to appearance.

The dealer went a little further in his talk on appearance and the method of cleaning used by a great many chauffeurs. When they start to clean a car they hunt around for a piece of waste and when found it more than likely is taken out of an old tool box; it is then rubbed on the varnished parts that have been partly washed, covered with grease and mud spots here and there; the grease spots are smeared over about four times the amount of space they originally covered and the sand and mud are rubbed over another four times the space they covered; the result is a smear that will catch all the dust and a lot of sand scratches.

At this stage he branched off to remark, "Can you imagine anyone going into your parlor and trying to polish your piano with an old dirty piece of waste? What you would do to them would be enough. You should at least be as careful with a machine that cost you as much as five or ten pianos."

A handsome looking car is a thing of beauty and a joy forever.

In buying a body polish get the best and don't buy one that you happen to find because it is cheap. The best is the cheapest.

Keep Lead Batteries Warm

Output of Lead Storage Batteries Is Reduced by the Cold

WINTER service of electric vehicles is somewhat marred, due to the influence of low temperature upon the output of the battery. The highest obtainable output is realized at temperatures not far from 90 degrees Fahrenheit, but as the temperature is lowered the battery discharge becomes more meager, falling off to a level that seriously affects the service when the temperature is hovering around the freezing point. It has been pointed out that the capacity of a lead-lead battery falls off at the rate of about 1-2 of 1 per cent. per degree Centigrade lowering of the temperature between 22 and 0 degrees Centigrade; that is to say, between 71.6 and 32 degrees on the Fahrenheit scale, remembering that 32 degrees Fahrenheit is the melting point of ice, and that 72 degrees on the same scale is average Summer temperature. But the temperature is frequently 100 degrees Fahrenheit in the Summer time and it not infrequently falls to zero in the Winter time. It is during these extreme conditions that batteries suffer most; they overheat on the hottest days and the electrolyte becomes so viscous on the very cold days that the results are only to be improved if a means is afforded for keeping the batteries under a more even condition of temperature than Nature seems to practise.

Don't make haste when you are making a mistake; it doubles the length of the road to success.

Don't be blind; if you do not understand how your motor is lubricated, it may be because it is not being lubricated. Find out where you are at.

Remy Kick Switches

Three Designs of Kick Switches for Ignition Control Systems

KICK switches are looked upon as a great convenience, but the practice of kicking an ordinary switch leads to brutal results, the switch not being capable of withstanding the abuse. The Remy Electric Company, of Anderson, Ind., recognizing the desirability of providing a kick type of switch to be placed upon the dashboard at a convenient point so that the autoist can throw from battery to magneto, or into neutral, as the case may be, by a simple foot movement without disturbing his control of the car or himself, has placed upon the market a line of this equipment as here illustrated.

Type-A switch is made either for a hand key or kick pedal. As shown in Fig. 1, this switch is mounted upon a highly polished coil box. This coil is practically the same as was used with their 1910 apparatus. Type-B switch, as shown in Fig. 2, is also made with either a hand key or a kick pedal. This switch is very compactly built and was designed for small and already crowded dashes, or where the dash was to be entirely plain and unencumbered.

Both of the above switches are of metal finished in black and brass. The hand key is hard rubber and of the conventional shape. The kick pedal is brass; the upper part has a sand-blast finish and the lower part is polished.

Type-C switch, as shown in Fig. 3, is made up as a kick switch only, and when installed is almost flush with the dash, as can be noted from the illustration. This switch is of brass throughout, and with its sand blast and polished finish makes a very handsome appearance. All of these switches are equipped with a hard-rubber push button for starting the motor on the spark without cranking when batteries are wired in connection.

These kick switches are all provided with a detachable key which can be conveniently carried in the operator's pocket. The removal of this key makes the switch inoperative and provides against theft of the car. One characteristic of these switches is the ease with which they may be installed. There are no soldered connections to make, all of the wires being cabled and each wire has a terminal clip. Each of the two cables of the dash kick switches is plainly marked. The wires composing the cables are in color and are to be connected to corresponding color binding posts. The cables are equipped with a brass diverging device which holds each wire out at the proper angle for connecting.

Storage Battery Diseases

Sulphate of Lead is the Normal Product

CONSIDERING the forms of storage batteries that are made entirely of lead, for both the positive and the negative elements, using an acid for the electrolyte (the solution), the tendency of the acid of the electrolyte is to convert lead, and absorbing the sulphion of the electrolyte in the process.

Starting out with peroxide of lead as the active material of the positive plates, and spongy lead as the active material of the negative plates, the mere presence of an electrolyte to supply the sulphion is all that remains as requisite for the delivery of an electric current. But in the delivery of the current there is a corresponding chemical change; the peroxide of lead is reduced to lead sulphate, and the spongy lead is also reduced to lead sulphate. Why should there be any question about this sulphion being abstracted from the electrolyte? This sulphion is taken up by the active material of the respective plates and the result is sulphate of lead. Now, sulphate of lead is of no value for purposes of delivering an electric current, although, fortunately, sulphate may be oxidized by an electric current, hence its use in storage batteries. The point here is, sulphate of lead is the compound that is most to be feared in lead batteries because it is the compound that is always being formed, due to the action of the ever-present electrolyte. Surely there is no defect in the reasoning which makes men express a preference for the new styles of torpedo bodies now to be had from every maker of gas cars.—E. H.

Electric Lighting

Illustrating the Hartman System of Electric Lighting Furnishing Current for the Horn

IN recent times the idea of electric lighting in connection with gasoline types of automobiles has gained converts and the Hartman Electric Manufacturing Company, of Mansfield, Ohio, has placed upon the market a relatively inexpensive system for this purpose, comprising a six-volt dynamo, as illustrated in Fig. 1, including a regulator, as shown in Fig. 2. The dynamo is of the enclosed type, weighing 24 pounds, and the regulator is of substantial design, and so arranged as to be mounted on

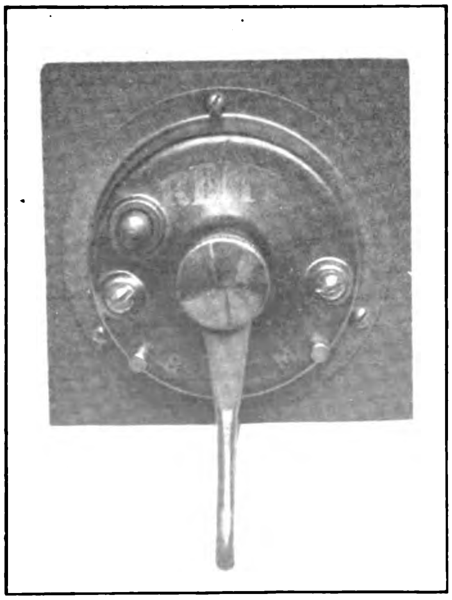


Fig. 2—Is the Remy type-B switch designed for hand key or kick pedal

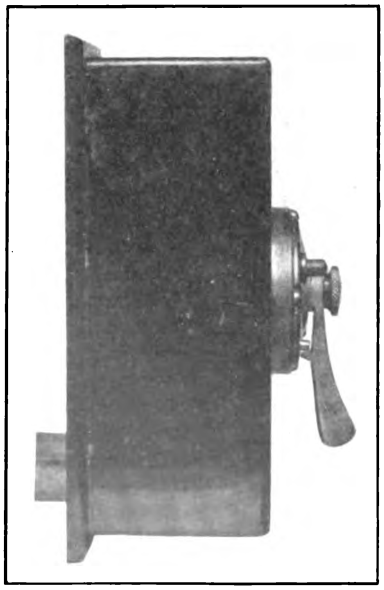


Fig. 1—Shows a type of switch which is furnished for either hand key or with a kick pedal

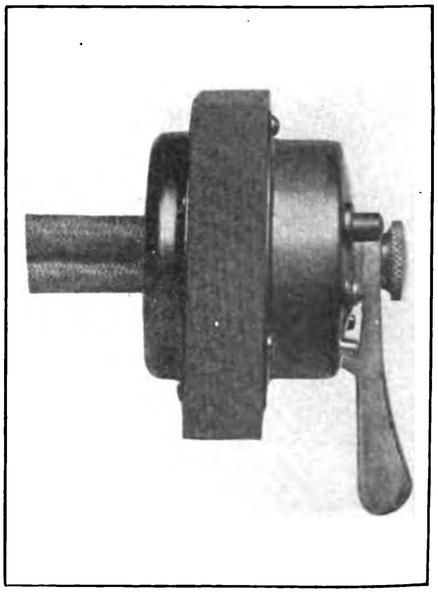


Fig. 3—Is a switch designed with a kick pedal only

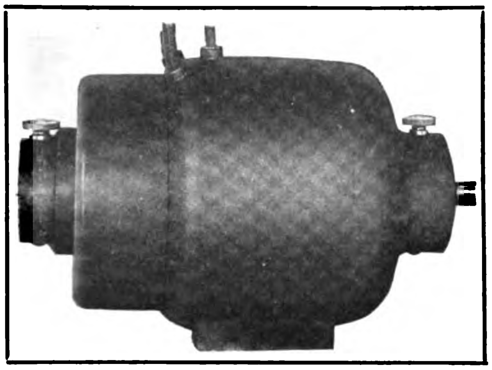


Fig. 1—Dynamo for lighting an automobile and other work

the dash. With the regulator are included three switches, one of which controls the headlight, the second operates the side lights and the third takes care of the tail light. A socket for a trouble lamp is also provided, and a battery for absorbing the surplus energy is included in the system, which battery serves as an auxiliary battery for ignition purposes. As this system works when the car is at rest, or going below 10 miles per hour, the dynamo is automatically switched out, and the current is supplied by the battery, but when the speed of the car is above 10 miles per hour, the dynamo is thrown into action, carries the load, and any surplus resulting is absorbed by the battery. The system is entirely automatic, requiring no attention beyond the occasional oiling of the bearings of the dynamo. The function of the regulating device is to maintain the dynamo voltage constant under conditions of varying speed. Tests have shown that the voltage varies but slightly under speed changes ranging from 1,200 revolutions per minute of the dynamo up to the maximum in service. The battery floats on the circuit, and is therefore protected against overcharging, but it is so situated electrically that when it is below the charged state its receptive condition invites current from the dynamo. The details of the system are worked out to a fitting limit; a turn-down feature is provided in connection with the headlight switch, which enables the driver to kill the glare of the headlights when passing through congested districts and to turn the lights on in full force when the road condition warrants doing so. All circuits are fused so that trouble on one branch is not communicated to the remaining branches, and a separate circuit is provided for the ignition system. Full instructions are furnished with each equipment, and if purchasers so desire the company will supply fittings so that acetylene lighting equipment may be changed over to electric. These facilities are also available for the electrical equipment of oil lamps.

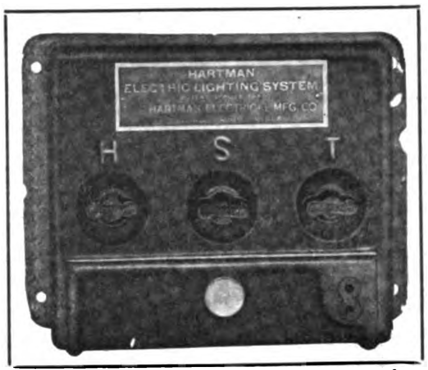


Fig. 2—Control system with switches for each circuit

Tires and Winter Driving—There always seem to be drawbacks in the tire problem, and danger to this most vulnerable part of the automobile is always present. In Summer heat has a detrimental effect due to expansion. In Winter there comes the question of moisture due to rain and snow. A tire properly inflated that would pass over a sharp stone in Summer on a dry road without damage, if driven over the same stone in Winter on a wet or snowy road would probably cut, as rubber cuts very easily when wet. A road containing loose stones should always be taken slowly and with caution; if the patch is a short one, sufficient momentum should be attained before striking them to allow the car to roll over with the clutch out: but if the stretch is long, slow down beforehand.

1910 Edison Storage Battery

FINAL INSTALLMENT — DEALING WITH WALTER E. HOLLAND'S PAPER AS PRESENTED BEFORE THE TWENTY-SIXTH ANNUAL MEETING OF THE ASSOCIATION OF EDISON ILLUMINATING COMPANIES, HELD AT FRONTENAC, THOUSAND ISLANDS, N. Y., SEPTEMBER 6, 7 AND 8, 1910

CONTINUING the explanation of the diagrams accompanying this article, Fig. 26 is an interesting curve showing the alacrity with which the Edison cell adjusts its voltage to sudden changes of discharge rate; and showing also how nearly the voltage at different rates corresponds to that of constant-current discharges at each rate. The slight disagreement between these voltage values is accounted for by variations of internal resistance due to temperature differences. The dropping off at the highest rate toward the end of the varied-rate discharge seems to indicate that it is the increased heating alone which causes full capacity to be given at the same high rate of constant current.

The Edison cell thrives on short-current discharges. Fig. 29 gives the current curves of nine consecutive short-circuit discharges of an "A4" cell, which show an actual betterment of the cell by such treatment. Nine short circuits were given, in this instance, but the betterment ceased after the fourth run. This betterment has been found to be due to the fact that high-rate discharges improve the working conditions of the iron electrode, giving the cell stronger voltage. The improvement is hardly great enough to show on a normal-rate discharge, but becomes very evident at high rates, as shown in Fig. 29.

The length of time which the new type of Edison battery will continue to have a useful capacity must remain a conjecture, sufficient time not having yet elapsed since its inception to ascertain this by actual service tests. Life tests have been made in the laboratory, however, under conditions designed to accelerate deterioration; and by comparison and inference some sort of an

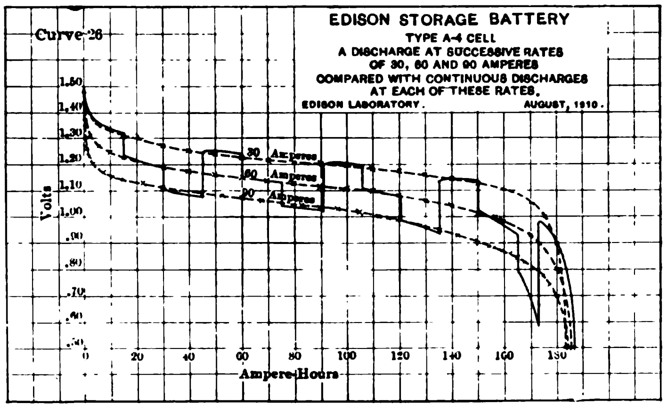


Fig. 26—A discharge at successive rates of 30, 60 and 90 amperes

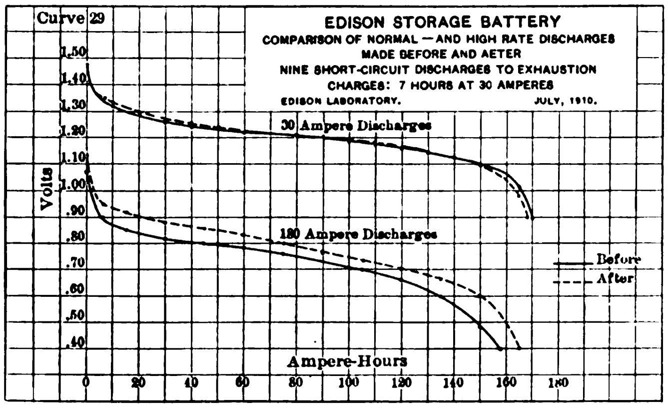


Fig. 29—Comparison of normal and high-rate discharges under different conditions

estimate can be formed from the results of these experiments.

To get life results more quickly use is made of two principles, one—mentioned previously under "Normal Ratings"—that high-temperature working shortens life; the other, that discharging to zero voltage, if practiced continually, has a similar effect.

All ideas as to improvement of the storage battery are first tried out in miniature cells having the single iron pocket and single nickel tube (1-24 and 1-30 parts, respectively, of regular plates) as electrode units. These experimental cells are just like the commercial cells in mechanical construction and give comparative results at proportional rates. A relatively quick life-test is obtained by maintaining such cells at a temperature of 130 degrees Fahrenheit during both charge and discharge, and carrying every discharge to zero voltage. After every 50 such "hot runs" each group of cells is allowed to cool down and is then tested at normal temperature. It is certain that this "killing test" is at least three and perhaps five times as severe as the conditions of commercial service; that is, 50 hot runs would be equivalent in effect to 150 to 250 runs in practice. Nevertheless, miniature regular cells will increase in capacity during 150 to 200 hot runs, and at the end of 500 hot runs will usually have better than original capacity. In some cases after 1,000 hot runs, cells had lost only 20 per cent. of their original capacity.

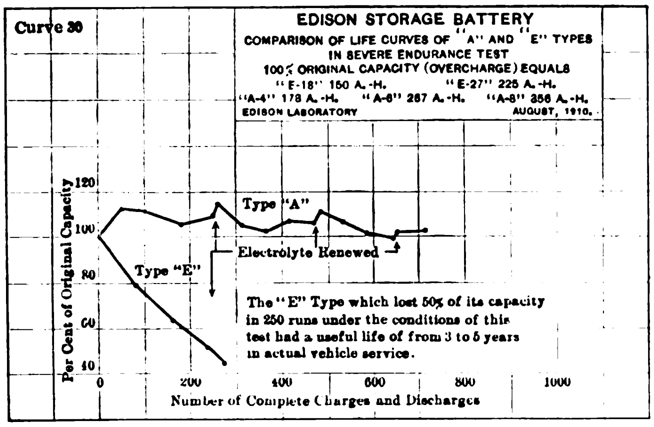
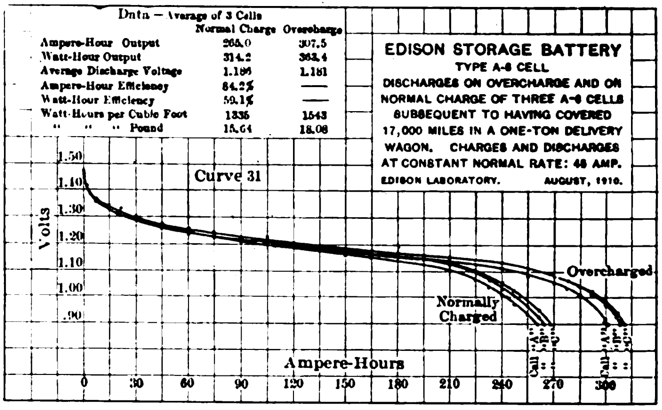


Fig. 30—Comparison of life curves of "A" and "E" types of cells

Life tests of many "A4" cells are also made, but at somewhat lower temperatures, as it is desired to have the conditions approach a little nearer the normal. In this case the temperature averages only 105 to 110 degrees Fahrenheit, but every discharge is carried to zero voltage, each cell then being short-circuited some minutes to ensure its complete discharge. The severity of this test as compared to service conditions can be judged from data obtained on the "E" type of Edison cell, some batteries of which were put in commercial operation six years ago. Curve "E" of Fig. 30 shows that this old type lost 50 per cent. capacity in 250 runs under the conditions of this test, and yet in actual vehicle service it had a useful life of three to five years. Curve "A" of Fig. 30 is the life result to date of the "A" type under the same adverse conditions. The inconstancy of the output in this case comes principally from differences of temperature, as the tests were made in a top-story room whose temperature varied considerably, depending upon outside conditions.

Two years ago the first regularly manufactured "A" type battery ("A6" cells) was installed in a demonstration wagon of one of the vehicle companies. After a few months of this service, during which several long test runs were made, the wagon was sold to a New York dry goods house, where it is still in operation. In July just past three cells were taken at random from this battery for test after having covered 17,000 miles. The results of the test are given in Fig. 31, which shows that these old cells, formed up under commercial service conditions, are actually better in overcharge capacity, in output on normal charge and in efficiency than the average of cells formed up under laboratory conditions; and that the watt-hour output given on normal charge is now, after 17,000 miles, 16 per cent. above the rated watt-hour output, while the maximum output exceeds the rating by 34 per cent. In the light of such a performance who can set a limit to the life of the new Edison battery?


Data — Average of 3 Cells

	Normal Charge	Overcharge
Ampere-Hour Output	265.0	307.5
Watt-Hour Output	314.2	363.4
Average Discharge Voltage	1.186	1.181
Ampere-Hour Efficiency	84.2%	——
Watt-Hour Efficiency	59.1%	——
Watt-Hours per Cubic Foot	1336	1543
" " " Pound	15.64	18.08

Fig. 31—Discharges on overcharges subsequent to having covered 1,700 miles in service

Proposed Electric Vehicle

An Admirer of Electric Vehicles Makes Valuable Suggestions

IMPOSING upon your good nature I desire to generously disagree with those who think that electric vehicles must ever have the taint of the horse and be so designed that the users will ever have to see all style and convenience pass them by, leaving a whiff of the odor of half-burned gasoline. Why is it that electric vehicles are so far behind the times? Why not make them just as gasoline automobiles are designed? If it is convenient to sit in a low seat in a gas car, what makes it inconvenient to have the same advantageous seat in an electric? If the center of gravity should be low in a gas car, why should it not be low in an electric? If the wheelbase must be long on a gas car, why should it not be long on an electric? If the wheels should be of large diameter on a gas car, why should they not be of the same large diameter on an electric? What is the fad that keeps the electric vehicle in the class of the modes of yesterday, leaving every admirer of this splendid device of transportation in the position of the ass who starved to death between two bulging haystacks? Who are the sleepers? Must they ever be with us? What is the answer? Please do not consign this communication to the waste-basket on the ground that the writer is a kicker. In all fairness to five electric vehicles that I have owned, not one of them compared favorably in style of design to any one of a dozen gas cars that can be made for not far from $1,000, but the electrics cost more.—E. H.

Operation and Care

LOOK AFTER THE LUBRICATING OF THE SMALL BEARINGS; TIGHTEN UP THE CLAMPING AND HOLDING BOLTS; LECTURES; LETTERS; QUESTIONS; TIRE-REPAIR; A VARIETY OF SHORT STORIES

OPERATING an automobile without paying some attention to the details and giving them some care is like making a hole in the gasoline tank and expecting that the fuel will remain in. The cost of maintenance of an automobile will be enormously increased unless the little things are looked after, and there is a good chance also of an accident. A long story, relating the nature of the acts that will produce good results, generally ends in confusion, but, confining the lesson, so to say, to some one phase of the whole instead of generalizing may have advantages. The illustration of a Matheson car here given, with the same raised up to permit of seeing the underparts, gives rise to an opportunity to letter the parts that are to be considered.

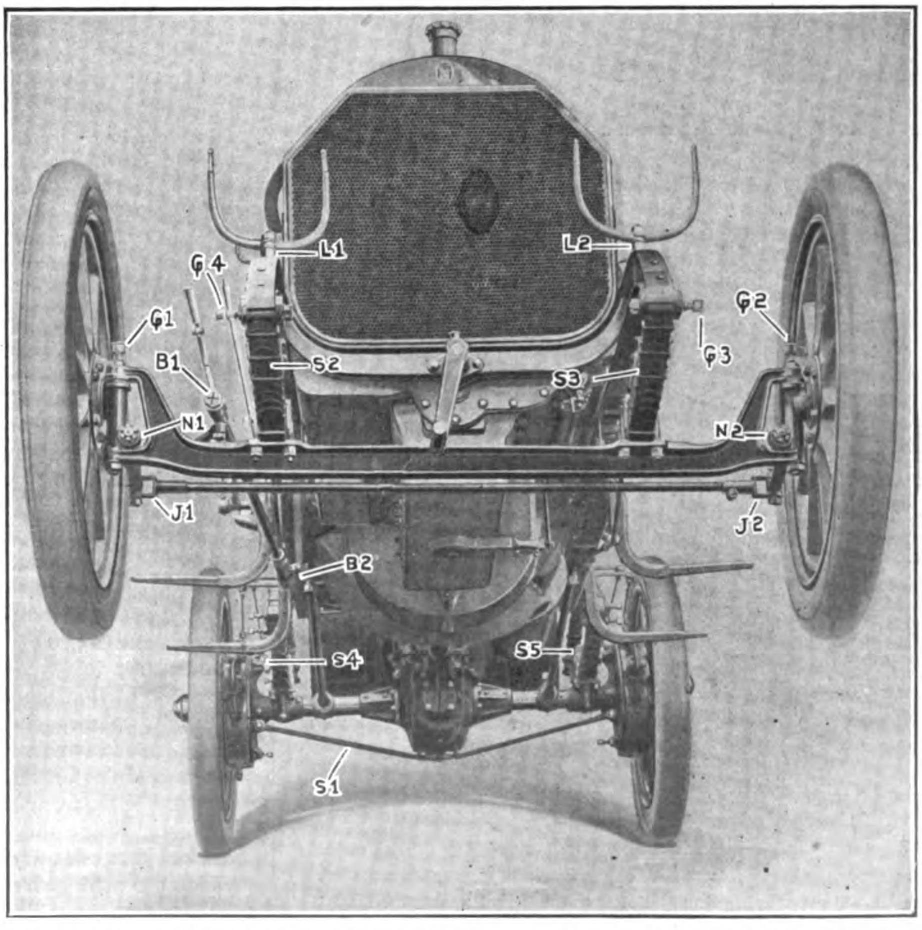
Questions of Lubrication.—Grease is fed to the small bearings by means of cups; it rarely ever happens that the cups are examined by automobilists to see if they are properly filled, or if the grease is in a good state of preservation. Referring to the illustration the grease cups G1 and G2 of the knuckle bearings should be given the best of attention, and the cups G3 and G4 of the springs, both front and back, should be kept filled. All other grease cups should be examined.

Steering Gear Bearings.—Keeping the automobile on the road is a matter of maintaining the steering gear in good order. The bearings and joints J1 and J2, also the ball-and-socket joints B1 and B2, should be looked after with the greatest regularity. Then, there are the nuts N1 and N2, in particular, not forgetting that all the other nuts on bolts and studs in connection with the steering equipment should be kept tight and locked. The springs will do good work if they are looked after; pry up the plates of the springs S2, S3, S4, and S5, squirt in some lubricating oil or smear grease over the surfaces, and let the plates spring back into place; do this every month. Lamps cost money; why not keep the brackets securely in place? The clamping bolts L1 and L2 should be looked after. When the rear axle sags the tires are abused. Why not look after the stay S1?

Take a car as it is here illustrated. It is made for absolutely silent performance; this silence is only possible if all the parts are suitably designed, and so made that all the relating members fit at the joints and so work in with each other that there is no lack of "design-harmony." In the meantime, let us call to mind that if it is desired to reduce the size of a part for any purpose, the most common practice in the shop is to set it up in centers in a grinding machine; this grinding is done so rapidly that it pays handsomely to resort to it rather than to use a cutting tool. Now, when the automobile is put into service, the first thing that the owner does is to set it up in centers in Nature's grinding machine, and, knowing full well that "dry grinding" is the most efficacious, or destructive, as the case may be, oil is scrupulously shunned and the grinding process makes terrific inroads on all the measures for silence that it costs so much.

Sand, as it drifts up from the top of the road, sifts in through the crevices however small they may be, and it is this sand that Nature so abundantly furnishes as the abrasive substance for the autoist to use. Look at a watch-case; let it be ever so tight at the seams; even so, it is but a matter of a few weeks at best when enough dust to obscure the figures on the dial will pass in through the seams; if dust has the stealth to do this, what chance is there to make joints in automobiles so tight that sand-dust will not get in? If not wanted, the great defender is oil.

False and Fair Promise.—Referring to patents, Edison says, "Is it generally realized that no matter how flagrant the infringement nor how bare-faced and impudent the infringer, no federal court will grant an injunction *until the patent shall have been first litigated to final hearing and sustained?*" On the other hand, the language of the grant would lead an unsophisticated inventor to believe that he is entitled to protection for 17 years.



MATHESON CAR RAISED UP AT THE FRONT END TO SHOW THE UNDER SIDE AND THE PARTS TO BE LOOKED AFTER

Piston Deformation

Poor Compression Sometimes Due to Warping Pistons

WHEN the stroke of the motor is long in proportion to the length of the connecting rod, or when the angularity, so-called, is a maximum, the side pressure of the piston against the cylinder wall is relatively high, and this will be accentuated if the motor compression is high, so that in the absence of good designing there is the probability of a considerable warping of the piston, resulting in undue wear in the plane of the connecting rod, unless the warping is so pronounced that the buckling of the piston increases its diameter more than the amount of the clearance, in which event wear will take place in the plane at right angles to the throw of the connecting rod. Under such conditions it is only a matter of a short time when the cylinder will be worn to an elliptical conformation, when the piston rings will no longer be capable of maintaining a tight compression. Fortunately, there are not a great number of cases of this sort in automobile work; but, unfortunately, the most efficacious remedy lies in the purchase of a new motor.

Smoke Is a Nuisance.—It is said that visible smoke consists of solid carbon particles and solid or liquid hydrocarbon particles or tar vapors. Smoke emanations are signs of incomplete combustion, but it may be true that complete combustion is impossible, due in some instances to the methods employed, and in other cases to the qualities that reside in the fuel. Excess of oxygen, *i. e.*, more air, is the proper way to eliminate smoke.

Cantor Lectures on Motors

PROFESSOR W. WATSON, D.SC., F.R.S., DELIVERED A SERIES OF LECTURES ON THE GASOLINE MOTOR, OF WHICH THIS IS THE FOURTH INSTALLMENT—BY PERMISSION OF THE ROYAL SOCIETY OF ARTS

I SHALL not describe how the indicator can be used to study the ignition of the charge. It is a well-known fact that in many cases, when an engine is fitted with both coil and magneto ignition, the running of the engine and the power developed is better when the charge is fired with the magneto than when it is fired by the coil. This effect is generally considered to be due to the fact that the magneto gives a much hotter spark, due to the passage of a larger quantity of electricity, and it is supposed that when the charge is fired by such a hot spark the pressure developed is greater than is the case when a feeble spark is employed.

I have examined this question, and have found that when the inlet valve is in a pocket, and the sparking plug is in this pocket, then, so long as the timing of the spark due to the magneto or coil is the same, on no occasion have I obtained any indication of a difference in the pressure developed, or even in the rate at which the pressure rises, due to the nature of the spark which is employed to fire it.

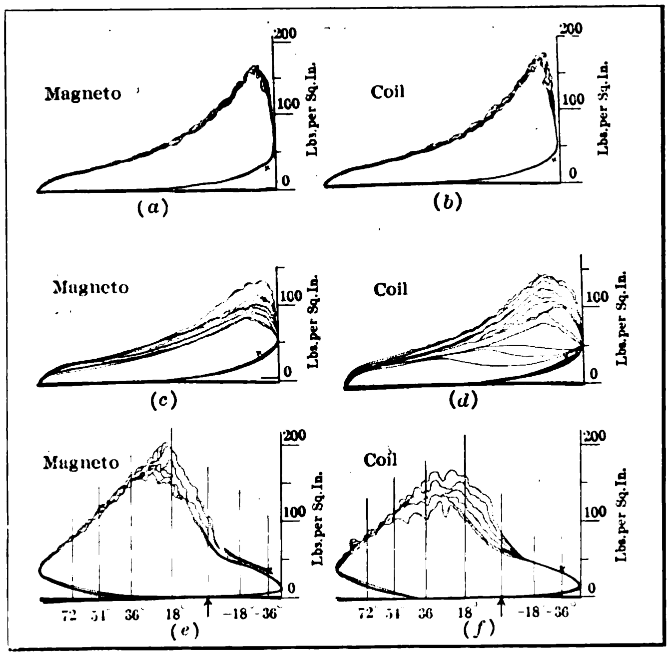


Fig. 16—Manograph cards, showing the results obtained with different methods of firing the charge

In the case of one four-cylinder engine, in which there was a marked increase in power on switching over from magneto to coil, by taking indicator diagrams from all four cylinders it was at once evident that the loss of power when using the coil was due to faulty timing. Thus, if the spark advance was adjusted to give correct timing for one cylinder, in one of the other cylinders the spark occurred too early, and in another too late. This effect was due to a badly designed commutator, and on replacing this by one designed in such a way that the timing was exactly the same for all the cylinders the engine gave as much power with the coil as with the magneto. The above remarks apply to engines having the spark plug in the inlet-valve pocket, so that, at the time of firing, the charge in the immediate neighborhood of the spark is almost free from admixture with exhaust gases left over from the preceding firing stroke.

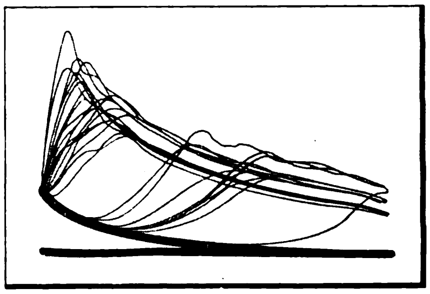


Fig. 17—Manograph card of a series of explosions that were delayed

In the case of engines in which there are no pockets, or at any rate when the sparking plug is elsewhere than in the inlet-valve pocket, then a hot spark seems to be a distinct advantage, particularly when a weak mixture of petrol and air is employed.

This effect is shown in the indicator diagrams given in Fig. 16, for which a sparking plug was used in the combustion space on the opposite side to the pocket containing the valve. The upper two diagrams were obtained with a fairly strong mixture, and in this case there is not much difference observable. The two middle diagrams were obtained with a weak mixture, and it will be observed that the maximum pressure developed, and, in fact, the pressure throughout the working stroke, is much more regular for successive strokes in the case of the magneto than with the coil. In some cases, when using the coil, the burning of the charge is excessively slow, so that the pressure does not reach its maximum value till near the end of the stroke. The crosses marked alongside the compression stroke indicate the point at which the spark passed.

The two lowest diagrams also correspond to a weak mixture.

but the phase of the indicator has been altered, so that the spot of light is traveling from right to left at the maximum speed during the time the piston is at the top of the stroke. In this way it is possible to study the rate at which the pressure rises in the cylinder during the time the charge is actually burning. The vertical lines drawn across the diagrams are separated by equal intervals of time, the one marked with an arrow corresponding to the instant when the piston is at the top of the stroke. A photograph of the spark occurring in an auxiliary spark gap, placed in series with the sparking plug, is obtained on the negatives by placing the auxiliary spark gap alongside the hole in the diaphragm through which the light which falls upon the mirror of the indicator passes. It will be noticed that the magneto spark continues for a very much longer time than does the coil spark. Further, although the coil has a trembler, only one spark passes, since before the trembler has time to act a second time the battery circuit is broken at the commutator. Another point which is brought out strongly by these photographs is the large amplitude of the waves set up in the cylinder, or, at any rate, in the pipe connecting the indicator to the cylinder. This pipe joined the cylinder just alongside the spark plug, so that the charge was fired near the end of the tube, and under these conditions it is always found that the waves in the pipe are particularly well marked.

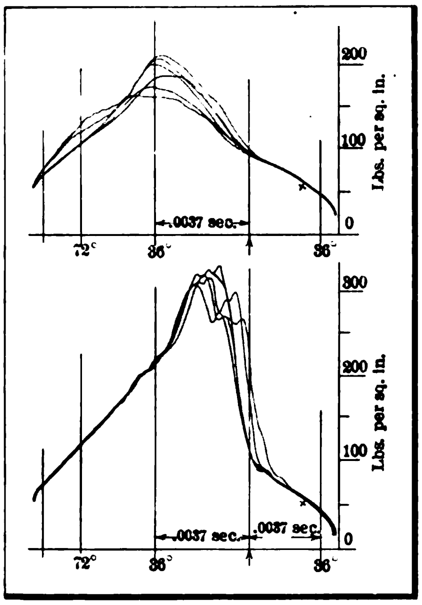


Fig. 19—Manograph cards showing the effect of varying the angle of advance and retard of the spark

When a trembler coil is employed it is important that the current in the primary shall not be less than a certain value, otherwise there will be a considerable delay, of varying amount, before the trembler blade is attracted sufficiently to break the current and cause the passage of a spark. If the current is very much reduced, then the trembler may entirely fail to act, so that the primary current is only broken by the commutator. Thus the spark, in place of occurring very shortly after the primary circuit is completed at the commutator, as is the case when the current is sufficiently powerful to cause the trembler to act, occurs when the circuit is broken at the commutator and is thus much delayed. In Fig. 17 is shown the kind of diagrams obtained when a comparatively weak mixture is fired with a trembler coil, the current being so weak that the trembler sometimes acts and sometimes fails to act. The diagrams may be divided into two series: the first series correspond to the trembler acting, and although the timing of the spark varies considerably, yet the charge is fired reasonably early. In the other series, where the trembler failed to act, the time of firing is so late that the maximum pressure is in some cases only reached toward the end of the stroke.

Another subject which I have investigated by means of the indicator, is the question of the influence of the number of sparks used to fire the charge. As has already been pointed out, even with a rapid trembler only a single spark is obtained at each spark gap, and there is no doubt that if the charge is fired by the first spark, the passage of any subsequent sparks will have no influence on the pressure developed or the rate at which the charge burns. By using two spark plugs at different parts of the combustion space, however, the charge may be fired simultaneously in two places, and hence we should reasonably expect the charge to burn more rapidly, since the flame will not have so far to spread before the whole of the gas has been inflamed.

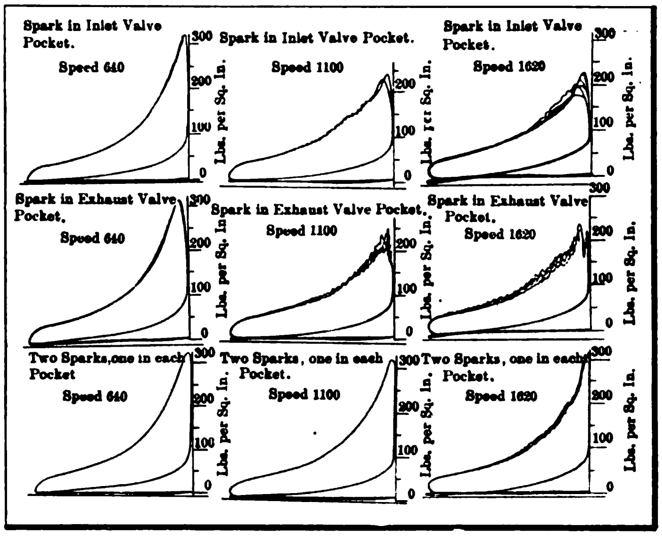


Fig. 18—A set of manograph cards showing the effect of igniting the spark at two points

The effect of varying the position of a single spark plug, as well as of using two sparks, is shown in Fig. 18.

It will be observed that at a speed of 640 revolutions per minute the diagram, and hence the power developed, is the same whether the spark takes place in the inlet-valve pocket, in the exhaust-valve pocket, or in both simultaneously. At a speed of 1,100 revolutions per minute, however, there is a distinct advantage in using two sparks, the indicated horsepower per cylinder rising from 4.6 horsepower per cylinder to 5.2 horsepower. At a speed of 1,600 revolutions per minute the effect is even more marked, the indicated horsepower rising from 6.5 to 7.3. This improvement at high speed is due to the increase in the rapidity with which the charge fires when the combustion is started at two points, as may be seen by a study of Fig. 19. The instant at which the spark passed is marked by a cross. As before the spaces between the vertical lines represent equal intervals of time (0.0037 second).

Graphite for Lubricating

Value of Oils and Greases Stimulated by Addition Thereof

WHEN bearing surfaces are examined under a powerful microscope the surface resembles a nutmeg grater. The high spots scraping over each other are the cause of friction. Flake graphite attaches itself to the high spots, fills in the low spots, and forms over the entire surface a thin, tough, veneer-like coating of marvelous smoothness, so that, instead of having actual metallic contact, there is graphite-to-graphite contact.

It has been truly said that wherever there is a mechanical movement flake graphite may be most satisfactorily used as a lubricant, and it is easy to see, with the above in mind, how the lubricating value of all oils and greases is stimulated by adding the correct proportions of pure flake lubricating graphite.

About the automobile there are many parts that are difficult to lubricate and which soon cause annoyance because of improper attention.

Wherever greases are used it is well to add from four to ten per cent. of flake graphite by weight, depending upon the service. It is better yet, however, to use graphite greases manufactured by some reliable company, that are especially prepared for the work in mind.

On a Curve

Safe Driving Depends Upon Speed, Radius of the Curve and the Center of Gravity of the Car, Including Some Local Considerations

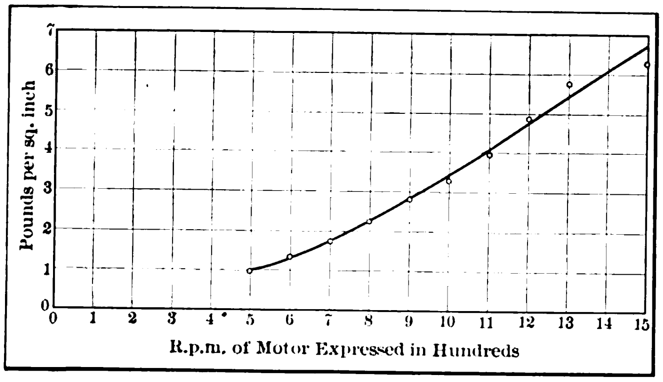
SINCE the wheelbase of automobiles is fixed by other considerations, as the conventions, safety in driving around curves depends upon the center of gravity of the automobile, radius of the curve, and the speed. There are local considerations, as the state of the road, condition of the surface, nature of the tread of the tires, and the chance that a puncture will occur just at a critical moment, and it may also transpire that the right-of-way will be pre-empted by some other automobile, or—who knows—a cow. From the speed-radius point of view, for an automobile with a low center of gravity, safety will depart when the speed exceeds that as given in the following table for the several radii:

Radius of curve, feet	Limit of speed, miles per hour
100	41.
150	50.2
200	58.
250	64.9
300	71.
400	82.
500	91.8

Back Pressure of Muffler

Some of the Power of the Motor Is Consumed in Back Pressure

ELIMINATING noise is at the cost of power of the motor, practically in every example of which exact knowledge is available, although there are types of mufflers that offend but slightly relative to those that are intended to dampen noise by the simple expedient of preventing the exhaust gas from coming out fast enough to get out of the way of the piston and the incoming mixture. It is a great misfortune that the silencing of noise is at the expense of power; but it is well-spent power at that, nerves being worth more than the cost of the power that is used up to save them. The curve as here charted shows how the back-pressure increases with the speed of the motor. Starting with a back pressure of one pound per square inch at 500 revolutions per minute, increasing to 6.3 pounds per square inch at 1,500 revolutions per minute of the crankshaft of the motor. It is scarcely to be supposed that the amount of the back-pressure will be the same in all makes of motors considering a given speed, nor is it true that all mufflers will offend to the same extent, but the fact remains that more or less back-pressure will have to be entertained as a rule. Should a muffler cut-out be used? Probably not—it is the source of much noise and it prejudices the public in favor of adverse automobile legislation. Nor is it likely that the muffler cut-out eliminates the back pressure, although it probably is true that it contributes to the easing up of the same. Of course the efficacy of a cut-out depends upon how it is made, and the manner of its installation.



Back pressure in pounds per square inch cause by muffler at different engine speeds

Compression Troubles

LOSS of compression means loss of power. The motor so suffering it is not in good order. The carbureter will also indicate that account of carbureter trouble from the purely carbureter point of a low depression in the region of the nozzle of the carbureter, and the lack of suction of the motor following loss of compression, that is

A TO Z OF THE CAUSES OF LOSS OF COMPRESSION

(a) Leaky gasket joint.
(b) Leaky inlet valve.
(c) Worn piston rings.
(d) Worn cylinder.
(e) Valve stems disformed.
(f) Leaky exhaust valves.
(g) Valve stems in tight guides.
(h) Valve stems gummed up.
(i) Valve seats pitted.
(j) Valve springs, temper gone.
(k) Valve lift adjustment changed.
(l) Crack in cylinder.
(m) Piston ring broken.
(n) Piston ring in tight slots.
(o) Piston rings, slots all in line.
(p) Piston rings gummed up.
(q) Cylinder head covers not tight.
(r) Crack in piston.
(s) Porous piston.
(t) Spark plugs not screwed in tight.
(u) Broken valve.
(v) Broken valve key.
(w) Broken valve spring.
(x) Overheated motor.
(y) Wrong valve setting.
(z) Cracked porcelain of plug.

Ensnaring Ads.

Which Fall by Being More Beautiful Than Straightforward

ADVERTISING is a science and an art—everybody says so—and withal quite crafty, too. Through the great charm of these versatile aspects, and perhaps for other reasons as well, the special ability for turning a plain business announcement into a joy forever is being assiduously cultivated and the adepts are every day introducing new methods, one more brilliant than the other, for capturing and holding the attention of the fickle public. In the absence of a suitable scale for measuring advertising achievement, it is unfortunately as yet impracticable to announce from day to day that a local, national or international record for advertising performances has been broken, but this may come as soon as advertising shall have been proclaimed a sport and a pastime, as well as a science and an art. A new mark, if not a record, was made recently, however, when a bunch of business men with goods to sell were induced to be satisfied with the reflected glory of booming the name of the artist who had chiseled their announcements into words. Under the head, "Do it once, but don't do it again," the trick marked a passing emergency rather than a threatening innovation, but it suggests the query if the advertising beautiful is, after all, the business bringer.

There must be a large percentage of intrinsic value in advertising, or it would be dead and damned long ago.

AN ANALYSIS OF THE DIFFICULTIES THAT LEAD TO LOSS OF COMPRESSION IN MOTORS, WITH A BRIEF WAY OF FINDING THE REMEDY

will perform in a "lazy" manner and the ignition system will act as if the mixture is not efficacious; this will be so, but it will not be on of view. True, the carburetion will be bad, but this will be on account this condition of the depression will be brought about on account of to say, failure of the piston to pull a proper vacuum.

A TO Z OF THE PROPER REMEDIES TO APPLY

(a) If worn, fit new one and draw up tight.
(b) Take out and clean if worn; grind in.
(c) Have new ones made to size of cylinders.
(d) No cure except lapping and fitting new pistons.
(e) Best to fit new valve.
(f) Clean off oil and carbon.
(g) Ease the valve stems in a lathe.
(h) Take out valves and clean in kerosene.
(i) Grind in with fine emery.
(j) Fit new springs equal in strength.
(k) Probably does not close early enough; close down.
(l) This can sometimes be repaired by welding.
(m) Take out at once and replace with a new one.
(n) Ease rings, not slots.
(o) If this happens often fit step rings or pin.
(p) Sometimes kerosene injected will cure it.
(q) Take off, clean face joints; if gasket, fit new one.
(r) Fit new piston; not worth welding.
(s) Slightly turned and a plate fitted might cure.
(t) Screw tight; new gaskets are cheap.
(u) Fit new one; old ones can sometimes be repaired.
(v) Fit new one; anything will do to get home.
(w) Seldom happens; can be packed temporarily.
(x) Cool off with little kerosene.
(y) Retime motor.
(z) Fit new porcelain or new plug.

New Rubber Forests

May End Scarcity by Developing a Brazilian Virgin Field

FURTHER declines in the raw rubber market are expected by the American trade, and their effect upon the tire market can be conjectured. According to those most closely in touch with the situation, there is no likelihood of large, immediate purchases in the open market as stocks on hand are sufficient for their purposes for the time being.

The supply of raw rubber for the spring trade has been picked up in small lots and by adroit buying, and at the present stage the demand is somewhat slackened. But the other factor in the situation, that of the supply, is what is having more weight with the tire men. For several weeks the price level of rubber has been steady with a downward tendency, but the fact was noted that any material buying orders stiffened the backs of holders and that the floating supply of the product was not large. This alone would indicate that the manipulated conditions still exist in the market, but the tire men have been pleased to hear reports from the Brazilian field that recent explorations have developed the fact that the practically unknown tropical jungles back from the Amazon River contain millions of acres of virgin rubber forests.

"An exchange of thought contains valuable suggestion to the listener—the tongue is the enemy of the listener."

Specific Gravity of Fuel

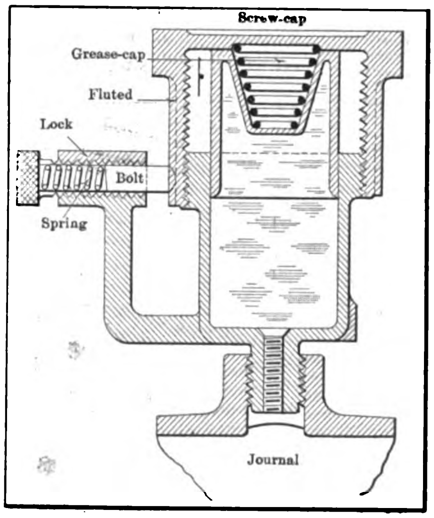
Gasoline is Fractionally Distilled of Crude Oil Holding Several Fractions

ATTEMPTING to determine the quality of automobile gasoline by sticking a hydrometer into a measure of it and observing the specific gravity of the liquid as a whole is a useless undertaking. The specific gravity may be taken without difficulty, but it will not be a measure of either the fuel value of the liquid (by indirect indication) or of the volatility of the same, due to the fact that the distiller, if he takes five fractions, can so balance the lighter with the heavier fractions as to bring about a given specific gravity without using that measure of the middle fractions that will produce the most desirable grade of automobile gasoline. No method of indicating quality should be used in determining the same, if the compounder of the mixture can by jugglery produce the apparent result without having to deliver the goods. If hexane, for instance, is the best fractional distillate then the method to employ in the determination of the quality of the gasoline is that method which will show hexane, if it is present, or the absence of hexane, if it is left out. It should be understood by automobilists that automobile gasoline is not gasoline proper; there may not be any gasoline in the mixture that he buys for gasoline. The probabilities are that automobile gasoline is a compound of the three benzine distillates, with enough hexane to permit of starting the motor, it being the more volatile fraction. To whatever extent it is possible to make a composite pure, thus eliminating by-products in the process of manufacture, it is a good thing; the price is affected favorably.

Special Grease Cup

So Designed as to Press the Grease Down

LUBRICATION by means of grease depends for its efficacy (a) upon the quality of the grease, and (b) upon the use of a well-designed grease cup. The illustration here shown is of a special form of grease cup that offers the advantage of holding enough grease to make it worth while using a cup, and in addition to this necessity, it is so made that by means of a spring which presses against the supplementary cap, the grease is gently pressed down all the time. In addition to this spring the cap proper may be screwed down from time to time, thus adding to the pressure exerted by the spring. A lock-bolt is located at a point of vantage, so contrived that it does not have to be undone when it is desired to screw down on the cap, but it does afford absolute security, preventing the cap from screwing off or down. True, this cup is rather formidable, but it is less so than the bill that comes to the automobilist who relies upon sand as a lubricant for the multiplicity of bearings that designers have not, as yet, learned to do without; until they do, let us use grease, which to do, demands a place in which to store it, and a way by which it will be forced into the journal to be lubricated. Buy good lubricating material, disregarding price,



Special form of grease cup with automatic means of pressing the grease in, in addition to the hand-pressure cap

Going Up Grade

What Happens When an Automobile Is Going Up Hill

On a grade a body is free to move only on the inclined plane. Its weight acts downward. This downward force may be resolved into the components N, normal to the plane, and R, in line with it. The component R retards the car. Since $R:W::Q:L$, $R = \frac{Q}{L}W$, or the resistance due to a grade is equal, in pounds, to the weight of the car multiplied by the proportion of rise in the grade: Roughly, 20 pounds per ton of car weight per 1 per cent. of grade. For the car in question, which, when loaded, weighs, say, 3,800 pounds, the resistance due to grade only, on a 1 per cent. grade, is 38 pounds; on a 4 per cent. grade, 152 pounds, and so on. A car must have tractive force sufficient to overcome the resistance of the steepest grade it is likely to encounter, otherwise no amount of horsepower will make it mount the hill. This is to be accomplished by using large cylinders, or more cylinders, small wheels, or a high gear ratio, or by a combination of these methods; and, after all, the operating conditions at the motor will affect the tractive force more than any other factor.

The highest tractive force is developed on the first gear, and this gear must, therefore, be used on the worst grades. This means a comparatively slow speed, since at 10 or 12 miles per hour the piston speed will have reached 1,000 feet per minute. It is desirable to use second or even third gear unless the grade is such as to stall the motor, and greater economy, of course, follows the use of the higher gear.

Viscosity Interferes

Varies with Temperature, Changes of Gasoline Altering the Flow of Same Through the Nozzle

Between Midsummer and January automobiling the temperature changes in round numbers 100 degrees Fahrenheit in the latitude of New York, and it is within the probabilities that this temperature change is fully 150 degrees Fahrenheit in northern Minnesota. This temperature change has no marked effect on the functioning of a motor *per se*, nor should it have any serious effect upon the lubrication, although it might interfere with efficacious work on the part of the water-cooling system, provided no attempt is made to utilize anti-freeze mixtures. The greatest difficulty in connection with temperature changes lies in the place where it is least expected. Gasoline, like molasses, becomes thick or thin, depending upon the temperature. Like molasses, gasoline flows through an orifice fast if it is thin, and slow if it is thick. When the weather becomes cold the gasoline, like molasses, flows sluggishly. In attempting to disregard this situation the average automobilist has a miserable time of it, and if he lacks in the qualities of a bulldog he will put his automobile away in the garage and nurse his grievance in silence; the other course is to consider natural laws, make the nozzle hole big enough for Winter work and enjoy life.

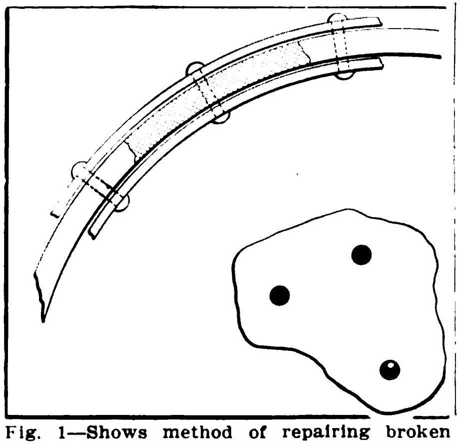


Fig. 1—Shows method of repairing broken aluminum base chamber

Letters from Subscribers

Loose Nuts Stopping Oil Feed

Editor The Automobile:

[2,423]—I have trouble with the lock nuts on my drip feed oiler shaking loose and the adjusting screw closing down and giving insufficient oil to the motor. I can see this in the daytime, but at night I fear that some time I shall have trouble through want of lubrication. What shall I do? R. Kelly.

Detroit, Mich.

Fit a lock nut to the existing nut (Fig. 5). A better way is to take a small piece of tube and cut it to about the right height as in Fig. 3, and this will prevent the adjusting screw falling below the proper level.

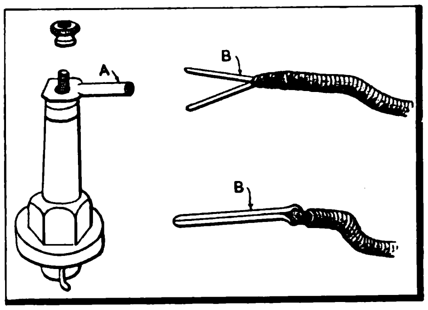


Fig. 2—Easily made terminal

To Fit Terminal

Editor Automobile:

[2424]—How can I fit terminals to low-tension wire without soldering? I find that they shake loose if not soldered. Inquirer.

Take a small piece of copper pipe, split it and hammer it flat: then drill a hole to the size required and screw it to the particular connection. A split pin that makes a tight fit in the pipe should then be used (Fig. 2); bind ends of loose wires with tape, first opening split pin slightly to make a better fit.

Inaccessible Gasoline Taps

Editor The Automobile:

[2,425]—On the last two cars I have had the gasoline tap is placed under the tank, which is located under the driver's seat, and it is necessary to take up boards every time I wish to turn the gasoline off. Can you suggest anything so that the supply can be cut off without this inconvenience? Tired.

Newark, N. J.

We would suggest that you fit a rod through the frame as shown in Fig. 6 that will grip the tap handle, but which should point downwards when open. The reason for this is in case the vibration causes the handle to drop the gasoline flow will not stop.

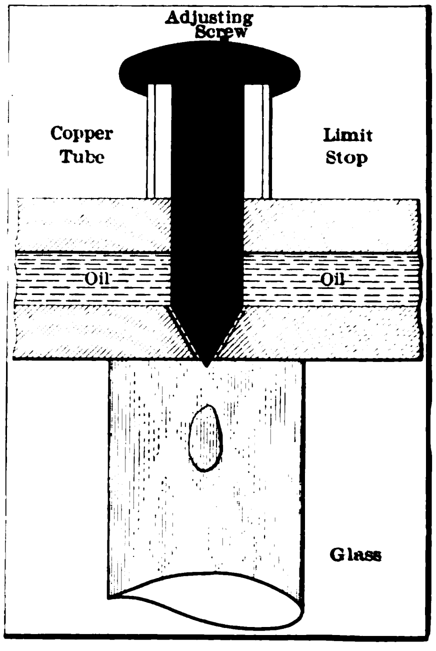


Fig. 3—Drip-feed oiler with limit stop

HIS DEPARTMENT IS DEVOTED TO THE ANSWERING
F LETTERS FROM SUBSCRIBERS ON ANY SUBJECT
ELATED TO THE RUNNING OF AUTOMOBILES

Repairing Broken Base Chambers

Editor The Automobile:

[2,426]—I recently had the misfortune to break a piece out of the lower half of the base chamber of my motor. Could you tell me a way of having this repaired otherwise than by welding? F. R. E.

North Adams, Mass.

This is a question that it is difficult to answer without knowing exactly what part of the base-chamber is broken or how it was done. Lugs can be welded satisfactorily, that is to say, they are guaranteed by the repairers; but presuming that the part of the base that has met with an accident does not have to bear any strain, Fig. 1 shows a method that can be employed and can be relied upon to retain oil. There is no real necessity for the inside liner, but this can be fitted if there is room and the section a large one. The outside strip is made of copper and hammered to the shape of the part to which it is intended to apply it. The broken part is then riveted to the copper strip which is in turn riveted to the base chamber.

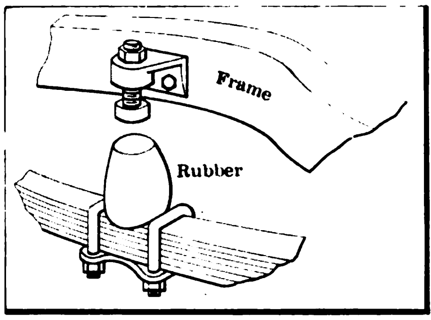


Fig. 4—Rubber buffer for upswept frames and 3-4 elliptic springs

A Buffer for Weak Springs

Editor The Automobile:

[2,427]—When the car I run is fully loaded the rear springs seem to deflect very much, and sometimes, in going over a bad piece of road or a railroad, there is a bumping noise at the rear of the car. Could you suggest any kind of buffer that will overcome this? Limousine.

New York.

The method shown in Fig. 4 should be what you want. The metal point of contact of the buffer should be slightly larger than the rubber cushion. The buffer can be so adjusted that it will strike the rubber cushion as the spring comes up and thus deaden the impact.

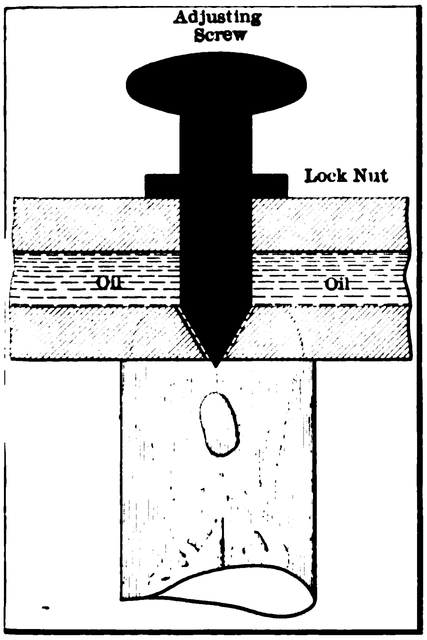


Fig. 5—Drip feed oiler with ordinary lock nut

Lubricating Advice

Noiseless Performance and Long Life Depend Upon Efficient Lubrication

JUST using a considerable quantity of lubricating oil ostensibly on the bearing surfaces is not the way to realize all there is in it. The man who counts his money carefully, making sure that the balance is correct, will be on the exact right road when he pursues precisely the same course in connection with the lubrication of the bearings of his automobile; the same care and precision are all that good judgment dictates. Below are some useful hints to be followed as nearly as the equipment of the various makes of automobiles will permit; good lubricating oil should be used, however.

(A) The resistance decreases with the thickness of the film.

(B) The resistance increases very materially with the viscosity of the lubricant.

(C) The point of nearest approach is approximately 90 degrees from the line of load.

(D) The points of maximum and minimum oil-film pressure are approximately at equal distances from the point of nearest approach.

(E) As the speed increases the points of maximum and minimum oil pressure get further and further apart, till at very great speeds they are in the line of load.

(F) As the speed increases the eccentricity of the oil film becomes less.

(G) The concentric position is the one of least resistance.

(H) Oil should be supplied at a point where the supply pressure is greater than the film pressure.

(I) The loading for a given speed must not exceed a certain limit at which the oil film is broken.

(J) This limit may be increased by lengthening the bearing, so increasing the cooling influence on the bearing.

(K) Oil grooves wrongly placed may destroy continuity of the film.

(L) A motion of pure rotation produces automatic maintenance of the film, provided the supply is adequate.

(M) The temperature varies throughout the bearing, the highest temperature being at the point where the film is thinnest.

Further, in the case of a reciprocating load we know that—

(N) A reciprocating load irrespective of rotation produces automatic lubrication.

(O) Heavier mean loads can be supported if the direction of load is reversed, because the lubricant is more vigorously sucked in, and the retardation of surfaces approaching one another normally increases very rapidly as the film becomes thinner.

Generally speaking, failure of lubrication is caused by rupture of the film due to:

(P) Inadequate supply of lubricant.

(Q) Reduction of the viscosity arising from excessive heating, either general or local.

(R) Badly placed oil grooves.

(S) Overloading.

(T) Grit.

(U) Impurities, such as water, reducing the film-forming qualities of the oil.

(V) Take nothing for granted—plausibility is a danger; it frequently leads to bad results. Investigate, and when a method is proposed, if it pans out, use it.

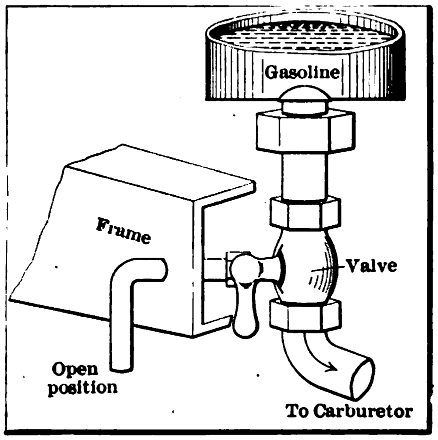


Fig. 6—Tap fitted outside frame for cars with gravity feed gasoline supply

Care and Repair of Tires

FOLLOWING up the line of thought as introduced under the head of "Imprint Methods of Testing" in THE AUTOMOBILE of November 10, it was decided to try out tires under two sets of conditions, *i. e.*, (a) to ascertain the area of tire contact under different conditions of pressure with the tires on the wheels with the car ready to use, not including passengers, and (b) rolling the car along the floor, permitting the rear wheel to intercept a "chock," the same being hewn down so as to present a face set at an angle of 60 degrees from the horizontal, the idea being to give the tire a good jolt, with a means available to show the imprint area, and compare it with the normal imprint as measured under the tire of the car standing still on the floor.

The pressures obtaining in the tire under the different conditions are stated for each print, and a study of the prints as given will at once lead to the conclusion that road obstructions have a marked effect upon the extent of deformation of pneumatic tires, introducing flexure to a degree that must have a large bearing upon the rate of deterioration, and with a view to measuring something of the deteriorating influence an attempt will be made to give an empirical formula, which while it cannot be regarded as absolutely accurate is far better than a disregard of the facts.

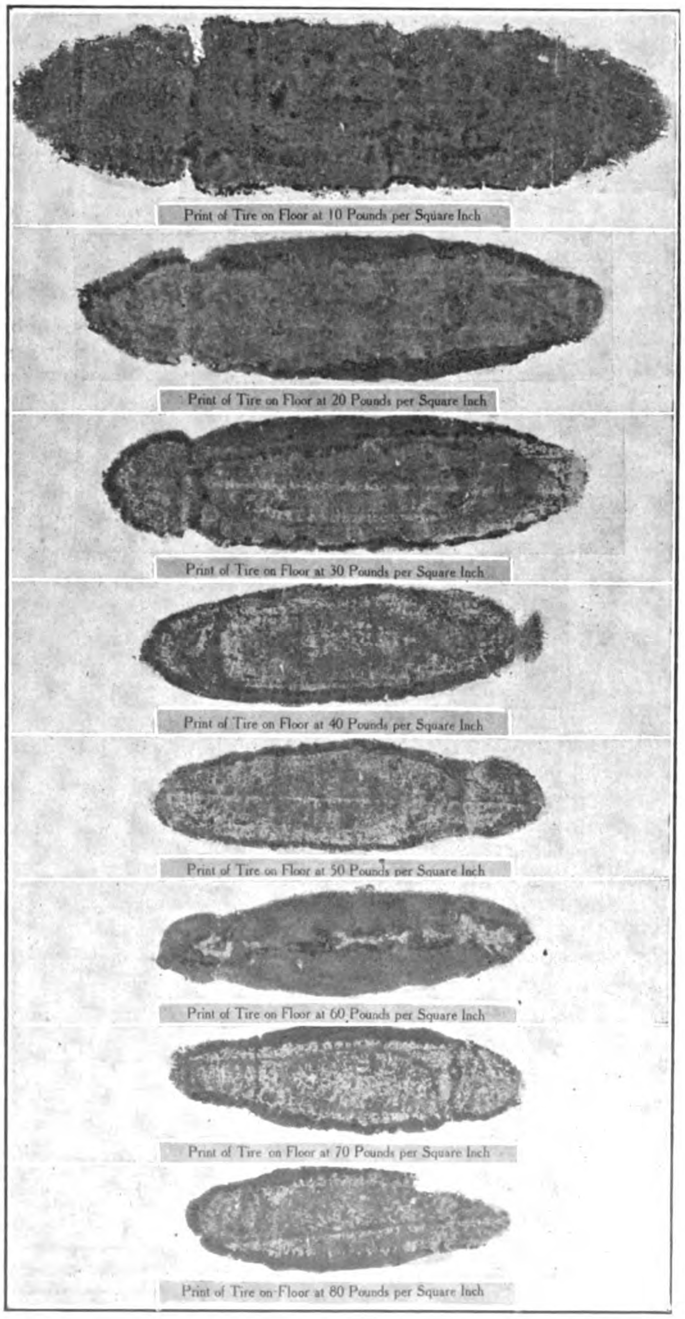


Fig. 1—Prints taken at various pressures with a 34 x 4-inch tire on the wheel, with the car standing still and resting on the floor

As a general proposition it will be possible to conclude that the tire which presents the least area of contact as shown by a print will last the longest. How much longer the life will be with the minimum area of contact must be left to conjecture to a considerable extent, but if the width of the print multiplied by its length is divided by the pressure of air in the tire at the time of making the print, the constant derived will be a rough indication of the difference in tire life. To be more accurate, find the area of the print and divide it by the pressure in the tire.

Referring to Figs. 1 and 2 of prints taken at the garage of the Overland Sales Co., 1599 Broadway, New York, for purposes of illustrating this article, the pressure in the tire under the several conditions is given in each case, care having been taken to start with the pressure as low as 10 pounds and raise the same by even increments to 80 pounds inclusive. It is generally claimed that 90 pounds per square inch is not too high for tires as large as 34 x 4 inches, which was the size used in this test, but an examination of the tire prints discloses no very sound reason for wishing to raise the pressure above 80 pounds per square inch. Fig. 1 shows the imprint of the tire under pressure between 10 and 80 pounds inclusive by 10-pound increments, with the car resting on the floor; in other words, it shows the amount of tire contact under static conditions. The tire contact around the periphery under the different conditions of pressure was as follows:

PERIPHERAL CONTACT OF A 34 X 4-INCH TIRE

Pressure per square inch	Peripheral contact in inches
10	11 1-2
20	9 3-8
30	8 1-2
40	7 1-4
50	7
60	6 5-8
70	6 1-8
80	5 7-8

The cross-sectional contact under the same conditions follows:

CROSS-SECTIONAL CONTACT OF A 34 X 4-INCH TIRE

Pressure per square inch	Cross-sectional contact in inches
10	3
20	2 5-8
30	2 1-2
40	2 1-8
50	2
60	1 7-8
70	1 3-4
80	1 3-4

Between 70 and 80 pounds per square inch the cross-sectional contact was substantially the same, but the peripheral contact changes noticeably, showing that there was a substantial gain by having the pressure at 80 pounds as compared with 70 pounds, if it is true that reducing the area of contact is beneficial. There must be a point beyond which reducing the area of contact ceases to be desirable, but this point has to do with the easy riding qualities of the automobile, and the probabilities are that easy riding is at the expense of tire life. Referring to Fig. 2, two conditions are depicted in the illustrations of imprints marked (A). The results were obtained by pushing the automobile for a distance of about 6 feet, bringing the rear 34 x 4-inch tire up against a vertical post, thus striking a blow, and bringing the car to rest by impact. In order to compare the performance of the tire with the normal contact under static conditions reference may be had to the table:

PERIPHERAL CONTACT OF A 34 X 4-INCH TIRE AGAINST A VERTICAL POST

Pressure per square inch	Peripheral contact in inches
10	12
20	11 1-2
30	10 3-4
40	9 3-4
50	8 5-8
60	7 1-2
70	7 1-4
80	6 1-2

SHOWING RESULTS OBTAINED BY IMPRINT METHODS ON A 34 X 4-INCH TIRE UNDER STATIC CONDITIONS AND AS THE RESULT OF IMPACT

The cross-sectional contact of the same tire as shown when the car was stopped by bringing the tire up against a vertical post was as follows:

CROSS-SECTIONAL CONTACT OF THE TIRE AGAINST A VERTICAL POST

Pressure per square inch	Cross-sectional contact in inches
	3 1-2
20	3 3-8
30	3 1-4
40	3
50	2 3-4
60	2 3-8
70	2
80	2

In this case it is evident that the difference between 70 and 80 pounds per square inch, from the squashing point of view, is nominal. At the very low pressures, however, the measurements indicate very little, owing to the sensitiveness of the tire and inability to accurately fix the value of the impact blow. The illustrations marked (B) to the right in Fig. 2 show the result obtained by pushing the automobile along the floor and arresting motion by bringing the tire up against a chock cut to an angle of 60 degrees for a height of 9 1-2 inches. The point AB represents the top of the chock, and a sharp line indicates the point where the tire rolled over onto the top of the chock in each case. Necessarily the tire squashed down the most just where it turned over the edge of the chock. The cross-section contact of the tire increased as the tire rolled up on the chock, and the maximum measurements under the different conditions of pressure are given as follows:

CROSS-SECTIONAL CONTACT OF THE TIRE WITH A 60-DEGREE CHOCK

Pressure per square inch	Cross-sectional contact in inches
10	6
20	5 1-2
30	5
40	4 1-2
50	4
60	3 3-4
70	3 1-2
80	3 1-4

No attempt will be made at this time to interpret these tire prints beyond pointing out how increasing pressure increases protection and how road obstructions concentrate the work on a small area of the tire, thus making it self-evidently desirable on the part of the autoist to steer clear of large road obstructions, particularly if the automobile is going at a high rate of speed. The impact prints given here were made when the car is rolled along the floor by two men with barely a 6-foot start. The strain on the tire would be increased enormously were the speed of the car higher.

Who Buys Autos?

Sentiment and Character Seem To Be Factors As Well As Money

IT puzzles French manufacturers to find some good reason accounting for the fact that England has twice as many automobiles in daily use as their own country despite the position as pioneers and teachers which the French held for a number of years. The distribution of wealth does not explain the situation, as there is a large wealthy middle class in both countries. Perhaps, it is said, it is because the Englishman employs his automobile for both pleasure and business and makes of it a paying investment which he can well afford to keep in good order, while the Frenchman uses it for pleasure only and gets little direct pecuniary return. But this explanation is not hailed as perfectly satisfactory. The question remains of interest even to the manufacturers of other countries, though it might be dismissed as simply another demonstration in favor of the almost established contention that the French prefer constitutionally to get rich by economy and the English by push and expenditure. Time is money in Great Britain, while in France it is an opportunity for a new sensation, and the automobile is not exactly new any more. Its general idea is settled, and the French love to prove out new general ideas for the benefit of the rest of the world, in all things, except money, capital and investment. With British capital preponderating in most of the large automobile manufacturing companies operating under French names on French soil and with French workmen, it is not really to be marveled at that the average *citoyen* cares little about swelling their dividends—and is there not at this point a reminder to the American manufacturer who consents to merge the individuality of his company in a larger capitalization, in whose ups and downs the American citizen takes only a secondary and impersonal interest?

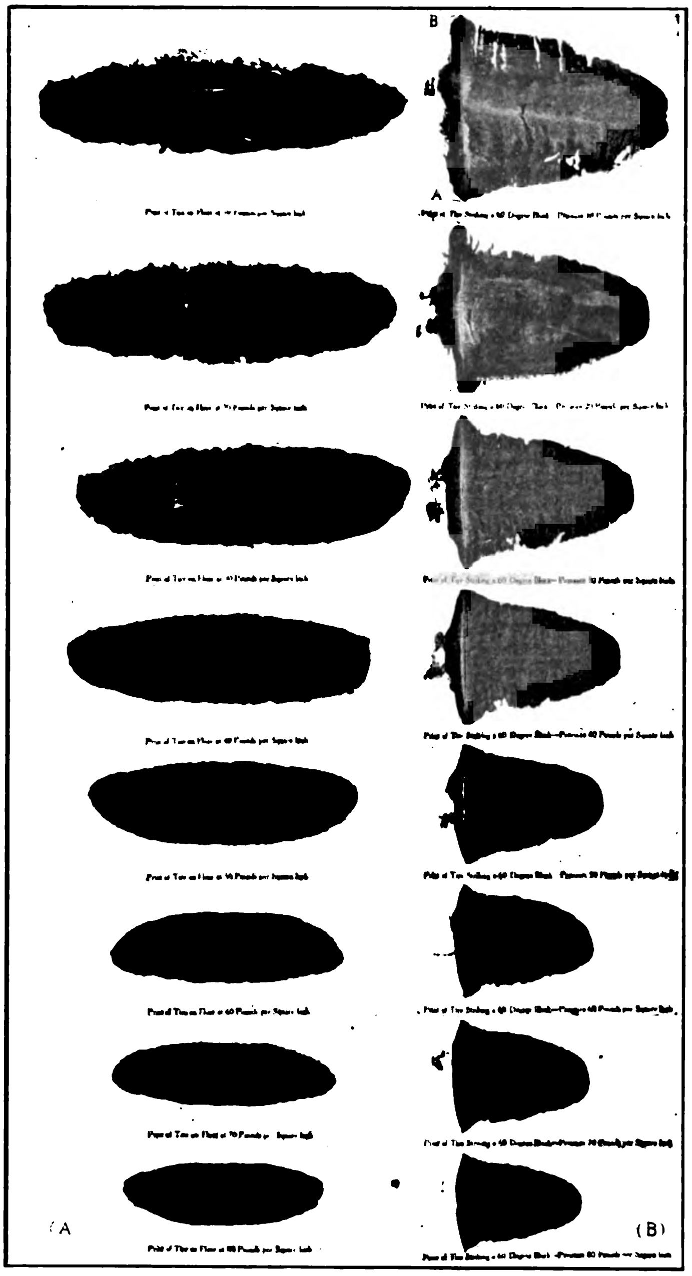


Fig. 2—Prints taken from a 34 x 4-inch tire (A) by bringing the car to rest by contacting the tire against a vertical post (B) by rolling the car along the floor and up against a 60-degree chock until the tire passed over and on top of the chock, the elevation being 9 1-2 inches

Questions That Arise

SOME OF THOSE THAT COME UP IN EVERY-DAY AUTOMOBILING ARE ANSWERED BY THE MATTER WHICH IS BEING PREPARED BY FOREST R. JONES IN THE NEW EDITION OF THE "AUTOMOBILE CATECHISM" THAT WILL SOON GO TO PRESS

[273]—How can you make an emergency repair of a broken leaf-spring—one of those which carry the body of the car?

A.—Place a bar of steel along the spring and fasten the bar and spring together with U-shaped clips, somewhat like those commonly used for fastening the spring to the axle. Two or more clips must be used. The elastic action of the spring is of course lost to a considerable extent, or even wholly.

A rubber bumper or a block of wood will hold the body up if the spring will still keep the axle in position otherwise.

[274]—What is a convenient way of removing a valve spring of the coiled form?

A.—A bar of steel, thin and forked at one end to straddle the valve stem and press against the washer at the end of the spring is a suitable tool. Put it under the spring, or washer, and compress the spring by lifting on the bar. The key can then generally be readily removed from the valve stem so as to leave the valve free to be lifted out and the spring removed.

If the forked bar can be used as a lever resting on a fulcrum, the operation is more easily performed. Some such bars are provided with a chain having a hook to catch on the head of the motor cylinder.

Some of the earlier forms of springs have the end stuck through a hole in the valve stem. No key is used with them. The forked bar can be caught in the spring just above the end of the latter and lifted to relieve the pressure of the spring against the hole in the valve stem. The end of the spring can then be forced out of the hole with more or less difficulty.

[275]—When putting a gasket or packing in a pipe-connection, what precautions must be taken?

A.—That the packing does not squeeze into the pipe so as to stop the passage. This is most apt to occur when candlewick packing is used.

Sheet packing between metal parts should be as thin as will allow it to adjust itself to the irregulations of the surfaces.

If the joint is to be opened frequently, coat one side of an asbestos, paper or canvas gasket with graphite and the other side with oil or varnish. This facilitates removals and holds the gasket in place.

[276]—How can a cracked or broken gasoline pipe be temporarily repaired?

A.—Slip a piece of rubber tubing over the pipe, or wrap a piece of sheet rubber around it and bind with tape and string. Adhesive tape will not hold long on account of the gasoline dissolving the rubber in it.

Or put rather soft bar soap on the pipe and wrap with tape such as is used on clothing. Bind with cord. In the absence of tape a piece of strong paper may answer. Rubber cement, instead of soap, may serve for a very short time.

[277]—How can a leaky radiator be repaired?

A.—Sometimes it is possible for the novice to repair it by soldering. It is generally a decidedly difficult operation, however, and there is danger of doing more harm than good by opening up some of the other soldered joints. In such a case the only satisfactory solution is the skilled repair man.

A honeycomb radiator can be temporarily repaired sometimes by putting a small bolt with a soft washer at each end through the tube around which the leak occurs; tightening the nut on the bolt will draw the washers against the ends of the tube so as to stop the leak. A rubber washer or one of steam packing in the sheet form will do, back soft washers with stiff metal ones.

[278]—How can a loose nut be prevented from jarring off?

A.—A temporary expedient is to wrap a piece of string under the nut so that when the latter is drawn tight it will pinch the string between it and the part against which the nut would otherwise bear directly. In case the nut is in a place that becomes very hot, some such material as asbestos cord with a wire core is suitable. A thin copper wire may answer in any case.

A split lock-washer under the nut will of course always hold it in place. It is sometimes objectionable, however, because of its cutting and gouging the metal when the nut is removed.

[279]—How can a tire be tested for a leak at the valve?

A.—Turn the wheel so that the valve is at the upper part and hold a glass of water around the valve. Bubbles will pass out through the water if the valve leaks. Or saliva can be put around the valve stem cap and note taken of the appearance of bubbles.

The valve itself may be leaky, but the cap on the stem tight. To determine this, move the cap and test as above.

The best remedy for a leaky valve is a new one. They are inexpensive. The valve can be screwed out with the slotted end of the cap. A leaky valve can sometimes be made tight temporarily by putting a drop of oil on it. Use only a drop.

[280]—How can an inner tube be examined for punctures or slight leaks?

A.—If the tube has been punctured by a nail or a wire, look for two holes; one next the tread and the other on the side next the rim The punctures may be invisible with the tube deflated. Then pump up the inner tube to a light pressure and examine by stretching the rubber while holding it near the face or ear. Too much pressure will cause it to suddenly bulge at one point and possibly rupture. If the leak cannot be found in this manner, immerse the tube in water and look for bubbles while stretching the rubber. The valve should also be immersed.

Narrow Street Work

The Wheelbase Length Affects Turning of Car in Narrow Street

SELECTING an automobile is not so simple a matter as it looks. The intending purchaser, in addition to desiring a well-built car, of good material, accuracy of workmanship and appropriateness of design, must necessarily have in mind the nature of the service that is to be rendered, and he must govern himself accordingly. If a car is wanted for long-distance touring over mud and such other roads as may be encountered, this service will naturally suggest a long wheelbase, large diameter wheels, much power with great flexibility, a transmission gear with at least three speed changes, a well-fixed gear ratio, excellence of the spring suspension, a good windshield and a proper top, deep cushions and wraps.

But these are precisely the facilities that are not wanted in an automobile that is to go around in a congested district, and be sufficiently mobile to make city service pleasant and profitable. It is worth a great deal to be able to turn a car around in a complete circle, even if the street is comparatively narrow, and this facility puts a limit on the length of the wheelbase. Where the wheelbase can advantageously be from 116 to 124 inches in general touring work, it is necessarily limited to a maximum of 110 inches if turning around in narrow streets is to be measured as a particular advantage, and 100 inches would be a very good figure for town car and taxicab work, considering this point only

Don'ts for the Autoist

A FEW MEASURES OF INDIRECT VALUE TO THE MAKER, DEALER AND USER; THE PUBLIC AT LARGE CAN CHIME IN IF IT WANTS TO

Don't imitate the ass who starved to death between two haystacks; tackle one of the two; be the apex of a flying wedge and put on steam.

Don't work like a slave to get a few dollars and then work like a slave to get rid of your hard-earned pelf.

Don't hanker after everything that intercepts your line of vision; there are a lot of things in this world that you do not need.

Don't really want for anything; go after what you need; get it; it is a mere matter of the advantageous expenditure of energy.

Don't forget that energy is a most vigorous form of resistance that can only be overcome by an equal display of the same force.

Don't throw away the energy that is at your beck and call in your mad desire to acquire energy that is pre-empted.

Don't measure energy, in the form of dollars, as being your property, unless you can hear them clink against each other in your pocket.

Don't throw the nest-egg away just because the hen is not laying to-day.

Don't tug away on a thing that you cannot lift—get a crow-bar and pry it up from the pest who holds it down.

Don't stand on the peak of a high mountain and say, "I wish I owned all that I can see." It is more to the point to go down on the working level and chase opposition up a tree.

Don't borrow money for a day—wait a day and there will be no occasion to incur the liability.

Don't be dismayed by the pole-cat who threatens your right-of-way; execute a flanking movement, but don't forget that the predicate is not the subject. The pole-cat is predicate to the subject, but the subject lies beyond. Flank the cat, but stick to the subject.

Power of Motors

May Never Be a Mere Matter of Piston Displacement

STRANGE as it may seem, the idea has gained a footing that the power that is to be expected from internal combustion motors is proportional to the piston displacement. This would be true were all motors made exactly alike, but such is not the case—far from it; they are at wide variance with each other. The piston-displacement rule as it is promulgated by racing boards is not based upon the assumption that for equal displacement the power of the several motors will be the same. The real idea is that for a given displacement the power of all motors would be the same were they all equally designed. Of course, all the motors would be equally bad, or good, according as the model showed capabilities, and this is the possible danger to be encountered when standards are established. If the standards are high, the products will show the same characteristics. The piston displacement rule leads to abnormal conditions in racing, due to the fact that it is possible to so design a motor that it will deliver power at a high speed and be incapable of performing at all at low speed. This will be true if the "cold compression" is so high that the mixture will pre-ignite at low speed and only operate when the speed is so high that the compression will be lowered by wire-drawing of the mixture. It will be possible to start a motor of this character, but it will not be possible to run it at a low speed.

Don't disregard the fact that nothing is useless if it lightens the burden—make every point tell.

Don't accept the dictum that knowledge is cheap; it would be were it not for the fact that experience is power.

Don't cackle like a hen or roar like a lion; they are level-fixing habits; one lays eggs and the other serves as a door-mat.

Don't confer benefits that do not belong to you—let the owner thereof be the dispenser thereof.

Don't cheat yourself as you do when you say that you would do a thing if you had time; time is yours whether you like it or not; will you waste it?

Don't whine if you tax yourself as you do when you fail to think for yourself.

Don't forget that it is with loaned money that all the harm is done; if you loan you are a harm-doer; if you borrow you are harmed.

Don't partake of real sound stupidity in which you will be unrivaled if you expend all the money you have in an automobile, leaving nothing with which to meet the maintenance charges.

Don't forget that the path of life leads to something; find out what it is; if it is good, throw in high gear; if it is not good, clap on the brakes.

Don't do less than Stradivarius, who made violins; or Leonardo, who painted good frescoes; or Napoleon, who dragged cannons over the Alps; or Wellington, who made St. Helena famous.

Don't make a canyon out of a foot-path; blaze the way, but let it be a way of your making.

Don't dig for coal in a culm pile; Mother Earth welcomes you in virgin fields.

Don't think that because you are one of 90,000,000 that you have to ride on the cart of despair; there are thrice 90,000,000 opportunities rotting for want of attention.

Don't take off your hat to success; tackle the jade.

Don't forget that when the jay hoards up nuts for the winter the squirrel makes a memorandum of the location of the bird's store-house.

Don't choose between a tyrant and a conqueror; just be the latter.

Don't make your abiding place anything less than a king's palace, nor forget that some kings' palaces are fools' Paradises.

Don't be a little potentate; there is nothing the matter with playing the part of a big man.

Don't know yourself by the little things, nor pause on the crest of the biggest wave—go on!

Don't glut yourself at the breakfast of life or be stilled by wine at life's dinner—beyond lies supper and the long evening with its manifold enjoyments.

Don't accept the utterances from the tongue when the eyes speak another language—believe what the eyes say.

Don't let money be the principal object; life's work should be the aim, and money but one of the increments of the dividend.

Don't be a swine; it is to be bombarded with pearls that will look to you like cobble stones.

Don't be nonplused by the bright stars that are fanned into a flame by a passing breeze.

Don't silence the human voice and struggle to reach the heart of the antagonist with a sharper instrument—no weapon of man's devising is the equal of a well-modulated voice.

Speed with Security

BY MARIUS C. KRARUP. THE "FIFTY PER CENT." REDUCTION OF TRAFFIC-EASE RESULTING FROM PRESENT METHODS—THE PHYSIOLOGY OF OBSERVATION AND CAUTION. (SECOND INSTALLMENT.)

IF it is assumed that the present legal regulations, while in most localities onerous and one-sided, would safe-guard traffic as much as is required if they were enforced, but accomplish this object (wherever it is accomplished) mainly by cutting down the average speed to something less than is intrinsically desirable, it follows that the cutting out of elements which are admittedly important sources of danger and inconvenience, but which have never so far been subjected to regulation or elimination, must result automatically in raising the average permissible speed not only for automobiles, but for all members of the traffic which are capable of taking advantage of the change. Systematic agitation on this basis would pave the way for a general understanding of the fine points involved—points which are not necessarily too fine drawn because they have not so far been spontaneously and commonly appreciated. Nearly all the factors in modern civilization which make civilization what it is, and which no one would think of abandoning, are in their origin beyond the range of popular insight. The automobile motor is one of them. The true means for securing safe traffic in conjunction with high average speed may be similarly inconspicuous to the average mind before their efficacy has been proved in practice, and yet they may be readily perceived by the specialist who is acquainted with the underlying facts and is accustomed to weigh the values of general ideas, one against the other.

The traffic regulation in New York city offers an example of speed increased by means of the suppression or regulation of other dangerous elements. By halting the traffic at crossings and sending it away in blocks, the average speed of the traffic has been raised considerably and the safety of pedestrians has been increased at the same time. At high speed more vehicles pass a given point in a given time. Inversely, at any one point a given number of them are farther apart.

One of the leading considerations, when one is looking over the hindrances which at present exist against the general adoption of speedy traffic, is presented in the obvious requirement that the reasonable degree of caution which everybody is expected to observe shall not be reduced from a mutual to a one-sided obligation. The normal condition of the past—preceding the automobile—has been that A looked out for B, but also that B looked out for A. Neither A nor B can be satisfied to have safety reduced 50 per cent. at the outset by having all the obligation or all the ability to observe caution delegated upon one of the two. "Fifty per cent." is here used figuratively. It may be more or less. Nobody can tell the exact relations. Perhaps security depends 25 per cent. on one party's caution, 25 per cent. on the other party's caution and 50 per cent. on the combination of both. The vital fact is that it suffers when the full use of the senses is not shared by all concerned.

This condition is realized, however, if traffic member A is usually so placed that it is physically impossible or difficult for him to get out of the way of an automobile unless the driver B of the automobile observes him and voluntarily contributes his share by veering from his course, slowing up or signaling. Evidently speed is in this respect of importance; in fact, the largest element of all the danger ascribed to speed consists in this reduction of chances. The remedy consisting in speed reduction would be almost ideal if it were desirable and if it could be enforced. But, being undesirable, it cannot be enforced, and slow speed, adopted as a rule but most conspicuous by its exceptions, becomes perhaps more dangerous than an expected high average speed which the members of the traffic learn to more or less accurately gauge and look out for.

The "fifty per cent." reduction of tranquillity and safety which undeniably must be the result if one person instead of two is depended upon for producing the desired situation in each instance is so serious, if anything in traffic regulation is serious, that it must by some means be counteracted if it shall be said that the system of regulation is efficient. A fifty per cent. reduction of ease and a somewhat corresponding reduction of safety in traffic would be too high a price to pay for speed. From this viewpoint, among the 16 causes of disturbance enumerated above, those which involve a reduced capacity for observation on the part of all traffic members with regard to the speed and direction of the movements of automobiles should be considered in the very first line, if they have not been considered before, and remedies should be devised for their removal. Probably No. 8 among these causes of trouble has been less considered than any other, and is also in itself the most important one, partly because it applies to all automobiles and partly because the existing deficiency to which it refers would seem to be removable without hardship in any direction. It relates to the lack of change in the contour of a moving automobile. Its importance depends mainly upon facts with which all well-informed physicians are familiar. These facts relate to the physiology of the senses. Leaving aside all scientific phraseology, the condition for perceiving motion in one's surroundings may be said to consist in having motion represented in the sense images produced in the brain of the observer or the person who is in line for receiving a sense image, whether consciously observing or otherwise. Motion in a sense image means change from one image to a different one. If this change from one image to another is slow or very small, the idea is conveyed to the mind that the thing in the surroundings which moves is distant or moves slowly. The mind can usually determine whether it is slow or distant by the aid of a number of simultaneous sense images; that is, sound helps to interpret sight, and man's dual or perspective vision, due to the co-ordination of the two eyes, is in itself usually sufficient for deciding whether the motion is slow or distant. When the attention of the person is focussed upon the moving thing the difficulties in forming accurate perceptions are, of course, minimized, but for the subject in hand the question is one of the perceptions formed under less favorable circumstances, as when the "mind is absent" and the different senses are not consciously co-ordinated. Examples may illustrate the matter. When a person places his finger upon another person's naked arm the act is noticed distinctly because the sense image of the touch represents a change, but if the finger remains there and is not noticeably warmer or colder than the arm the mind, if otherwise occupied, is likely to become nearly unconscious of the presence of the finger, the sense image produced by its light pressure remaining without change except such as may be due to pulsation, slight difference in temperature, etc. If a person not intimately familiar with the gait of horses hears the steps of a walking horse, but sees nothing, he receives frequently the impression of two horses trotting or of a fast canter, because the walk produces a more rapid succession of separate and distinct auditory sense images and only the slow change in the distinctness of the sounds convinces him after a little hesitation that the movement causing the sounds is in reality slow, whereupon he reasons that it is a walk. Similar hesitation in the traffic is to be avoided.

Digest

A SHORT EXPLANATION IS OFFERED HERE OF TWO RECENT FOREIGN DEVICES INTENDED TO CHEAPEN THE PRODUCTION OF AUTOMOBILES DESIGNED FOR THE HUMBLEST FORMS OF TRANSPORTATION—SINGLE-LEAF VEHICLE SPRING AND SUBSTITUTE FOR DIFFERENTIAL

The production of automobiles of extremely low first cost, which may be adapted to displace the horse in even the humblest forms of transportation, continues to engage the attention of European designers. Francis Ernoult proposes a new type of vehicle spring which might be applied to such automobiles at first, though he believes its field of application should eventually prove much wider. He wants to use a spring plate of uniform thickness and varying width instead of the multiple leaf spring of uniform width and varying thickness. The illustration (Fig. 1) shows the comparative dimensions of an ordinary vehicle spring and of the one-leaf spring intended to take its place, and also two other shapes in which triangular cut-outs or a series of perforations permit the sides of the spring to remain parallel. With regard to simplicity and cost of making, Ernoult mentions that, apart from the eyes, which are alike for both types, the one-leaf spring may be stamped in a single operation, while the ordinary spring requires many. When cut to length each of the leaves must be arched, one differently from another; they must be perforated for the assembling bolt, the ends must be rounded, they must be beveled, slotted and pinned or spurred, the leaves must be placed and adjusted with care, lubricated and mounted. As to wear, the single leaf escapes the friction of one leaf upon another and therefore demands no care, while the multiple spring must be taken down occasionally, cleaned and greased. The single leaf works always in the same manner, while the multiple one creaks and becomes hard, when not greased, and weaker from wear. Defects in the temper or curve of any one leaf may cause it to break.—*La Technique Automobile et Aérienne,* October 15.

Evidently with a view to very cheap construction, Léon Charpaux offers a substitute for the differential gear in the arrangement shown in the sketch (Fig. 2). The axle A is supposed to be driven from the sprocket wheel O and is joined rigidly with the hub C of one of the driving wheels by means of a squared end portion and a nut. The other end has two short squared portions D and F, between which lies a cylindrical portion operating as a bearing member for the other driving wheel, the bushing J being interposed. Two friction plates G and H are mounted upon the squared portions D and F and are pressed against the adjacent surfaces of the wheel hub by spring K, secured by a nut. Leather washers between plates G and H and the hub surfaces are kept lubricated from a mass of consistent grease filling the hollow spaces in the hub. The tension of the spring K is adjusted to produce a friction coupling which will hold tight for straight driving, but will yield more or less at turns (and grades), permitting the wheel to rotate faster or slower than the other.—*La France Automobile,* No. 38.

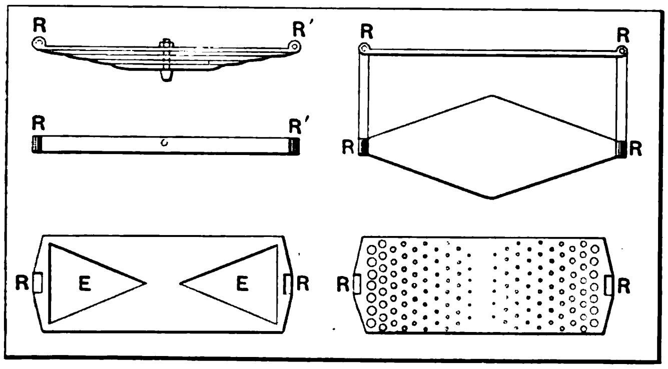


Fig. 1—Diagram indicating dimensions of Ernoult single-leaf vehicle spring and the ordinary multiple-leaf spring. E, triangular cut-outs

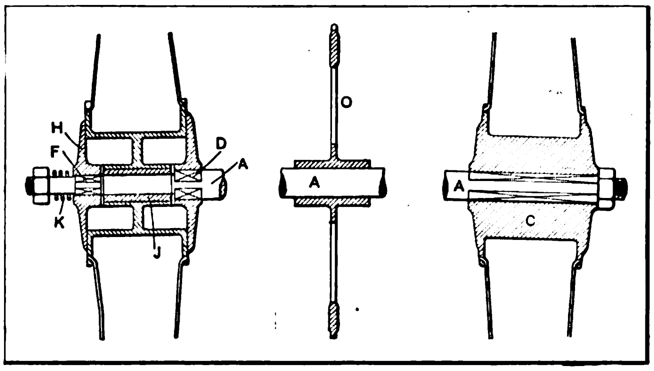


Fig. 2—Cross-sections showing the workings of the Charpaux substitute for the differential gear

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL-CLIMBS, ETC.

Nov. 19-26	Oakland, Cal., Idora Park Show, Under Management of Oakland Automobile Dealers' Association.
Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 11-12	New York, Annual Meeting, Society of Automobile Engineers.
Jan. 14-28, 1911	Philadelphia, Annual Show, Philadelphia Licensed Automobile Dealers' Association, Third Regiment Armory.
Jan. 15-21, 1911	Detroit, Wayne Gardens, Detroit Automobile Dealers' Association.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4,'11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11,'11	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Feb. 18-25	Minneapolis, Minn., Annual Show Minneapolis Automobile Show Association, National Guard Armory.
Feb. 18-25	Binghamton, N. Y., Second Annual Show, Binghamton Automobile Club and Chamber of Commerce, State Armory.
Feb. 24-27	New Orleans, La., Annual Show, New Orleans Automobile Club.
Mch. 4-11, 1911	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.
Mar. 25-April 1	Buffalo, N. Y., Fourth Power Boat and Sportsmen's Show, Sixty-fifth Regiment Arsenal, Buffalo Launch Club.
Mch. 25-Apr. 8	Pittsburg, Annual Show, First week, pleasure cars; second week, commercial trucks. Automobile Dealers' Association of Pittsburg, Inc.

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ELECTRICALLY, activity is pronounced. The coming of the Edison storage battery has awakened financiers to the unlimited possibilities for safe investment in this field. The managers of central electric lighting stations are everywhere preparing to charge electric vehicles upon demand; they can afford to do this work at a price that will compare favorably with, if not outstrip, the cost of gasoline, especially if the demand be made upon them during the hours of the day when their machinery is lying idle—eating its head off, so to say. It is not strange that the whole battery situation should take on a new and hopeful attitude. Competition is the life of trade, unless it gets a strangle grip; but if it is possible to silence an industry by competitive strangulation, it is no less feasible to reduce it to a state of perfect stagnation by a strong grip uncontested. There never has been the shadow of a doubt about the ability of electric vehicles in short-haul work. The points of demerit were recognized when reference was had to long-haul work, and to the life of the battery. Clearing up these retarding influences is sufficient to awaken capital, and when this potential force responds to the call, it brings with it enterprise, brains, and brawn.

* * *

DUE to the splendid foresight and thoroughly good management of the citizens of the South, and those of Savannah, Ga., in particular, the Grand Prize was run under the most favorable conditions, from the point of view of the track, the policing, and the looking after the visitors from afar and the folks at home. It is to be regretted that so much cannot be said for the contestants. From abroad came cars that had such a high center of gravity that they tipped over, and such soft material that the axles sprung, or the parts gave out. Among the American cars, there were two points of demerit, one of which was represented in the car that was driven fast enough to win but that was fitted with tires that were too small; nor was any provision made for replacing them with tires of the proper size, thus tracing the losing of the race directly to tire trouble of the kind that has nothing to do with quality. It was a clean case of lack of preparedness, and the reckless trusting to luck; luck was snoozing in the other fellow's back yard. The second demerit is attached to the splendid automobiles that performed consistently from start to finish, with no sign of mechanical trouble of any sort, nor even tire trouble. In those cases, had the cars been driven fast enough to induce a little tire trouble, it is more than likely that the result of the contest would make different history and better reading.

* * *

IN the operation and care of automobiles it seems to be necessary to continue to point out the advantages that are to be derived if the lubricating question is attended to with precision and intelligence. On page 831 of this issue a car is raised up at the fore, and some of the points for lubrication are indicated, and it is the purpose here to go on record as saying that, however inconspicuous these points appear to be, they are just as much entitled to attention as the crankshaft of the motor or the gear spindle in the transmission case. Statistics, of which the supply is too meagre, point absolutely to one thing, and that is that the average automobile is relegated to the scrap heap because it makes too much noise. Strange to relate, the average automobilist troubles himself much about the quality of the motor, and the ability of the transmission, in the face of the fact that these main units rarely ever give out. The way to make cars last longer is as simple as A B C. It is a plain case of putting lubricating oil on the little bearings that are here and there in the chassis, even if this extra effort results in some lack of attention to the motor.

* * *

JUST to show that tires are subject to frightful abuse, if they are permitted to intercept road inequalities while they are in an uninflated condition, some tire prints were made, and reproduced on page 839 of this week's AUTOMOBILE, and they offer conclusive evidence of the fact that this form of neglect is companion to a most destructive process. The test shows that a 34 x 4 inch tire on the wheel of an automobile tracks 3¼ inches when the pressure is 80 pounds, and the tire is rolled up on a 60-degree surface, but the same tire with the pressure reduced to 10 pounds tracks 6 inches. The width of the imprint in tracking is an index of the flexure induced, and the difference between satisfactory service and a disconcerting tire bill is represented in the difference between almost no flexure and a very little bit. In the meantime repeated tests show that tires are not maintained in a proper state of inflation; in many cases the pressures are below 50 pounds per square inch, but the chauffeurs almost invariably claim that it is from 80 to 110 pounds; they do not seem to know just what pressure is being maintained, and in some instances the chauffeurs had gauges in their tool-boxes which they failed to use.

News Section

HAPPENINGS OF THE WEEK IN VARIOUS SECTIONS OF THE COUNTRY AS GATHERED BY THE 84 SPECIAL WRITERS AND CORRESPONDENTS OF "THE AUTOMOBILE"

Benz and other foreign cars wrecked during Savannah race. Big list of visitors entertained in Southern style. Velie wins and loses in litigation with A.L.A.M. News of Olympia Automobile Show. News of seventeen different automobile shows. Triple tie in Chicago Motor Club Reliability. Matured debts of General Motors Company ordered paid—new board elected—Durant remains. E. R. Thomas Motor Company fails. Society of Automobile Engineers will meet January 11 and 12. Important happenings pending.

Savannah Grand Prize Race in Silhouette

Pertinent facts about the Grand Prix: The race was over the longest route ever attempted in America, 415.2 miles, 24 rounds of a course 17.3 miles long. The winner broke the American road race record, averaging 70.55 miles an hour. His car was a giant of power, the pistons displacing 920 cubic inches. The race was won by less than 1 1-2 seconds, the tightest fit ever experienced in a big road race. Bruce-Brown, the winning driver, is the son of wealthy parents and drives for the excitement of driving. He only recently graduated from the amateur ranks; in fact, until this race there was some doubt as to his having surrendered his amateur standing.

THE Marquette-Buick, No. 17, which finished third, made the best performance ever receivey by an American car in a road race. This creditable showing is all the more remarkable on account of fifteen tire changes required to keep the car going. As usual with the Buicks, the car was driven and beaten and lashed throughout the race; was run at terrific speed on the turns and through the unfortunate fact that its tires did not fit nearly every round found it in trouble. Despite all these things the car finished the full course. Conservatively driven on tires that fit, this car should have been much further to the front. While the rated horsepower of this Buick is only 57 3-5, upon dynamometer test it has showed 120 horsepower.

The Lozier pair and the Marmon, which completed the route, showed careful driving and splendid stability. The Loziers could have gone faster. Mulford did not have to change a tire throughout the race and there is no doubt that the white car could have plugged along several miles an hour swifter than it did. However, the reliability of the performance was generally commented upon. Horan's Lozier did a little more spurting than that of his teammate, but was not quite so steady. The little Marmon, the smallest car in the contest, did all it could.

Already the Savannah Automobile Club has made application to stage the running of the Grand Prize in 1911, and from the success attained in the recent race the chances favor such an outcome.

The system used to protect the track from over-running by spectators was as near perfection as can be imagined. Armed soldiery to the number of over 400 guarded the whole course effectively. Governor Brown of Georgia, representing the State, the County Board, representing the county, and Mayor Tiedeman of Savannah with the city officials, representing the city, gave the affair the aspect of an official function.

The citizens of Savannah and the Savannah Automobile Club showed a superior brand of Southern hospitality. Homes were thrown open right and left for the accommodation of visitors and everything was done to make the attending Northerners feel at home. Prices were high and in some of the hotels accommodations were impossible to get, but there was little complaint from any quarter.

It is estimated that fully 100,000 strangers were in Savannah Saturday. In some quarters it is figured that probably 150,000 would be closer to the true number.

One of the interesting features of the social side of the race was the dinner tendered to Governor Brown by the Motor Racing Association on board the "Wall Street Special" Friday night. A number of speeches were made and the guest of honor replied in a welcoming oration.

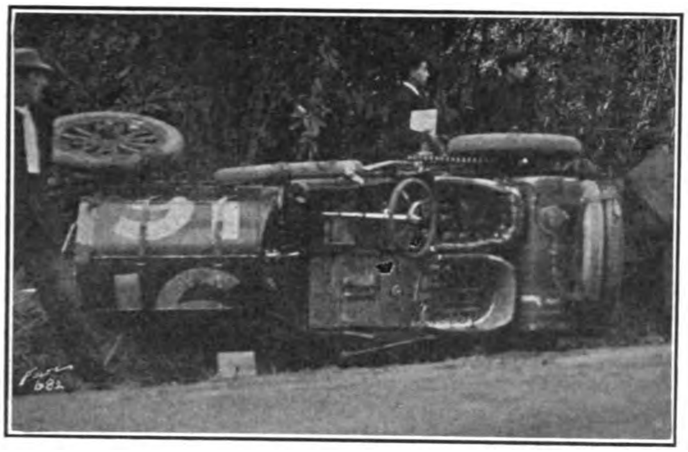
The whole affair was ably conducted without reference to expense and the impression created was wholly pleasant.

Benz and Fiat Racers Wrecked During Race

SAVANNAH, GA., Nov. 14—Now that the big race has passed into history, the preliminaries that insured such a brilliant success as was attained are coming in for much commendation all around. The work of the officials was done with refreshing precision during the running of the race. Not a slip was noted and not a word of criticism is spoken of them and their work.

The accident that put Wagner's Fiat, 16, out of the running might have been avoided had the driver heeded the warning of the technical committee in time. A bolt in the left side of the right front spring broke early in the race, causing a crack in the spring seat. He was flagged in the eleventh lap and it was suggested to Wagner that a new spring seat be installed. Caleb Bragg, team manager, added his advice to that of the committee, but Wagner declined to stop for repairs. In the seventeenth round while passing over the one soft spot on the course something yielded and spectators saw the car strike an abutment of a bridge and turn end for end into the ditch. Whether it was simply a skid on the soft place in the road or whether the rest of the spring clips gave way can hardly be determined with certainty because the impact of the car broke off the front axle at the

Wreck of Benz car as it was shown disabled alongside of the track



Flat racer driven by Wagner with a bent axle which threw the sprocket chain off

weakened spring seat, even if the break did not occur prior to striking the bridge.

Benz car, 18, driven by Haupt, was badly wrecked while the driver was attempting to make a sharp turn at the Montgomery cross roads. The car was unable to swing safely into the straightaway at the speed at which it was going and turned over and over into the ditch, throwing the driver and his mechanic clear of the wreckage. By some marvelous freak of luck neither was seriously hurt.

"Wall Street Special" a Big Success

The "Wall Street Special," the solid vestibule train run from New York to Savannah over the Atlantic Coast Line to accommodate metropolitan motor enthusiasts who wished to see the race under ideal conditions, proved a big success. The Motor Racing Association had charge of the train and conducted the affair with much careful forethought.

The train consisted of five Pullman stateroom cars, an observation car, dinner, composite and baggage car. The journey in both directions was accomplished without untoward incident and a pleasant, comfortable time was enjoyed by those who composed the party.

The following is the list of passengers on the train: Horatio M. Adams, H. P. Burchell, E. R. Bergdoll, H. A. Beale, Jr., Mrs. Beale, George McK. Brown, Robert McC. Butt, Duncan Curry, Mrs. Curry, C. M. Chauncey, George Chorpening, A. B. Cordner, O. J. Delaney, Mrs. Delaney, E. T. Delaney, C. A. Frank, Miss Fish, F. Gregory, L. D. Gregory, G. M. Graham, Willis Holley, A. E. Hall, Mrs. Hall, Robert Hager, Jr., J. R. Humpton, Mrs. Humpton, E. E. Hewlett, J. S. Hartsell, Frank Johnson, Ed. Korbel, John Kerrison, F. Keenan, R. W. Kane, Emanuel Lascaris, Harry B. Lasher, J. McNamara, E. C. J. McShane, Charles Meegan, Thomas F. Moore, Mrs. Moore, Edward Moss, Mrs. J. J. Mullen, Edgar G. Murphy, E. B. Nussbaum, E. S. Partridge, A. Rostein, M. J. Sullivan, G. L. Sullivan, E. E. Schwartzkopf, James Sullivan, H. M. Swetland, A. N. Sweeney, A. J. Smith, George Thomas, 3d, Jonathan Thompson, George P. Tangeman, George H. Thomas, Mrs. Thomas and and G. Weiss.

Sharp Dead as Result of Accident

SAVANNAH, GA., Nov. 14—W. H. Sharp, automobile manufacturer and entrant of the Sharp-Arrow car in the Grand Prix race, died to-day at the Savannah Hospital as the result of injuries received when his car turned over in practice for the big race last Thursday. Mr. Sharp was internally injured and his mechanic, Albert Fuchs, was almost instantly killed.

Mr. Sharp designed the car that cost him his life. He was originally a photographer at Trenton, N. J.

Bruce-Brown Also Won Back His Home

SAVANNAH, GA., Nov. 14—Winning the Grand Prize race was not the only agreeable development Saturday as far as David Bruce-Brown is concerned. The winning was fine, but there was something else about the result that will appeal to Mr Bruce-Brown with more force even than being returned a winner for he regained his home and won the prize at the same instant. The youthful driver became interested in motoring while he was a student at Yale and late in his college career he bought a big racing car. He was reticent as to his plans, at least as far as discussing them at home is concerned, and when the newspapers came out one morning with the story of how he had driven and won an important race, his mother, a wealthy and prominent member of society, forbade him to repeat his performance on pain of losing his income.

Bruce-Brown did not consider the proposition long and cast his lot unreservedly with the drivers of racing automobiles. Domestic relations were strained, in fact cut off for a long time thereafter.

But when the young man steered his giant racer back to the pits after flashing past the judges a winner, the first person to greet him was his mother. She could not wait until he removed his cotton mask, but rushed into his embrace as he stepped from his car.

Those who sat near the mother in the stand during the race declare that she "pulled" openly and fervidly for the success of her son.

His future as a race driver is being discussed widely and from a number of viewpoints, the general opinion being that his future course is in the balance.

Velie Wins One Decision, but Loses Another

Wisconsin Supreme Court holds against four concerns of A. L. A. M., who sought to check conspiracy action in Circuit Court. The Federal Circuit Court in opinion on merits of contract between Velie and Kopmeier sustains demurrer of Milwaukee representatives of motor company, holding that the contract was one of agency and not of outright sale.

MILWAUKEE, Nov. 14—Two particularly important opinions of high courts have been filed recently in connection with the litigation instituted by the Velie Motor Vehicle Co., of Moline, Ill., against the A. L. A. M. and its constituent members and its former representative in Milwaukee, Wis., the Kopmeier Motor Car Co.

The first of the decisions is embodied in the opinion of Chief Justice Winslow of the Wisconsin Supreme Court in which the court holds favorably to the plaintiff in a matter of procedure. In the other case, which was brought in the Federal Circuit Court, Eastern District of Wisconsin, Mr. Justice Quarles sustains the demurrer of the Kopmeier Motor Car Co. and holds adversely to the merits of the Velie Co.'s claim.

In the suit against the A. L. A. M. the Pierce-Arrow Motor Car Co.; the Chalmers-Detroit Motor Car Co.; the Pope Manufacturing Co. and the American Automobile Co. filed writs of prohibition to nullify service made upon their representatives in Milwaukee on behalf of the original suit of the Velie Co. The method taken was to invoke the power of the Supreme Court of the State to prohibit the Circuit Court from proceeding with the cases against the defendants.

Chief Justice Winslow holds that the relief prayed for is not proper and peremptorily denies the motion to restrain the Circuit Court, without going into the merits of the case.

The status of the litigation is placed at the same level it would have assumed if no question had been raised as to the service upon the defendants.

In the Federal case the decision is more radical.

The Velie Co. entered suit against the Kopmeier Motor Car Co. to recover damages for the alleged breach of an executory contract based upon an agreement set forth in the contract between the parties, that the Kopmeier Motor Car Co. agreed to handle the Velie product in the Milwaukee territory and under the agreement promised to buy at least 50 motor cars.

Judge Quarles holds that the contract as set forth is not a contract of sale, but rather one of agency. The foundation for his reasoning is the fact that in the contract it is provided that the Kopmeier concern is required to perform certain acts with regard to the automobiles, alleged to have been sold under terms of the contract, long after they would have passed absolutely to the Kopmeier Co. if the contract had been one of sale and not of agency.

The defendant company filed a general demurrer to the complaint and the court sustains the demurrer, which defeats the suit so far as the allegation of sale to the Kopmeier Co. is concerned.

In the suit against the four members of the A. L. A. M., which was decided favorably to the complainant's contention, a dissenting opinion has been filed by Judge Timlin, which was concurred in by two other members of the bench.

Mayor Gaynor Knows How to Get Around the Callan Law

New York, Nov. 16—1,200 chauffeurs are on strike and they decline to come to an agreement with their respective companies in the taxicab business unless their union is recognized. Mayor Gaynor has undertaken to bring about a settlement, and is showing some impatience at the inertia of the strikers.

It is now proposed to encourage strike-breakers, and the Mayor, according to the most recent report, threatens to put a policeman on every cab for the purpose of protecting property and the strike-breakers. No doubt a settlement of the strike will be effected in the long run, but it is interesting to note that the strike-breakers will either have to comply with the terms of the Callan Law and show competence, or if the Mayor puts policemen on taxicabs, he will do so for the purpose of protecting law-breakers.

The only reason for giving this whole matter serious thought lies in the fact that the citizens of the Empire State have had this law inflicted upon them, and it was foisted by a set of men who are making a living out of it, but strange to relate, the chauffeurs were in favor of it, and automobilists were indifferent. It was the most slippery piece of law-making of which we have any record before us, and those who have to deal with the striking chauffeurs now know why they did not oppose it.

In the meantime, the plain citizens now know why automobilists were indifferent. A law that permits a band of chauffeurs to take the community by the throat should be quite satisfactory to the chauffeurs themselves, but a law that permits children to drive without a license is only good for one purpose, and that is to give cheap politicians a job. In the meantime, we wonder how the Mayor can afford to violate the law in the process of upholding it.

E. R. Thomas Motor Company Goes Under

Buffalo, N. Y., Nov. 14—Inability to secure financial relief and a strike at the Reading factory in which its frames are made are given as the causes of the failure of the E. R. Thomas Motor Company, of Buffalo. The company had been in close quarters since early Summer and recurrent rumors of financial troubles were circulated at intervals.

Matters came to a crisis last week when E. R. Thomas, president of the company, issued a statement to the creditors appealing for time to gather the resources of the company and to try to make additional financial arrangements. In this statement Mr. Thomas says that until the last few weeks he had been quite hopeful for the affairs of the company, but that the onslaught of the bankers, politics and commercial conditions had prevented the acquisition of more funds.

Mr. Thomas declares that the company owes him more than it does all the other creditors together, and states that he is willing to wait for payment until the company can shape its affairs.

In putting the matter directly to the creditors, he says that the creditors have everything to gain and nothing to lose by delay in court proceedings. He says that he has loaned the company $300,000 in cash and much valuable collateral and asserts that he has reason to believe that a reorganization of the company on conservative lines will be accomplished within a week through the injection of Buffalo capital. This is to be made available by reason of the collateral loaned by Mr. Thomas.

No formal proceedings have been instituted to date against the company as far as the records show.

Remington Gets Manly Drive License

New York, Nov. 16—Emerson Brooks, who is the retiring general manager of Rothschild & Co., and for 20 years vice-president of J. M. Quinby & Co., of Newark, N. J., is booked for the vice-presidency and general management of a new undertaking under the name of the Remington Standard Motor Co., which concern has just been incorporated under the laws of West Virginia, with a capitalization of $1,000,000. This new company is taking over the plant of the Baldwin Steel Co., at a valuation of $229,000. The new concern will be "at home" at Charleston, W. Va., but the executive office will be at 1597 Broadway, New York City. F. M. Staunton, president of the Kanawha Banking & Trust Co., of Charleston, has been elected second vice-president; George A. Grounds, president of George A. Grounds & Co., of Pittsfield, Mass., is treasurer, and the directors of the new concern are: Eliphalet Remington of Ilion, N. Y., DeWitt Bruce, of Lenox, Mass., and Harrison B. Smith, of Charleston, W. Va. The most important undertaking of this company will be represented in the manufacture of a 2-ton truck, utilizing the Manly hydraulic transmission, the details of which were given in The Automobile more than a year ago, in which it will be remembered that the gasoline motor is hooked up to a battery of hydraulic pumps, and they in turn drive a battery of hydraulic motors, the latter being attached to the rear road wheels of the truck. This plan does away with the transmission gear, differential and bevel drive, also the extensive lever control system, including brakes as ordinarily required. The first truck of this type has been run around New York for a couple of years and works extremely well.

Trade Association to Give Reliability Run

November 29 and 30 have been selected as the dates upon which the New York Automobile Trade Association will hold its two-day endurance run through New York, New Jersey and Connecticut. The contest is open to stock cars which will be classified under Class A, in its seven divisions.

W. C. Poertner is active in promoting the affair. An entry list of 25 cars has been promised and there is a likelihood of half a dozen others. The run will be conducted on strictly technical lines and will be fully sanctioned by the Contest Board. Entry blanks have just been issued.

Gilbert Mfg. Co. Sues on Tire Case Patent

The Gilbert Manufacturing Company, of New Haven, Conn., has filed a bill of complaint in the Circuit Court of the United States against the B. E. Manufacturing Company, of New York City, asking for an injunction and an accounting.

Activity in Line of Shows Centers Attention

A. L. A. M. preparing vast quantities of lattice and 7,000 yards of carpet to floor the white and gold splendor of the Garden Exhibit. Nine more motor car manufacturers sign up for space in Palace show. Plans being formulated for automobile shows at the Importers' Salon, New York, at New Orleans, Cleveland, Omaha, Columbus, Milwaukee, Cincinnati, Pittsburg, Buffalo, Detroit and Los Angeles.

ACTIVITY in preparing for the A. L. A. M.'s coming Eleventh National Automobile Show at Madison Square Garden from January 7 to 21 is rampant. Two entire floors of an immense carpenter shop are being devoted to the manufacture of lattice for use in decorating. This will be used along the sides of the main hall. More of this type of fencing will be utilized at the show than ever before. In another department, dozens of men are busy cutting and sewing 7,000 yards of light green carpet which will be used to cover exhibition spaces on the main floor and elevated platform. The carpet is of special weave and will give the impression of the cars standing upon grassy lawns.

The color scheme of the decorations will be white and gold, shot and set off with green and crimson. It is estimated that 300 men are at work on the preliminary details.

Nine More Makers Sign for A.M.C.M.E.A.

The L. J. Bergdoll Motor Co. announces that it will exhibit a Colonial Coupe in dark wine color; a standard touring car; a fore-door touring car in Richelieu blue and a chassis at the A. M. C. M. E. A. exhibition at the Grand Central Palace, which opens New Year's eve. Among the other motor car manufacturers who have signed up for space at the Palace show are the following: Cass Motor Truck Co., Port Huron, Mich.; The Only Car Co.; Alpena Motor Car Co., Alpena, Mich.; Henry Motor Car Sales Co., Chicago; Correja Motor Car Co.; Gaylord Motor Car Co.; Otto F. Rost (Black Crow); Geneva Wagon Co., Geneva, N. Y., and Richard B. Dare (Cyklonette).

Importers' Salon Insures Foreign Show

At a final meeting of the companies that are interested in the exhibition of foreign automobiles in New York, a fund of $8,360 was subscribed and a permanent organization was formed. The first official act of the new concern was to close a lease of the big banquet hall of the Hotel Astor, in which the show will take place January 2-7, 1911.

The following companies were represented and will have space at the show: Panhard, Renault, Benz, Itala, De Dion-Bouton, C. G. V., Darracq, Isotta, S. P. O., Zust and S. B. A., a new car made in Belgium. Among the accessory and aeroplane motor companies that will exhibit are the Anzani and probably the Gnome companies. Burr & Co., carriages, have also taken space.

Columbus Club Looking for Exhibit Hall

COLUMBUS, O., Nov. 14—The show committee of the Columbus Automobile Club is busy in its efforts to secure a suitable hall for the purpose of giving the coming show. Considerable difficulty is encountered in the work of securing a hall which is sufficiently large.

Cleveland Club Adjusting Show Situation

CLEVELAND, Nov. 14—The directors of the Cleveland Automobile club will meet to-night to take up the local situation as regards the holding of an automobile show in Cleveland this Winter. As a result of disagreements among the dealers, the city had two shows last year, one under the auspices of the Cleveland Automobile Club and the other given by a faction of the dealers.

The directors of the automobile club will endeavor to bring all dealers into amicable relations this year with a view of effecting a combination of forces. Even if the directors are successful in this it is pointed out in some quarters that two shows will have to be given because of the lack of a hall big enough to house a show in which all dealers and all makers are represented. No dates have been set.

Milwaukee Dealers' Show Association

MILWAUKEE, Nov. 14—Milwaukee motor car dealers have revived the organization formed several years ago and a permanent association has been incorporated under the laws of Wisconsin. The name is Milwaukee Automobile Dealers' Association. There is no capital stock. One of the main purposes of the corporation is to conduct an annual motor show in Milwaukee. In February, 1910, when the Milwaukee Automobile Club held its second annual show, fourteen of the best known dealers in Milwaukee refused to join in the exhibition and held private shows in their garages. These dealers are the leaders in the new organization, the charter members of which are: The KisselKar Co., Frank J. Edwards, manager; Welch Bros. Motor Car Co.; Curtis Automobile Co.; Albert Smith; Jonas Automobile Co.; Hickman-Lauson-Diener Co.; Edgar F. Sanger Co.; Rambler Garage Co. of Milwaukee; Johnson-Burnham Sales Co.; American Automobile Co.; Bates-Odenbrett Auto Co. and the Kopmeier Motor Car Co. The membership fee is $250. A directorate of seven members has been elected as follows: Frank J. Edwards, the KisselKar Co.; Emil Estberg; Frank Hickman, Hickman-Lauson-Diener Co.; Clifford E. Golder, Curtis Automobile Co.; A. F. Timme, Kopmeier Motor Car Co. and H. B. Pruden.

Omaha Association Perfects Show Plans

OMAHA, Nov. 14—The Automobile Show Association has arranged to hold its Sixth Annual Automobile Show from February 20 to 25 inclusive. It will be held in the Omaha Auditorium. The show will be managed this year by Clarke G. Powell and Willard Hosford, who have managed the shows for the past three years.

Every dealer in Omaha belongs to the Association, and will exhibit at the show. The stage and boxes will be removed from the Auditorium, and by rearranging the space more room will be given than last year.

Detroit Dealers to Exhibit in January

DETROIT, Nov. 14—Plans are already under way for the Tenth Annual Automobile Show, to be held under the auspices of the Detroit Automobile Dealers' Association, January 16-21. As was the case for several years past, it will be held in the Wayne Hotel Gardens. Walter R. Wilmot, who was in charge of the automobile exposition at the State Fair, has been selected to manage the forthcoming show, which it is promised will in every way surpass its predecessors in splendor and in the number of exhibitors.

Los Angeles Show in Redwood Forest

Los Angeles, Nov. 14—The Licensed Motor Car Dealers' Association, of Los Angeles, will hold their Second Annual Show at Fiesta Park, December 24-31, 1910, except Sunday.

This show promises to surpass in magnitude and splendor the very successful exhibition of last year. It will be held at the same place, under a waterproof canvas canopy, covering 80,000 square feet of floor. The redwood forest idea will be repeated, and in addition to this beautiful feature, a cascade at the north end will supply a mountain brook, which will traverse the entire length—400 feet, terminating in a pool. A pumping plant will be installed to return the water to the cascade, with a capacity of 1800 gallons per minute. Twenty-five thousand 16-candle-power incandescent lights will set the beautiful scene in a blaze of light.

Thirty members of the licensed dealers' association will exhibit an aggregate of about 200 1911 models.

Cincinnati Club and Dealers Unite for Show

Cincinnati, O., Nov. 14—An agreement has just been reached between the Automobile Club of Cincinnati, and the Cincinnati Automobile Dealers' Association by which the Dealers' Association is to give the annual automobile show with the hearty moral support of the club. The retail dealers' association show committee, which is now making a canvass of the situation and expects to arrange dates for the latter part of February or the first part of March, consists of Edward Herschede, chairman; Harry T. Boulden, secretary; H. L. Leyman, R. C. Crowther, Frank H. Miller, W. G. Welbon, and Edward F. Kruse. Owing to the marked advance of the Queen City as an automobile center during the past year and the spirit of co-operation now existing on all sides the forthcoming event is expected to make a most creditable showing.

Two Exhibitions to Be Given at Pittsburgh

Pittsburgh, Nov. 14—A movement is on hand to have an independent automobile show next Spring. The Associated Automobile Dealers of Pittsburgh is the name of the organization which was formed at the meeting a few days ago to promote the show. Its officers are: J. Joe Feicht of the Liberty Automobile Co., president; Edward Bald of the Bald Motor Car Co., vice-president; James Kerr of the Kline-Kerr Motor Co., secretary; J. B. Howe, of the Pittsburgh Automobile Co., treasurer. Thirty-four members were enrolled and the building has already been secured for the show.

The 1911 show committee is making good progress in shaping up affairs for the fifth annual exhibition. The second week of the show will be the exhibition of motor trucks, motor boats, etc. and 12 dealers have already taken space for this event.

Bridgeport Dealers to Use Big Auditorium

Bridgeport, Conn., Nov. 15—The Bridgeport Automobile Dealers' Association announced to-day that a show would be held and plans are now under way to secure the Park City skating rink, one of the largest auditoriums in Bridgeport. No date has yet been set for the show. Bridgeport's first automobile show was held last March. Frank Rantz, president of the association, stated to-day that a meeting will be held next Tuesday evening at the Stratfield to fix upon the date of holding of the show. J. L. Bloomer, secretary of the association, is preparing for a vigorous campaign.

Buffalo Show to Be Held at Arsenal

Buffalo, Nov. 14—The annual automobile show will be held in the Broadway Arsenal during the week beginning Feb. 5, under the auspices of the Automobile Trade Association of Buffalo.

Plans for Crescent City Exhibition Formed

New Orleans, La., Nov. 14—A large automobile show, as compared to most local shows, will be held by the dealers of New Orleans under the auspices of the New Orleans Automobile Club, February 24, 25, 26 and 27, 1911. The show will be in conjunction with the third annual Mardi Gras Speed Carnival, but will open one day in advance and will be open the first two nights. Homer C. George will be general manager of the show and races, working in conjunction with a committee of three representing the exhibitors.

Upon the day of the announcement, twenty dealers signed applications for space, agreeing to exhibit cars. Each will be given a space 25 by 25 feet. Accessory exhibits will be half this size. The car exhibits will be placed in the enclosed betting ring under the steel grand stand at the Fair Grounds, while the accessories will be exhibited in the ladies' dining room.

The show will be under the special direction of the dealers' committee and will not be a money-making enterprise in any sense. If any money is realized from it, said money will go toward building a road, upon which work is now being done under the auspices of the Motor League.

Chicago's Exhibition Has Vast List

Chicago, Nov. 14—The demand for space at the Chicago show is greater than ever. For the first week, January 28 to February 4, there are a dozen or more makers of cars and more than fifty makers of accessories on the waiting list. A typical line of commercial cars will be shown from February 6 to 11, and the main floors of the Coliseum and Annex are practically full.

Following is a list of the commercial car makers who have contracted for space, to be supplemented later by several to whom allotments have been made but who have not yet completed the formalities: Mack Bros. Motor Car Co., Allentown, Pa.; Mais Motor Truck Co., Indianapolis, Ind.; U. S. Motor Truck Co., Cincinnati, Ohio; Hart-Kraft Motor Co., York, Pa.; White Co., Cleveland, Ohio; Studebaker Bros. Mfg. Co., South Bend, Ind.; Alden Sampson Mfg. Co., Pittsfield, Mass.; Courier Car Co., Dayton, Ohio; W. H. McIntyre Co., Auburn, Ind.; Waverley Co., Indianapolis, Ind.; Reo Motor Car Co., Lansing, Mich.; Cartercar Co., Pontiac, Mich.; Grabowsky Power Wagon Co., Detroit, Mich.; Garford Co., Elyria, Ohio; Packard Motor Car Co., Detroit, Mich.; Avery Co., Peoria, Ill.; Pope Mfg. Co., Hartford, Conn.; Rapid Motor Vehicle Co., Pontiac, Mich.; Reliance Motor Truck Co., Owosso, Mich.; Peerless Motor Car Co., Cleveland, Ohio; American Locomotive Co., New York; Pierce-Arrow Motor Car Co., Buffalo, N. Y.; Metzger Motor Car Co., Detroit, Mich.; H. H. Franklin Mfg. Co., Syracuse, N. Y.; Knox Automobile Co., Springfield, Mass.; Kissel Motor Car Co., Hartford, Wis.; Kelley Motor Truck Co., Springfield, Ohio; Adams Bros. Co., Findlay, Ohio; Chase Motor Truck Co., Syracuse, N. Y.; Chicago Commercial Car Co., Chicago, Ill.; Lansden Co., Newark, N. J.; Federal Motor Truck Co., Detroit, Mich.; Automobile Maintenance & Mfg. Co., Chicago, Ill.; F. B. Stearns Co., Cleveland, Ohio; Economy Motor Car Co., Joliet, Ill.; Anderson Carriage Co., Detroit, Mich.; Marquette Motor Vehicle Co., Chicago, Ill.; Monitor Automobile Works, Janesville, Wis.; Clark Delivery Car Co., Chicago, Ill.; Schmidt Bros. Co., Chicago, Ill.; Brodesser Motor Truck Co., Milwaukee, Wis.

No Date or Place Yet for St. Louis Show

St. Louis, Mo., Nov. 14—At a meeting of the officers of the St. Louis Automobile Dealers' and Manufacturers' Association it was decided to leave the question of the 1911 show to the members. This action was taken because of the fact that opposition to the 1911 exhibit has developed. The same condition existed previous to the last show, but when it came to a vote an almost unanimous ballot was cast in favor of the proposition. The last show was held in the First Regiment Armory.

Olympia Automobile Show Opens in London

Olympia Show opens in London. Tendency of manufacture as shown in exhibits is toward smaller motors. Compactness and neatness in cylinder casting is a feature. Sixty per cent. of the automobiles shown are listed at less than $2,500, this includes, eight different makes of six-cylinder cars ranging up to 25 horsepower. Stroke of motor is longer in proportion to bore. Show is pronounced to be one of the most interesting ever held.

LONDON, Nov. 5—The motor show now in progress at Olympia is considered something of a step in advance as compared with any other show ever held in England. Space to exhibit was exhausted long before the show opened and the collection of automobiles on exhibition is one of the most interesting ever gathered under one roof.

The motors shown are generally smaller than they have been in the past; the horsepower being between 12 and 15, in a great number of instances. One of the first things that impresses the visitor, is the improvement in cylinder casting and design. The tendency is toward neatness and compactness and those concerns which adopted the plan last year of enclosing their valve stems, tappets, etc., have continued the practice, which goes a long way toward eliminating noise and excluding dust. The thermo-siphon system of water circulation which jumped into favor last year, is evidently holding its own.

More engine cylinders are cast en bloc this year than ever before and many new models are equipped with that type of cylinders.

Over 60 per cent. of the cars shown are listed at less than $2,500, even the six-cylinder cars of from 18 to 25 horsepower being so listed. Among the cars priced under that figure are the Arrol-Johnson, Daimler, Darracq, Fiat, Mors, Sunbeam, Clement-Talbot and Vauxhall all six-cylinder cars.

There is a tendency with small cars to rely upon ball bearings for crankshafts, but little success has followed the use of ball bearings in engines with bore of over 90 mm. The idea of equipping the car with only two ball bearings on the crankshaft has been tried to some extent in the current models, notably the Argyll. The worm drive, back axle, is slowly increasing in favor, half a dozen of the new models having been so equipped.

There seems to be a drift toward the adoption of a drive giving four forward speeds as opposed to three. The Wolseley Co. exhibits a gear box giving four and reverse, with direct drive on the fourth speed rather than the third, as heretofore. The Maudesley box gives direct drive on third with the fourth geared higher.

One of the chief developments of the year is the elongation of motor stroke with regard to the cylinder bore. The average of 14 typical makes of four-cylinder cars has been shown to be 3 1-4 by 4 13-16 inches.

The twin jet carbureter has made some advancement in popularity. The high tension system of ignition is practically universal, except where a dual system is used in cars of large power.

In the matter of engine lubrication the only novelty of any importance is the adjustable trough system, which while a clever idea does not seem to return sufficient advantage from its use to warrant the extra cost.

Clutches of all kinds are shown, including internal expanding, plate, leather-faced and metal to metal. The leather-faced clutch is maintaining its popularity and provision is generally made for smooth engagement by a series of springs under the leather facings. The hydraulic clutch is making no headway.

Frame design is very similar to last year, as finality in construction seems to have been reached in this line. The most general type of frame the side members are set in to give increased steering lock and are arched over the rear construction.

Front wheel brakes are growing in use on the higher priced cars, but on account of their more involved mechanism they are not likely to invade the field of the low priced lines.

The design of the rear axle, particularly as regards torque and radius rods, is the same as last year in almost all cases.

The chain drive is as dead as Queen Anne in the best known English makes, although the silent chain is creeping in for two to one shaft drive.

Among the accessories are shown several types of self-starters, one of which embodies the idea of an air compressor. Detachable wheels are shown in great variety.

Flush-sided bodies are shown in many lines, several makers having arranged the change speed lever within the frame to facilitate fitting on this popular style of body. Even in limousines and landaulets the current models show side doors attached to the front seats almost universally. In the matter of upholstering some of the ideas are novel. For instance, in the limousines it is not uncommon to find the bodies lined with wood in place of cloth. One line is displayed where the interiors are finished in the choicest tropical woods, comparable in pattern and workmanship with the best work of the cabinet-makers.

The Society of Automobile Engineers' Annual Meeting

NEW YORK, Nov. 16—Howard E. Coffin, president of the Society of Automobile Engineers, has announced that the annual meeting will be held in New York City on Wednesday and Thursday, January 11 and 12, 1911. The two days sessions will be devoted to the business of the Society and to technical subjects upon several of which papers will have been printed and distributed in advance of the meeting.

The work of the Society's standards committee is continuing actively; meetings of two divisions of this committee were held last week at the Society's New York office.

At the meeting of the plain, ball, and roller bearings division, the following were present: Henry Souther, Chairman Standards Committee; Henry Hess, Hess-Bright Mfg. Co.; A. P. Sloan, Jr., Hyatt Roller Bearing Co.; S. P. Wetherill, Jr., Wetherill Finished Castings Co.; Coker F. Clarkson, secretary.

At the meeting of the division on aluminum and copper alloys the following were present: Henry Souther, Chairman Standards Committee; Thomas J. Fay, Editor THE AUTOMOBILE; R. S. Fretz, Light Mfg. & Foundry Co.; H. W. Gillett, Aluminum Castings Co.; S. P. Wetherill, Jr., Wetherill Finished Castings Co.; Coker F. Clarkson, secretary.

General Motors New Board: Debts Paid

Responding to the instructions of the voting trustees, now in charge of the General Motors Co., a new board of directors has been chosen. It consists of the following: W. C. Durant, Anthony N. Brady, James J. Starrow, Albert Strauss, J. H. McClement, Nicholas L. Tilney, Richard Lukeman, Jr., Benj. F. McGuckin, H. L. Carlebach, Arthur P. Bush, Jr., and George Reichert.

All of the old board except Vice-President Durant failed of re-election. Anthony N. Brady, whose name is second on the list, has been financially interested in motor manufacture for some time and is connected with a number of prominent companies. James J. Starrow, represents Lee, Higginson and Co. and the others on the list represent various financial interests identified with the flotation of the $15,000,000 bond issue.

Announcement was made after the meeting that all matured obligations of General Motors had been taken care of and checks were being prepared for mailing.

Three Perfect Scores in C. M. C. Reliability Run

CHICAGO, Nov. 14—With a triple tie between a pair of Moline cars and a Fal, all of which finished the 1,000-mile reliability run of the Chicago Motor Club with perfect road and technical scores, the Van Sicklen Cup in the Roadster and Toy Tonneau divisions will be held by the Moline Auto Co. for eight months and by the Falcar Co. for four months. The Haynes entry was declared winner in the touring car division, with a penalization of two points for a loose bolt in the brake. This car is awarded the Stewart Speedometer Trophy. The team prize was won by the Moline pair, with perfect scores. The Standard Oil Trophy for economy in gasoline consumption was captured by the Cunningham, driven by J. C. Emery, using 83.80 gallons, the car weighing 2,930 pounds. The Falcar was second with an average of 17 miles to the gallon. The Michelin Tire Co. was awarded the Branstetter Cup with 15 points penalization.

The plan of holding the run was to send the cars over about 200 miles of varying roads each day for five days, the total mileage being about 1,050. The feature of the affair was the stability shown by the contesting cars and the excellent scores made by them. The technical examination to which they were subjected was severe and the fact that so many survived may be taken as proof of the good character of the competing automobiles.

The economy test proved illuminating as a measure of the cost of fuel and oil in touring under severe road and weather conditions. The clean scores registered in the roadster division of the tour were very creditable, as it scarcely seemed within the realm of possibility that no technical defects should be developed in such a hard test.

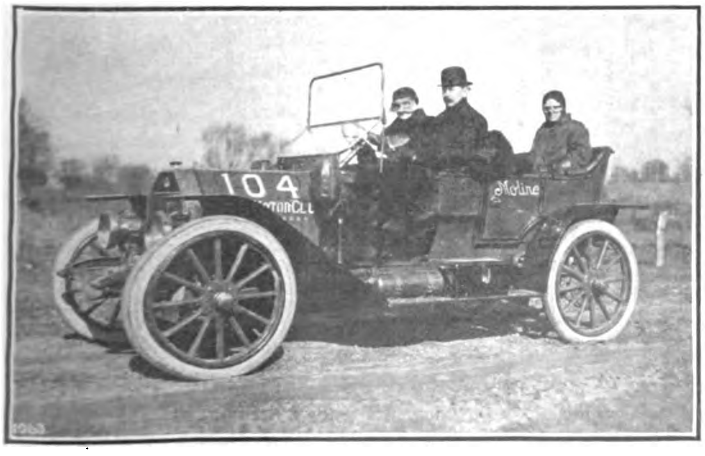
Tribune Trophy Goes to Chalmers

MINNEAPOLIS, MINN., Nov. 14—The Barclay Auto Company has become the permanent possessor of the Tribune Trophy through the decision of the trustees of the Automobile Club of Minneapolis. The Chambers "30" had finished the three contests with the best average score, as provided by the rules made in 1908.

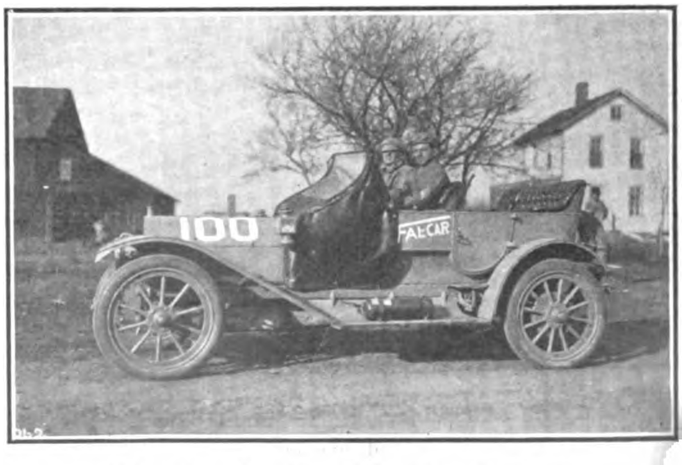
Upon being informed of the club's action, Mr. Barclay immediately arranged a banquet to fittingly celebrate the disposal of the trophy.

TABLE SHOWING PERFORMANCE OF CONTESTANTS IN C. M. C. RELIABILITY RUN—TOURING CAR DIVISION

Car No.	Car	ROAD SCORES											FINAL EXAMINATION												ECON. COMPETITION		
		1st Day		2nd Day		3rd Day		4th Day		5th Day		Total Road Score	Brake Tests			Total Clutch	Engine	Cooling	Lubr.	Carb.	Ing.	Mach. Parts	Running Gear	Grand Total Tech. & Time Pen'l	Gas. in Gals.	Car Wgt.	Pctg.
		Time	Tech.	Time	Tech.	Time	Tech.	Time	Tech.	Time	Tech.		Service	Emerg.	Total Brakes												
7	Haynes	0	0	0	0	0	0	0	0	0	0	0	48ft.	45ft.	0	0	0	0	0	0	0	0	2	2	88.20	3590	.317
9	Imperial	0	0	0	0	0	0	0	0	0	0	0	34	44	0	0	0	3	0	0	0	0	2	5	87.30	3560	.318
8	Henry	0	0	0	0	0	0	0	0	0	0	0	42	40	0	0	0	0	0	0	0	0	6	6	81.70	3710	.354
12	Cino	0	0	0	0	0	0	0	0	0	0	0	33	57	7	0	0	1	0	0	5	0	0	13	88.85	4000	.351
4	Cunningham	0	0	0	1	0	0	0	0	0	0	1	42	65	15	0	0	0	0	0	0	0	7	23	83.80	2930	.459
11	Abbott-Detroit	0	1	0	0	0	0	0	0	0	0	1	66	55	21	0	0	1	0	0	0	0	12	35	78.00	3430	.343
1	Abbott-Detroit	0	3	0	0	0	0	0	0	0	0	3	68	52	20	0	0	0	0	0	0	0	18	41	84.85	3410	.313
6	Halladay	0	0	0	0	0	52	0	0	0	5	57	42	43	0	0	0	0	0	0	0	2	6	65	95.25	3950	.323
10	Glide	0	0	0	66	0	0	0	0	0	0	66	70	63	33	0	0	2	0	0	10	276	11	398	.....	....	....
2	Haynes	0	0	0	0	0	0	0	35	0	0	35															
	ROADSTER DIVISION																										
100	Falcar	0	0	0	0	0	0	0	0	0	0	0	37	41	0	0	0	0	0	0	0	0	0	0	60.00	3269	.425
104	Moline	0	0	0	0	0	0	0	0	0	0	0	37	41	0	0	0	0	0	0	0	0	0	0	70.40	3550	.393
106	Moline	0	0	0	0	0	0	0	0	0	0	0	35	40	0	0	0	0	0	0	0	0	0	0	65.85	3210	.3808
117	Haynes	0	0	0	0	0	0	0	0	0	0	0	43	50	0	0	0	0	0	0	0	0	1	1	73.90	3170	.335
112	Staver	0	0	0	0	0	0	0	0	0	0	0	42	50	0	0	1	0	0	0	0	0	1	2	75.10	3040	.316
113	Staver	0	0	0	0	0	0	0	0	0	0	0	30	40	0	0	0	0	0	0	0	0	6	6	69.25	3040	.342
105	Lion	0	0	0	0	0	0	0	0	0	0	0	55	45	5	5	0	0	0	0	0	0	1	11	86.75	3590	.323
101	Midland	0	0	0	2	0	0	0	0	0	1	3	47	43	0	0	0	0	0	0	0	0	10	13	80.00	3680	.358
111	Halladay	0	0	0	0	0	0	0	0	0	0	0	37	38	0	0	0	3	0	0	10	0	12	25	76.25	2540	.260
108	Imperial	0	0	0	0	4	10	0	0	0	2	16	50	56	6	0	0	0	0	0	4	0	5	31	67.60	3070	.354
102	Grout	0	0	0	0	0	0	0	0	0	0	0	75	47	25	5	8	1	0	0	0	0	0	39	81.25	3960	.3807
119	Moline	0	0	0	0	0	0	0	35	0	0	35	36	45	0	0	0	5	0	0	0	0	26	66	76.40	3590	.317
107	Case	0	0	0	0	0	0	0	0	22	50	72	73	48	23	0	0	0	0	0	0	0	7	102	107.10	3630	.264
110	Speedwell	0	0	0	0	0	0	0	0	0	0	0	44	160	110	0	0	0	0	0	5	0	2	117	107.00	3510	.256
116	Brush	0	0	0	8	0	0	0	1	Withdrawn.																	
103	Hup	0	1	0	0	0	20	Withdrawn.																			
115	Krit	0	0	Withdrawn.																							
114	Case	0	50	Withdrawn.																							
118	Hup	Withdrawn.																									
109	Hup	Did not start.																									



Moline, No. 104, came through with a clean score



Falcar, No. 100, also ended with a clean score

News Notes from Hoosier Capital

INDIANAPOLIS, IND., Nov. 14—Many new companies are being formed with the expectation of getting in line for the 1911 season, and some important changes in agencies are resulting. Among the most important changes is that of the Premier agency from the Gibson Automobile Co. to the Premier Motor Sales Co. with Henry L. Johnson, formerly of the Boston Premier branch, as manager. The new company will distribute the Premier throughout the State.

The Marion Sales Co. has also been formed to act as general distributor for the Marion, which is to be manufactured on an extensive scale, during the coming season. Those interested in the company are: E. A. Brown, James E. Kepperley and J. O. Vanier. The Marion will be built in two chassis types, with a choice of a large variety of bodies, ranging from roadsters to taxicabs.

About 300 employees of the Overland factory in this city were entertained at a theater party last Monday night by Will H. Brown, vice-president of the company. Before the performance the Overland factory band gave a concert.

New Company to Make Automobiles

BUCYRUS, O., Nov. 14—The incorporation of the Sommer Motor Co., of this place, recently, with an authorized capital of $125,000 means the erection of a large plant for the manufacture of the Sommer automobile, which has been made on a small scale at this place for several months. The charter of the corporation permits the company to manufacture and sell automobiles, motor trucks, and other vehicles as well as automobile supplies and accessories in general.

The incorporators were: L. A. Sommer, who will be president and general manager of the corporation; L. M. Smith, F. C. Hopley, S. S. White and D. F. Flohn. Active preparations are being made for the location of the factory.

Auto Refrigerator Offers Advantages

The auto-refrigerator car shown in the accompanying illustration is utilized for transporting beef at Buenos Ayres by the Compania Sansinena Carniceria "Na Negra" de Carnes Congeladas. It is capable of handling 4,500 kilograms of meat in each load and is operated by a 35-horsepower motor of the four-cylinder type constructed at Puteaux-on-the-Seine, and is of the De Dion-Bouton type. The motor ice truck noted in the accompanying illustration is provided with a similar four-cylinder motor of 24-horsepower capacity; the cylinders of this engine have a bore of 104 mm. and a stroke of 130 mm., and the truck is arranged for three speeds forward and one reverse. This new motor truck has a capacity for handling 3,000 kilograms of ice in each load.

Automobile refrigerator car in Buenos Ayres

United International Motors Makes Its Bow

Benjamin Briscoe's trip abroad is already bearing fruit and the United International Motors, Limited, affiliated with the United States Motor Co. and representing that corporation in England, has made an auspicious début. United International Motors has obtained a concession from United States Motor Co. to manufacture and sell in the United Kingdom and continental Europe the various types of cars made by the American company. A staff of representative Britons has been assembled and the announcement has been made that it is the intention of the company to install a manufacturing department in full co-operation with the American plants. A guarantee for four years is given to all purchasers. The Brush, Maxwell, Stoddard-Dayton and Columbia types are specially emphasized. The new company has secured temporary quarters and is showing fifteen models.

Annual Election of A.A.A. Last of Month

The annual meeting of the American Automobile Association will be held November 30 and December 1, when the election of officials will take place. There has been the usual grist of rumors about radical changes in the make-up of the slate and indications point to the election of Vice-President Hooper of Philadelphia as president of the association. The groundwork of the Contest Board apparently will remain without revolutionary change although a number of officials now connected with it are likely to be switched about. The composition of the Technical Committee is arousing considerable comment. The opinion is expressed that it is likely to remain about the same as in the past season. Chairman S. M. Butler will stay at the head of the Contest Board.

Carples Resigns as Manager N. Y. Dealers

James M. Carples, general manager of the Licensed Automobile Dealers of New York, has placed his resignation in the hands of the Executive Committee, announcing that his new duties as general manager of the Daimler Import Co., who will handle Mercedes cars in America, made it impossible for him to continue as general manager of the Licensed Automobile Dealers.

Mr. Carples' successor has not as yet been chosen.

R. H. Johnson and J. M. Uppercu have been chosen members of the Board of Directors of the association.

Syracuse Club Points Out Auto Route

SYRACUSE, N. Y., Nov. 14—Notice has been received by The Automobile Club of Syracuse that since Nov. 5 the ferry from Cayuga to Seneca Falls has been discontinued. The road across the marshes at Free Bridge will be kept open and passable through the winter, which is welcome news to automobilists of this section that like to use their machines during that season.

Tourists going west from Auburn have been directed to follow the macadam on Clark street to Free Bridge, cross the marshes and take the second left turn into Seneca Falls. Going east through Seneca Falls, they are to turn left into Cayuga street and take the right fork to Free Bridge.

Ryan Head of Aero Club of America

Allan A. Ryan and his whole ticket were elected to administer the affairs of the Aero Club of America. The insurgent movement that was projected after the recent meeting at Belmont Park did not materialize. No formal announcement was made by the club as to action in the case of Drexel and other malcontents.

Don't try to accomplish a life's work in a day; constant **washing** wears away the hardest stone; wash, brother, **wash.**

Boston Truck Dealers for Organization

Boston, Mass., Nov. 5—At a meeting of a number of dealers connected with the Boston Automobile Dealers' Association, who handle commercial vehicles in addition to pleasure cars, an organization was formed, known as the Boston Motor Truck Association. The organization will start in at once to push commercial vehicles and in the future will have shows, endurance runs and reliability contests of various kinds.

Officers were chosen as follows: J. W. Maguire, Pierce-Arrow, president; A. P. Underhill, Knox, vice-president; J. S. Hathaway, White, treasurer; Chester I. Campbell, secretary; board of directors, the above officers and A. B. Henley, Franklin; Victor A. Charles, Inter-State; L. B. Butler, Rapid and C. F. Whitney, Alco and Stoddard-Dayton.

The advisability of having a show for commercial vehicles solely, this season, was discussed and it was decided that the plans could not be matured sufficiently without interfering with the arrangements for the regular motor show next March.

Windshields in United Manufacturers

Rumors that told of the dissolution of the United Manufacturers, which handles the Jones Speedometer, Motorol, Metzger windshield, ignition specialities and the Weed chain, and the erection in its place of a merger of various windshield companies prove to have little foundation in fact. The situation as far as it has developed indicates that, instead of dissolving, the United Manufacturers is planning considerable accessions to its lines.

It may be said with semi-official certainty that the company contemplates continuing in business. A plan is under way to bring several important manufacturers of windshields into the company. Announcement of the details will be made in due course.

L.I.A.C. To Be Ten Years Old Next Month

With much ceremony and rejoicing the Long Island Automobile Club will celebrate its tenth anniversary Dec. 7. The ample club house at 920 Union street will be the scene of a feast, entertainment and a meeting to commemorate the occasion.

The club has had a prosperous year and its size and importance have increased largely. Its club runs and competitive tours have proved a distinct addition to the pleasure of motoring.

Automobilists Satisfied with Election

While the storm of ballots raged last week something happened that will probably prove of benefit as well as interest to motordom. Among those who were not selected to make laws and administer them were the New Jersey legislators who were instrumental in framing the sumptuary law now on the statute book of New Jersey, which oppresses visiting automobilists and is a standing reproach to the fair name of the State. New Jersey roads are proverbially excellent, but the existing statute has proved so obnoxious to motordom generally that reprisal legislation has been passed by neighboring States against the Jerseymen. The associated automobile clubs of New Jersey realized that this condition was wrong and for months before election the members labored diligently to secure pledges from candidates of both parties to correct the legal situation.

As a result, the legislature chosen in Jersey on Tuesday is formed of men who have given their words of honor to change the burdensome and unjust law.

In New York State it may be noted incidentally that Samuel S. Koenig, Secretary of State, who was very active in the administration of the laughable Callan Act, and Albert S. Callan, the youthful Assemblyman from Columbia County, who was the titular father of the State motor law, are numbered among those who fell.

Road Builders to Confer for Four Days

Indianapolis, Nov. 14—Four days will be devoted to the study of road problems by the American Road Builders' Association at a convention to be held at Indianapolis, Dec. 6-9. Extensive preparations are being made for this conclave and the hope for State aid and State control of highways in Indiana hinges largely upon the automobile owners.

The Indianapolis Trade Association, with the aid of such men as Carl G. Fisher, president of the Indianapolis Motor Speedway, and Will H. Brown, vice-president of the Willys-Overland Co., is seeking the active support of every owner of a motor car in the State.

Detroit Favors $2,000,000 Road Bonds.

Detroit, Mich., Nov. 14—That the people of this community are fully awake to the advantages of good roads was demonstrated in the election of last Tuesday, when the proposition to bond Wayne county for $2,000,000 for road building purposes carried by a large majority. It served to show what a powerful force the motor car industry has become here, for the united support and co-operation of these interests were important factors in the success of the issue.

State Senator John N. Anhut, who was formerly actively connected with the industry as president of the Anhut Motor Car Co., now the Barnes, was defeated by his Democratic opponent, James H. Lee.

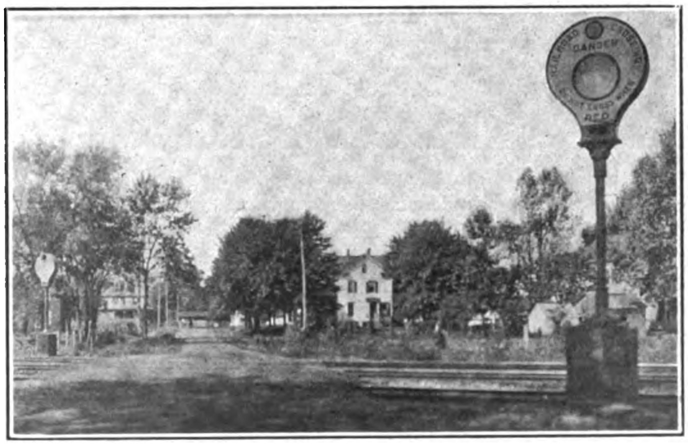
Reciprocity with Canada for Automobiles

Negotiations are being conducted between the authorities of Canada and the United States looking to a reciprocal arrangement of customs with regard to the introduction of automobiles from one country into the other. Officials of both nations are being strongly urged to reach an agreement by representatives of motordom on both sides of the line.

Nullifying Grade-Crossing Perils

Quite an advancement in the art of protecting grade crossings has been made by the Lehigh Valley and installed on one or two dangerous intersections of highways with the railroad right-of-way.

As shown in the accompanying illustration, the warning signal is substantially built upon a column of perhaps 15 feet high. For use in the day, the signal bears the caution: "Railroad Crossing. Danger. Do not cross when Red." An electrically operated gong also gives audible warning of danger. At night the signal shows a red light when a train is approaching the crossing and the bell also gives voice.



How the Lehigh Valley Railroad proposes to protect dangerous crossings

News of the Detroit Field

TWO MOTOR CLUBS MERGE AND HENCEFORTH WILL BE KNOWN AS THE WOLVERINE AUTOMOBILE CLUB—NOTES OF THE TRADE

DETROIT, Nov. 14—The Stanley Motor Car Co. has begun operations here making the Stanley "30" and the Stanley "40," selling at $1,450 and $2,000, respectively. The company is located temporarily at 315 Howard street and two cars have been turned out. From now on the concern expects to turn out one car a day and the product will be marketed principally in the West. The officer are: President, G. S. Murdock; secretary-treasurer, A. A. Savois; general manager, F. E. Gibbard.

An interesting bit of news to local autoists was the announcement that the Detroit Motor Club and the Wolverine Automobile Club had decided to consolidate, the name of the latter being retained. Committees from the two organizations have been at work on the matter for some little time and the details have just been completed. The combined membership is about 600, which, it is expected, will be increased to 1,000. Secretary F. H. Trego and Assistant Secretary W. O. Peck have established temporary offices at 1215 Woodward avenue. The club plans to erect one of the finest club houses in this section of the country.

William F. Cornell, of the Detroit Motor Car Supply Company, has been elected president of the Detroit Rotary Club, a new organization representing forty-five business and manufacturing concerns of Detroit with an investment of more than $7,000,000.

Mayor Philip Breitmeyer, who retires from office January 1, and his secretary, Frederick A. Van Fleet, are president and secretary-treasurer, respectively, of the Wolverine Motor Supplies Company, which has filed articles of association at Lansing and has already commenced operations at 1221 Woodward avenue. The company's principal output for the present will be the Detroit spark plug, invented by Theodore L. Beguhn. It differs widely from the ordinary spark plug in that mica washers take the place of the customary wire points for sparking purposes. Frank W. Kanter is vice-president of the company and George W. Stimpson is factory manager. John Gillespie, of the Gillespie Auto Sales Company, is also interested in the new venture.

Following the recent annual meeting of the Warren Motor Car Company General Manager J. C. Bayerline has announced that the capital stock of the concern has been increased from $100,000 to $300,000. Whether this means a stock dividend or a further enlargement of the company's facilities is not made known.

The Hupp Motor Car Company has announced that its new four-passenger touring car at $900 as well as its other 1911 models, including the runabout, a coupé and a torpedo, are ready for the market.

The Board of Commerce is doing some effective campaigning on behalf of its good roads bonding project. George S. Ladd, former master of the Massachusetts State Grange and now lecturer for the National Grange, is delivering a series of good roads talks here under the auspices of the board.

Roy Buell, who has been connected with the publicity department of the Regal Motor Car Company, has been promoted to the position of advertising manager. Mr. Buell is an ex-newspaper man. He went to the Regal company from the Associated Press.

Rothschild & Co., Body Makers, Fail

Bankruptcy proceedings were commenced Monday against Rothschild & Company, manufacturers of automobile bodies at 550 West Fifty-seventh street, New York City. Lillian H. Mendel, of Mount Vernon, and several other creditors instituted the proceedings. Federal Judge Hough named Charles Singer receiver under $5,000 bonds and authorized him to continue the business for ten days.

Liabilities are estimated at $100,000 and the schedule of assets foots up about $30,000. The company has on hand about $50,000 in contracts and the work of the receiver will be to fill as many as possible during his tenure of office. The company was formed in 1906 with capital of $35,000. This was increased subsequently to $200,000.

Auto and Airship Neglected by Military

Possibility of war between the United States and Japan, the readiness of the Japanese and the unpreparedness for such a development in the United States are being discussed with much freedom in European military circles, according to H. H. Rogers, son of the late Standard Oil magnate, who returned recently from across the Atlantic.

In speaking of this talk, Mr. Rogers said: "High military officers are unanimous that the war will come about within a few years, surely before the opening of the Panama Canal, and that America will be whipped just as Russia was."

Such reports, coming as they do from sources that should be well informed, carry a certain amount of force that the ordinary traveler's tale does not possess.

History clearly shows that in armed struggle the side which is able to mobilize its forces with the most facility and to determine the intentions of the enemy always wins. Napoleon said that Providence was on the side which had the heaviest batallions, but his practice showed that he did not believe in trusting to Providence alone. It was his plan to discover the intentions of the enemy and to "beat him to it," by engaging him with heavier forces than he could bring to bear upon a given crucial point.

All of which goes to show the importance of swift mobilization. In this age of the automobile and aeroplane as existing military forces the neglect of them by the United States Government is inexplicable. In case of war with Japan the problem presented to the army and navy would be one of swift assembly of fighting force at the point of attack. Those who have taken the pains to investigate the situation at all are agreed that there should be a board of automobile engineers installed at once co-ordinate with or superior to the general staff of the army and that a similar body of aeronautical engineers should be charged with the task of preparing a defense of the country by airships.

The palpable neglect of these two important elements of defense might lead to a very black page in American history.

Goes to Paris to See Long-Stroke Motors

Eugene Grenwauld, superintendent of the Moline Automobile factories sailed Tuesday from New York for the Paris Auto Show. The Moline Co. expects to get some ideas from inspection of the foreign exhibits at the Paris show, especially with respect to long stroke motors. The 1911 Moline motor is of the long stroke type, being 4-inch bore and 6-inch stroke.

Among the Accessory Makers

SHORT NEWS; SCHEBLER CARBURETER AND METHODS OF MANUFACTURE; ACTIVITIES OF ACCESSORY MAKERS AND OTHER ITEMS

—J. E. Strater has opened a branch office in Cincinnati for the Hoffecker speedometer and the Flentz shock absorber.

—J. C. Irwin has resigned his position as Wisconsin representative for the Firestone Tire & Rubber Company, of Akron, Ohio.

—Ground has been broken for the new Vulcan gear works, at Pontiac, Mich., one of the four new factories which are to be erected there.

—Wiley F. West has been appointed manager of the St. Louis branch of the Firestone Tire & Rubber Company. He comes from Atlanta, Ga.

—The Booth Demountable Rim Company has removed its general offices to 8410 Lake avenue, Cleveland, Ohio, where its factory is located.

—Truffault-Hartford shock absorbers will be used to equip Oldsmobile "Limited" and "Autocrat" models of 1911 and upon all Rambler cars.

—William Smith, former treasurer of the Lyric Theater of Cincinnati, now represents the Michelin Tire Co., in Ohio, Indiana and Kentucky.

—The Pennsylvania Rubber Company has appointed the Post & Lester Company, Boston, Mass., agents for Boston and vicinity, covering its automobile tires.

—E. J. Benson, who has been with the B. F. Goodrich Co., Detroit, for seven years, has joined the selling force of the Pennsylvania Rubber Co.

—W. A. Merriam has been appointed advertising manager of the Warner Instrument Company, and will conduct that feature of the business from the Boston office after December 1.

—The Badger Auto Tire Repair Company of Milwaukee, Wis., has moved to larger quarters at 132 Oneida street. V. A. Massee is manager. The company will handle the Kelly-Springfield tires in this territory.

—The J. S. Bretz Company has opened a western office and salesroom at 1215 Woodward avenue, Detroit. H. J. Porter and J. W. Hertzler, the western sales representatives of the company, will make it their headquarters.

—In calling attention to the application of a dynamo for lighting in an article which appeared on page 661 of THE AUTOMOBILE, it was stated that the dynamo used was an Apple. After investigation showed that it was an Applco.

—Charles W. Simpson has assumed the management of the Diamond Rubber Co.'s Cincinnati branch office and store at 807-809 Race street, succeeding E. B. Tozier, who has been appointed manager of the Diamond Co.'s branch at Minneapolis.

—Papers were filed with Secretary of State Thompson recently by the B. F. Goodrich Company, of Akron, Ohio, increasing its capital stock from $10,000,000 to $20,000,000. The increased capitalization will consist of 7 per cent. preferred stock.

—The following named concerns have been elected to membership in the Motor and Accessory Manufacturers' Association: Edison Storage Battery Co., West Orange, N. J.; The McCue Co., Hartford, Conn.; Pfanstiehl Electrical Laboratory, North Chicago.

—George B. Gaylord, formerly assistant to the general manager of the Buick Motor Company, at Flint, Mich., will hereafter have charge of the accessories and parts department of the Minneapolis Regal Auto Company. Mr. Gaylord assumed his new duties last week.

—George A. Wallace, of New Castle, Pa., is at the head of a big company composed of New Castle and Cleveland capitalists which has bought a site in Youngstown, O., for $300,000, on which it proposes to build a $2,000,000 plant. It is reported that automobile parts will be manufactured.

—Chase Langmaid, manager of the Hartford Rubber Works Company's Boston branch, announces its removal to the new building at 863 Boylston street. The five-story building is occupied entirely by the Hartford Rubber Works Company and has every convenience and facility.

—The Hollis Electric Company, jobbers' and manufacturers' agents, now located at 9 North Sixth street, Minneapolis, Minn., has just signed a long time lease for a building to be erected at No. 12 South Eighth street, just off Hennepin avenue, in the heart of the automobile section. The building is to be completed by February 1.

—Fred Helser, formerly with the Black-Crow Motor Car Company, and his father, Jesse Helser, of Warsaw, have formed a partnership under the firm name of the Helser Sheet Metal Specialty Company, and have opened a shop at 123 North Main street, Elkhart, Indiana. The output of the firm will be sheet metal parts for automobiles, including fenders, tanks and fixtures.

—The Archer Automobile Association, of Burlington, Vt., have applied for patents on a new style of clutch. It is cone shaped, and consists of one transmission member and two engine members, one of which applies friction to the outside and the other to the inside of the transmission member, and which will be fitted with leather, cork or asbestos, for various purposes. If desired they may be so arranged that one surface engages earlier than the other, so as to pick up the load without shock.

Making Schebler Carbureters

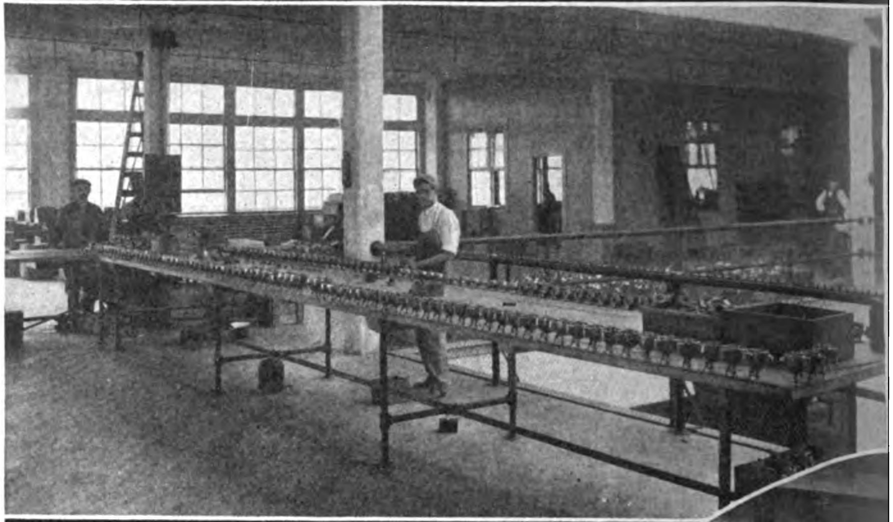
ILLUSTRATING THE VARIOUS TYPES OF SCHEBLER CARBURETERS; SHOWING METHODS OF MANUFACTURE; DEPICTING TESTING EQUIPMENT AND RAMIFICATIONS

GAUGING the automobile industry is to some extent accomplished by counting the number of carbureters that are being turned out, remembering that every motor used requires its carbureter. Without trying to show as whether or not each of the makes of carbureters has been manufactured on the same increasing basis year after year, the point will be made that the Schebler carbureter as manufactured by Wheeler & Schebler, of Indianapolis, Ind., has been turned out in increasing numbers as indicated by the statistical schedule as follows:

ANNUAL PRODUCTION OF SCHEBLER CARBURETERS

Year	Carbureters
1900	1
1907	48,625
1908	57,513
1909	100,000
1910	200,000
1911 (capacity)	4,000 per day

The first carbureter as invented by George M. Schebler was put out in 1900. A little later on, when the firm of Wheeler & Schebler was formed, the carbureter was somewhat improved, and the company went ahead with its manufacture on a modest basis, leading up to the 1907 output, which, at that time, was considered an enormous production. One of the basic reasons for the enormous advance in the production of carbureters at this plant is attributed to the consistent policy of Frank H. Wheeler, resulting in the continuous running of the plant, day in and day out, rain or shine, panic or no panic. When, during the 1907 panic, nearly every industrial establishment was either shut down or running on part time, Frank H. Wheeler kept his men at the bench and tools, turning out 48,600 carbureters, accumulating a stock of 24,000 carbureters, against the advice of every half-scared wiseacre in Indianapolis and for 100 miles around. One day, when business awakened, and manufacturers of automobiles made the discovery that carbureters were on a famine basis, promises were to be had a-plenty, but of carbureters there were none. This was Frank H. Wheeler's opportunity. In response to a telegram from the management of one of the big manufacturing companies Wheeler said: "Will ship a carload of carbureters to-day." The answer came back: "Do your damnedest." When the freight car was shunted off the siding that night it carried within a bakers' dozen of 5,000 carbureters. It was only a matter of a few days when the entire 24,000 carbureters were ordered and delivered, and it established the reputation of Wheeler & Schebler for promptness in making deliver-



Showing Rows of Float Bowls on the Testing Benches Having the Buoyancy of the Floats Determined

Part of the Space Devoted to Testing, Showing Lots of Model L & F Carbureters Undergoing Final Inspection

Battery of Multiple Spind
Out Screws an

Stock and Shipping Room, Showing Carbureters on Shelves Representing Stock and Boxes on the Shipping Table Ready to Go Out

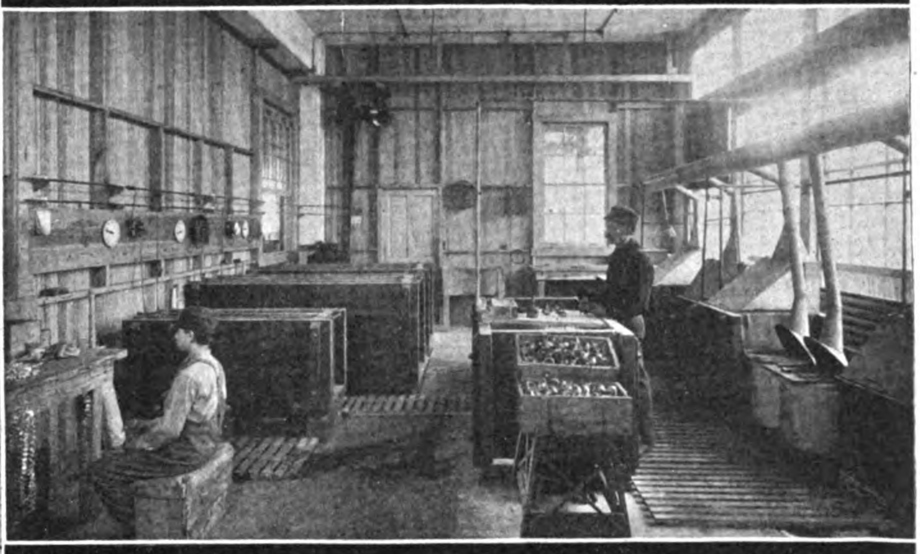
Corner of the Watch Lathe Department Where Needle Valves, Nozzles and Other Small Parts are Made to Great Accuracy

ies, made it perfectly plain to manufacturers that the quality would be the same for a single carbureter or a carload; and Wheeler & Schebler have been busy ever since maintaining this reputation. Since the plant was discussed in THE AUTOMOBILE last year, the foundry capacity has been doubled, which means that the raw material used therein is on a basis as follows:

New copper...	4 carloads per month.
Block tin......	12 tons per month.
Pig lead.......	4 tons per month.
Spelter	2 tons per month.

The floor space of the plant, as previously reported, is about 150,000 square feet. This floor space has been added to this year, making the total at the present time 300,000 square feet. Under the old conditions 500 men were kept continuously employed in the production of carbureters, but this labor list is being rapidly swelled, it being the idea to have a pay-roll of 1,500 men by the first of the year.

rew Machines for Turning
er Small Parts



Dipping Room, Where the Float Bowls and Other Castings are Finished by Dipping After They Pass From the Sand Blast Department

General View of Assembling Room, Showing the Systematic Lay-Out in Order to Secure Rapidity and Precision

Types of Carbureters Being Turned Out

The regular output of the plant is divided into five types of carbureters, known as models H, D, E, L and F, all of which are shown herewith. Fig. 1 shows the testing rack with rows of float bowls with floats in place for the purpose of observing the buoyancy of the floats, and the tightness of the bowls and the fittings. The floats are made of the finest selection of Spanish cork, which, after being fastened into place, is given a suitable coating of the best grade of shellac, and in this test each carbureter is examined in order to note if the cork is of the right buoyancy and whether or not the coating of shellac is complete.

It has been found in practice that the best grades of cork are impervious to the gasoline, excepting to a very slight extent, and this tendency to absorb the liquid is entirely offset if a proper grade of shellac is used as a coating, provided it is applied in the most efficacious way.

Fig. 2 shows the final inspection system, with Model L and F carbureters being put through. In this test the inspectors are instructed to examine every part with the utmost care, make comparisons with suitable standards, and decide with great definiteness as to whether or not the carbureters are good enough to be boxed and shipped with the assurance that they will be satisfactory to the purchaser and capable of maintaining the established reputation of the maker. After the carbureters are given the final inspection, they are forwarded to the stock and shipping department, as shown in Fig. 3, where they are properly scheduled and either boxed for immediate shipment or stored on shelves for stock.

An Undertaking with Many Details Thrown In

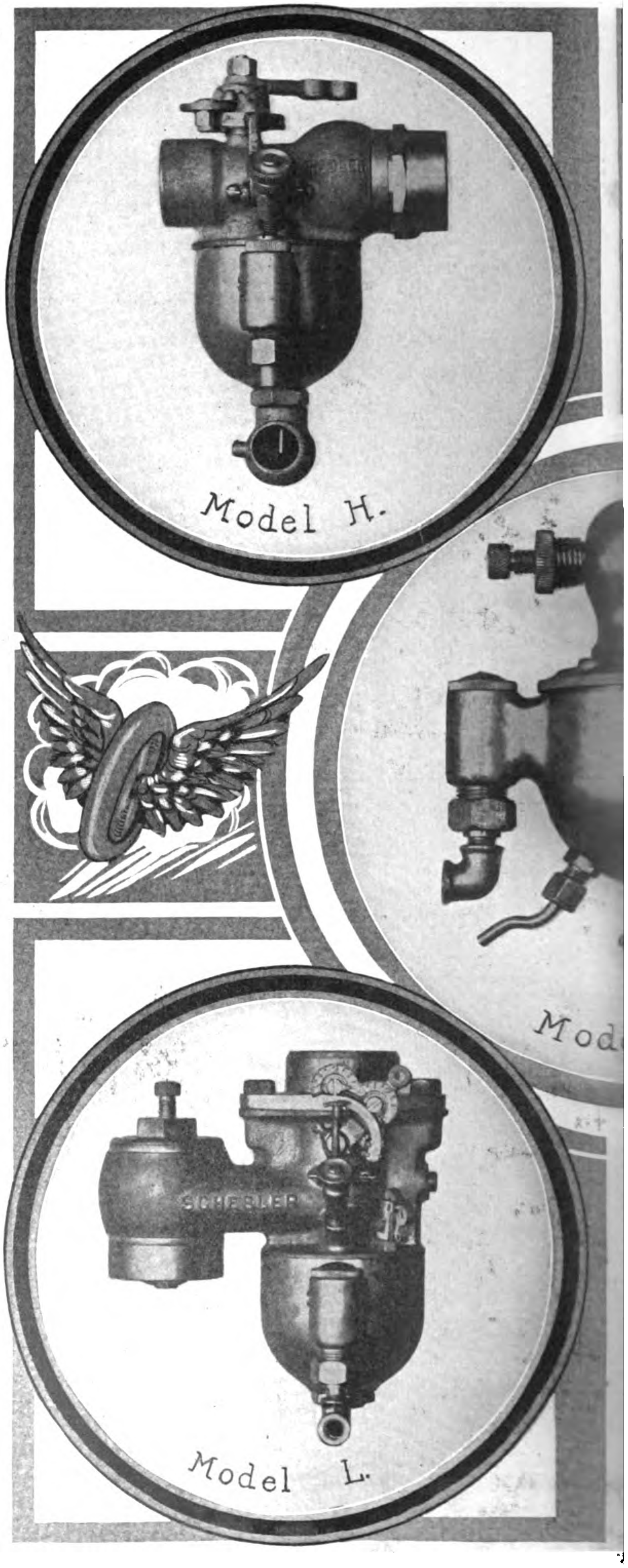
Thus far no attempt has been made to indicate the extent to which the manufacture of carbureters involves precise and almost innumerable details. Fig. 4 shows the screw machine department with two batteries of multiple spindle screw machines that are used and continuously operated in the production of screws and small parts as used in the carbureters. Two years ago the company purchased these small parts as screws. etc., and while it was found that the prices were low enough the fact remained that deliveries could not be depended upon, and the quality of the commercial product was far from uniform. Disregarding, for the time being, the question of the market, it was decided to install these screw machines, taking advantage of the better quality, and protecting the customers against a famine of material of this character. It was found in the long run that the better quality of product turned out effected a saving in other ways that fully compensated for the increased cost of raw material and the overhead charges involved in the installation of a screw machine department on this enormous scale.

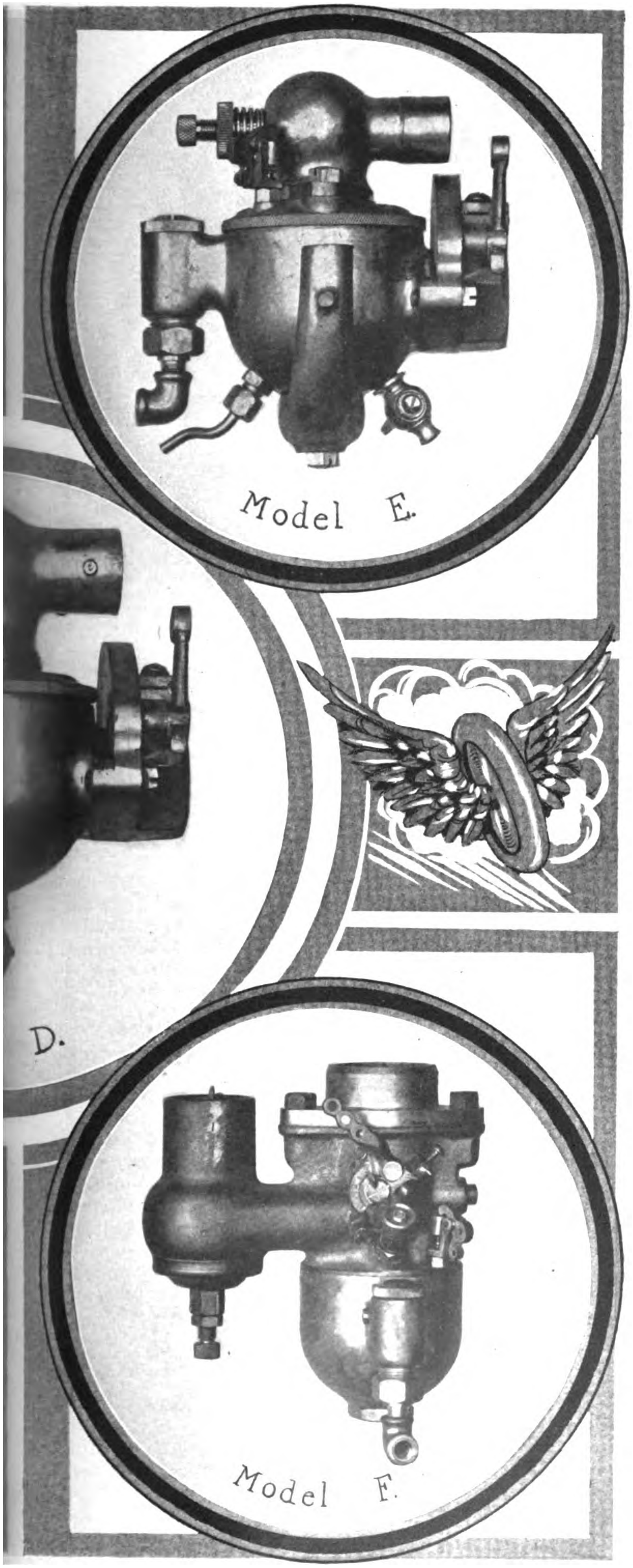
As an indication of the variety of work involved, reference may be had to Fig. 5, showing a part of the watch lathe equipment which is used in the finishing of the small parts, as needle valves, nozzles, etc. As an offset to the time required in doing the watchmaker's part of carbureter work, the dipping department, as shown in Fig. 6, is referred to, in which the heavier castings are dipped and otherwise made ready for machining at a rapid rate, in which a sand-blasting equipment plays an important part. Through the use of the sand-blast and a well-equipped dipping department, the bowls and remaining heavy parts are brought to a fine state of finish at small cost. To give an idea of the magnitude of the undertaking, reference may be had to Fig. 7, which is a general view of the assembling department, taking in about two-thirds of the space available in the assembling of carbureters. One of many tests of carbureters of this make is given below, in which the speed is advanced from the low point at 600 revolutions to a maximum of 2,000 revolutions per minute, resulting in a delivered horsepower of 14.1 at the low speed, ranging up to 32 horsepower at the highest speed.

SCHEBLER CARBURETER TEST

Needle No. 7. Very fine taper. Recommended as most suitable

Speed	Gross Load Lbs.	Tare Lbs.	Net Load Lbs.	D HP
600	50.5	27	23.5	14.10
700	51.25	27	24.25	17.00
800	51.125	27	24.125	19.20
900	50.75	27	23.75	21.40
1000	52.00	27	25.00	25.00
1100	51.00	27	24.00	26.40
1200	50.00	27	23.00	27.60
1300	50.00	27	23.00	29.90
1400	49.75	27	22.75	31.80
1500	49.00	27	22	33.00
1600	48.00	27	21	33.70
1700	47.25	27	20.25	34.40
1800	46	27	19	34.20
1900	44	27	17	32.30
2000	43	27	16	32.00





News of the Makers

Interesting Short Items Concerning the Doings of the Manufacturers

Roader Company Discontinues Its "20."—The Roader Car Company, of Brockton, Mass., has announced that it will confine its attention to making the Roader "30" instead of continuing to manufacture the 20-horsepower car that has been put on the market. The company states that the bulk of the demand seemed to be for the larger car and that in deference to it the decision was reached to discontinue the Roader "20."

Abbott-Detroit Car on 50,000-Mile Trip.—With the intention of covering 50,000 miles, mostly in the out-of-the-way places of the American continent, the Abbott Motor Company started one of its 1910 models away from Detroit November 13. The itinerary of the trip will include a long leg to Portland, Me.; thence through New England and New Jersey to Washington and Virginia; to Pittsburgh, Cincinnati and southward to Jacksonville, Fla. The northerly trip will be up the Atlantic Coast to New York. Doubling back to Detroit the car will take a course southward again to New Orleans, and thence through Texas and Old Mexico to Southern California, making a swing up to Seattle and then across the continent to Detroit.

First "Virginian" Car Turned Out.—The Richmond Iron Works Corporation, of Richmond, Va., an organization founded from a number of smaller iron works concerns many years ago, has now placed on the market the first automobile which was ever manufactured in Richmond. The corporation will operate an automobile department along with its other lines, and the machine manufactured will be known as the "Virginian."

The officers of the corporation are: M. A. Finn, president; H. H. McCurdy, vice-president; M. J. Francis, treasurer; W. P. Dessaussure, secretary; R. Massie Nolting, assistant secretary and treasurer; W. H. Woody, general manager; H. G. Wagner, automobile sales manager.

American Company Buys Indiana Plant.—Plans have been made to establish a large automobile factory near New Albany, Ind., by the American Automobile Company, which makes the Jonz gasoline pleasure car. At present the concern has plants in Kansas City and St. Louis. The machinery from both of these factories will be shipped to New Albany and the entire manufacturing business done there.

The plant of the New Albany Woolen Mills, now known as the Kentucky and Indiana Power Co., has been purchased by the American Automobile Co. for $30,000. The plant is situated within close proximity to New Albany proper and on the line of the Monon railroad. It includes about six acres of ground, the greater part of which is under roof. Work of remodeling the buildings will begin about November 20.

Berton B. Bales, president of the company, said yesterday that about $350,000 will be invested in the new factory. The machines will be turned out across the river, while the business of the concern will be transacted through the main offices of the concern in Louisville. The plant will employ about 700 people in the various departments.

Moline Auto Company Spreading Out.—The Moline Automobile Company has issued an order calling for overtime daily in the assembly department, the paint shop and the setting-up room. The overtime will extend until 8 p. m. daily. This company likewise is building an additional four-story warehouse. iThe dimensions are 60 by 130 feet and the contract price $45,000. The basement of the building will be of concrete and the remainder of brick. A sprinkling system and automatic fire equipment will be installed. The contract, which has been awarded to Henry W. Horst, of Moline, calls for completion in three months.

The company is likewise building a concrete testing track which is rapidly nearing completion and will be in use in a short time. It is located east of the plant.

Prominent Automobile Accessories

TURNING GEAR FOR HEADLIGHTS

The automatic gear for headlights shown in Fig. 1 consists of an adjustable lamp-fork mounted on a swivel post and bracket which is bolted to the frame of the car. The bracket is connected by means of ball jointed connecting rods to the upper end of a vertical shaft that rises from the front axle near the spring, the vertical shaft being held in position by means of a clamp which fits over the axle.

Fig. 1—Projects headlight's rays around turns

At its lower end the vertical shaft carries an arm or crank which is connected by means of a connecting rod to a similar arm or crank having an eye which is attached to the steering knuckle by removing the knuckle nut and putting the base of the crank under the nut; or if the knuckle has no nut, an arm is furnished to screw into a hole to be drilled and tapped in front center of knuckle.

The gear is attached to only one of the lamps and as the car is guided and the wheels turn, the lamp turns automatically and projects its light along the road and around turns in advance of the car, keeping the road ahead lighted at all times.

This gear is manufactured by the Scranton Automobile Equipment Co., 1438 South Penn Square, Philadelphia, Pa., and is sold complete ready for attaching to any make of car.

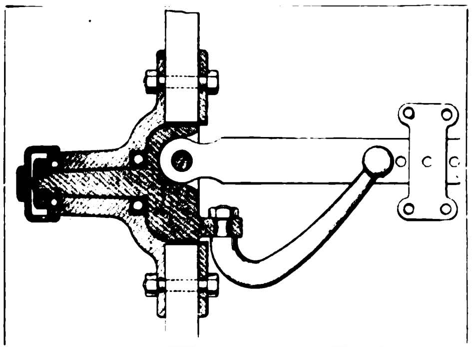


Fig. 2—Front axle designed on the caster principle

CASTER FORM OF FRONT AXLE

The caster form of front axle is made by setting the spindle 1 inch back of the center of the connecting pin on the end of the axle in the hub (Fig. 2). This gives a perfect caster for front wheels and it is claimed they will run straight ahead even if each wheel is disconnected from the other, also from the steering post.

In case the steering connections break and one or both wheels become disconnected from the steering post the car will not leave the road, perhaps to run into a fence or ditch, but will go straight ahead, giving the driver ample time to stop the car. The spindle is so connected with the end of the axle in the hub that it will bend or break the axle before it is possible to break the spindle. This axle is manufactured by the Queen Mfg. Co., Webster City, Iowa.

POWERFUL EMERGENCY JACK

Soft ground and mud are treacherous places to venture with an automobile owing to the likelihood of sticking in the mud. It would be well, especially during the winter, when country roads are likely to be bad, to equip the car with some means of easily lifting it out should it become stuck. The jack manufactured by E. I. Spencer, of Wichita, Kansas, can be fitted to the outside of the hub as shown in Fig. 3 and the car lifted without having to crawl under it and find some suitable place to put a jack, and go hunting for wood to keep the car up out of the hole it has fallen into. The feet can be raised as well as the top, there being an inside worm for this purpose.

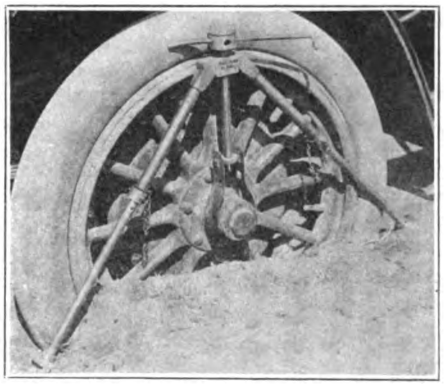


Fig. 3—A handy and powerful jack for mud runs

TO FRUSTRATE THE MEDDLERS

Cars that are fitted with switches that can be locked in the "off" position are less likely to be tampered with than those not so equipped. The New York Coil Co., 338 Pearl St., N. Y., has perfected such a switch. Yale locks are used, and the switch must be turned in the off position before the key can be removed.

THERMOID TIRE REINFORCEMENT

Attention has been turned of late to the better protection of tires by the advent of what are termed reinforcements.

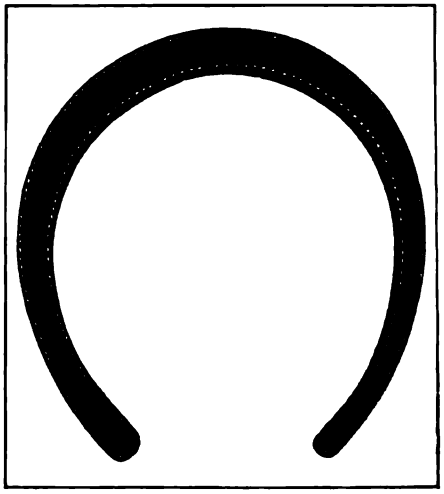


Fig. 4—Section of the Thermoid tire reinforcement

The insert illustrated in Fig. 4 is a product of the Thermoid Rubber Company, of Trenton, N. J., and is easily adaptable for a new tire or to act as a protection for a used cover to prevent blowouts.

The reinforcement is inserted between the casing and the inner tube and consists of duck in one single piece filled with solution or compound by a secret process. It is claimed that these inserts do not minimize the resiliency of the tire and that they distribute the strain and pressure over a greater area, and as a result weak spots are not called upon to bear the full burden.

WESTEN SHOCK ABSORBERS

It is not only necessary to eliminate the sudden rebound that proves so detrimental to automobile springs, often breaking them, but also the damaging vibration.

In the construction of the Westen shock absorber (Fig. 5) there are inserted two separate friction planes—one to lessen or moderate frictional resistance that controls the vibration caused by the lesser inequalities of the roadbed and the oscillation caused by the engine, and the second or greater frictional plane that controls the excessive vibration or rebound.

These shock absorbers are manufactured by the Westen Mfg. Co., 294 Halsey street, Newark, N. J., and the prices include all attaching parts.

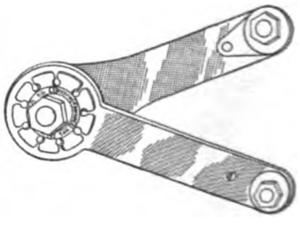


Fig. 5—The Westen shock absorber

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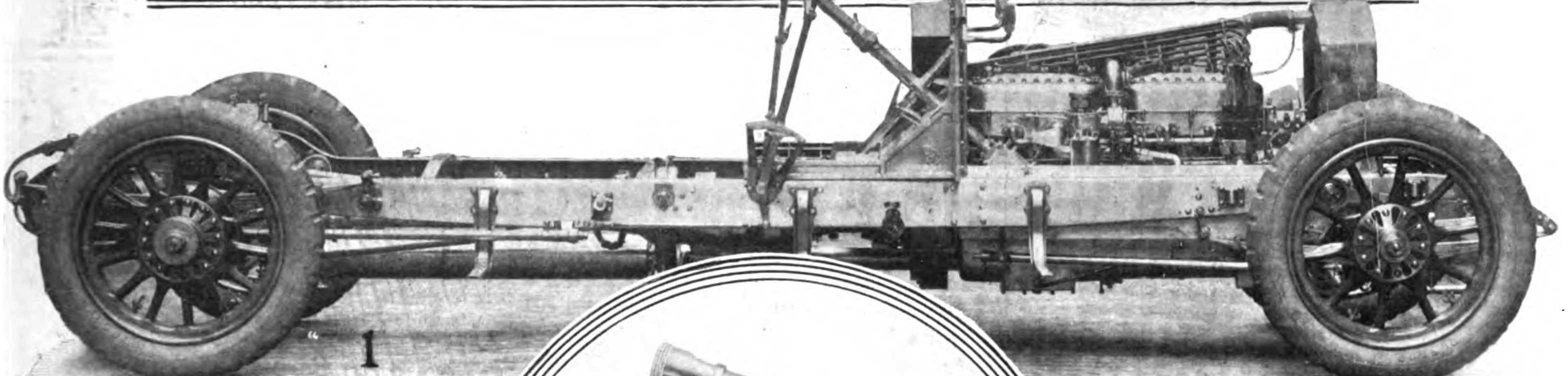
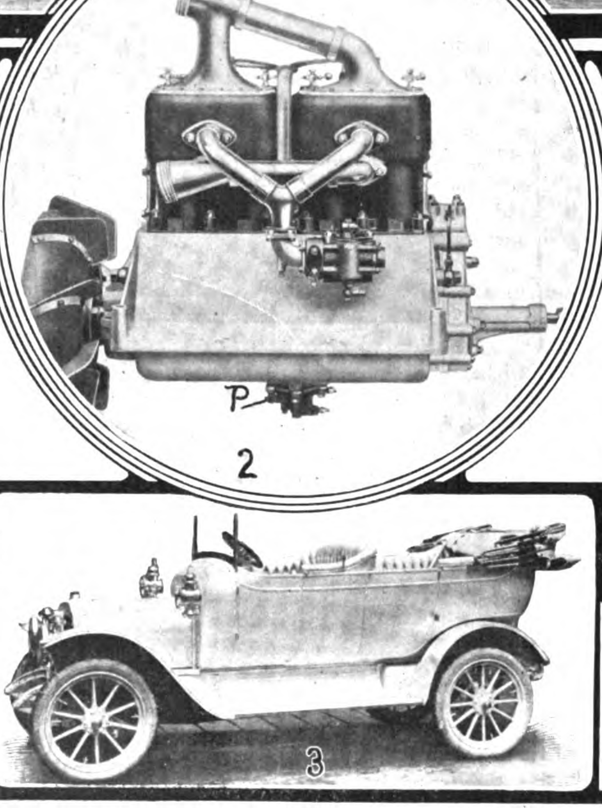
THE AUTOMOBILE

LATEST FOREIGN PRACTICE





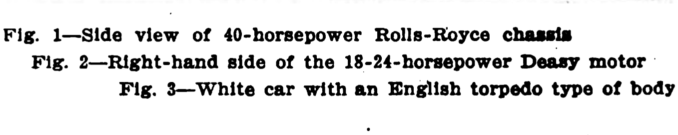


Fig. 1—Side view of 40-horsepower Rolls-Royce chassis
Fig. 2—Right-hand side of the 18-24-horsepower Deasy motor
Fig. 3—White car with an English torpedo type of body

REVIEWING the exhibits at the Olympia Show, which is now being held in London, would offer few advantages as compared with the picking out of the more important new features, discussing such details as will be of interest to automobile engineers in America. While it is interesting to know that the small-car craze is spreading over Great Britain, it having completed its first cycle on the Continent, this information is lacking in detail, just as the statement that the long-stroke idea is persisting fails to impress anyone on a practical basis. Just so long as the reference to the long stroke is confined to the single-cylinder types of motors, with a bore of something like 3.9 inches and a stroke of approximately 9.6 inches, it is easy enough to understand what long stroke means. It is a far cry from this truly long-stroke plan to the claim that a motor is of the long-stroke variety if, perchance, the stroke happens to be an inch more or less than the bore. Standing on a technicality is what it all amounts to, and to some extent the reports that emanate from the Olympia Show seem to indicate that for advertising purposes technicalities are taken advantage of. In order to be able to discriminate between the material facts from the point of which was recently held in automobile making and the immaterial technical claims, THE AUTOMOBILE has taken the pains to have a technical man of skill go over the exhibits, have them photographed, and it will be the purpose here to show by photographic reproduction the things that might be worth perpetuating by automobile engineers in America. But the mere fact that a thing is good does not necessarily mean that it should be adopted in place of some other device that is serving its purpose efficaciously; it is fortunate that most problems may be solved in two or more ways and there is more than a possibility that a solution which is highly efficient from the point of view of English practice would prove to be a poor plan in America if for no other reason because the roads are not so good.

In order to appreciate the general plan of the British automobile builder of skill and discrimination it will be necessary to examine Fig. 1 of the new 40-horsepower Rolls-Royce chassis, which was one of the most admired examples of chassis work in a long list of 1911 automobiles. Since it is not the purpose

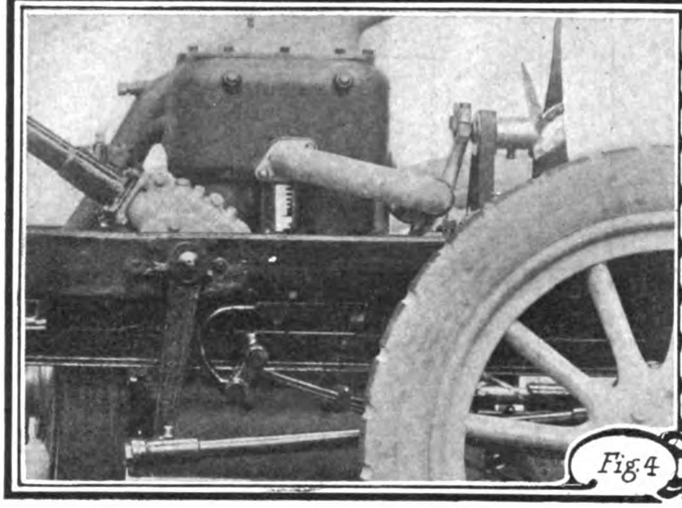


Fig. 4

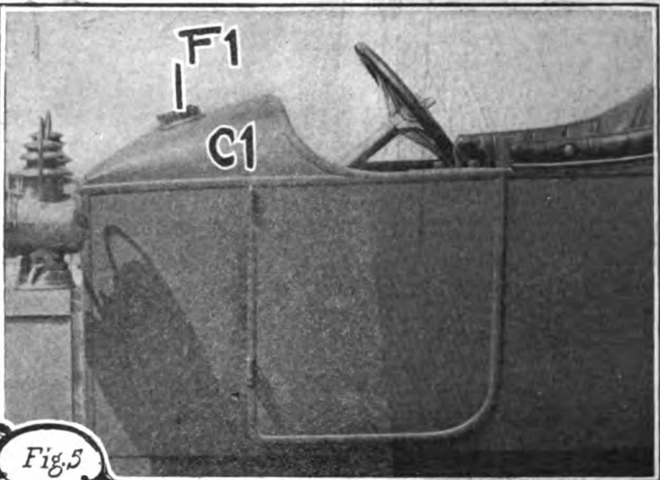


Fig. 5

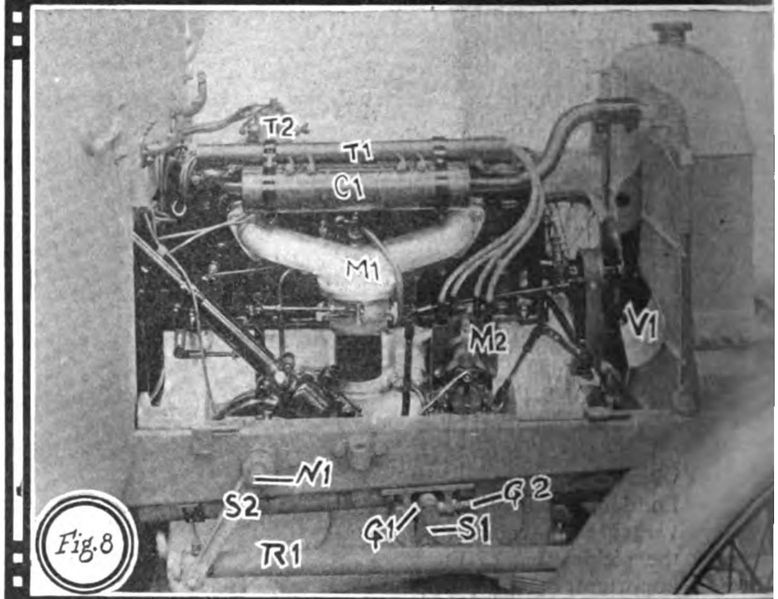


Fig. 8

here to delve into the details of the cars from a buyer's point of view, the reader is requested to pass on to Fig. 2 of an 18-24-horsepower, four-cylinder Deasy motor, in which the bore is 90 and the stroke 130 millimeters. The fan veins are on the exterior of a bowl-shaped flywheel and the water piping for the thermo-syphon system of cooling is trumpet-shaped at the fastening extremity. Attention is also called to the large area of the water piping and the high riser from the top of the cylinder to the main branch. Beyond this point it is worthy of note that the general designing is symmetrical and the motor is supported by webbed flanging with fastenings on the chassis frame, thus eliminating the need of an underpan, and in this particular example, the oil pump P is on the underside in a get-at-able position, with the chance perhaps that "drift" from the road surface might damage the pump or put the piping awry.

Fig. 3 is an example of the White car and is offered here as an indication of the "American invasion" which is now assuming substantial proportions. This car also shows an excellent example of British body-building, with evidences of style and of display of that smooth exterior which seems to be the thing abroad.

Mutterings of dissatisfaction at the performance of the various sleeve types of motors that are being developed in Europe are now so loud and persistent that they invade the editorial office of The Automobile with sufficient force to be noticed and the main cry is that all the attempts to supplant the "silent Knight" type of motor have thus far proven to be substantially futile. It is perhaps too much to expect that foreign designers are aware of the long series of efforts that were made in America as far back as twenty years ago to bring out sleeve and sliding types of valves that would compare favorably with poppet valves. As a matter of fact, the Raymond engine, with a rotary valve in the head of each cylinder, was the only one of the lot that survived long enough to assume commercial proportions, and it cost in the neighborhood of $400,000 for the makers of the Raymond engine to find out that poppet valves were better. It was on account of these trials and failures that Chas. Y. Knight, of "silent Knight" fame, had to go to England to "float" this type of engine, but, strange to relate, the American public tired of the idea just one motor too soon. Had it been a little more patient, accepting the Knight motor, there would have been ample compensation for the many failures experienced and the Knight motor would have been serving on American automobiles to-day instead of on the British Daimler, an example of which

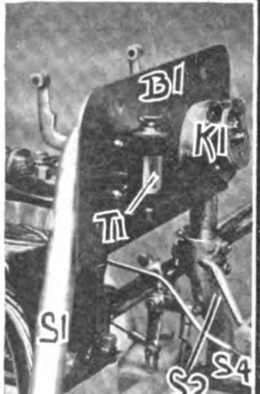


Fig. 10

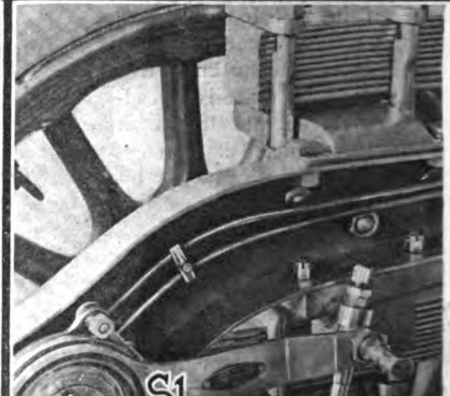


Fig. 11

Fig. 4—10-12-horsepower, two-cylinder Swift motor

Fig. 5—Location of the gasoline tank of the 15-horsepower torpedo type of Argyl

Fig. 8—Details of the 38-horsepower Knight motor in a Daimler chassis

Fig. 10—Dashboard construction of the 15-horsepower Daimler chassis

Fig. 11—Rear construction of the 40-horsepower Rolls-Royce chassis

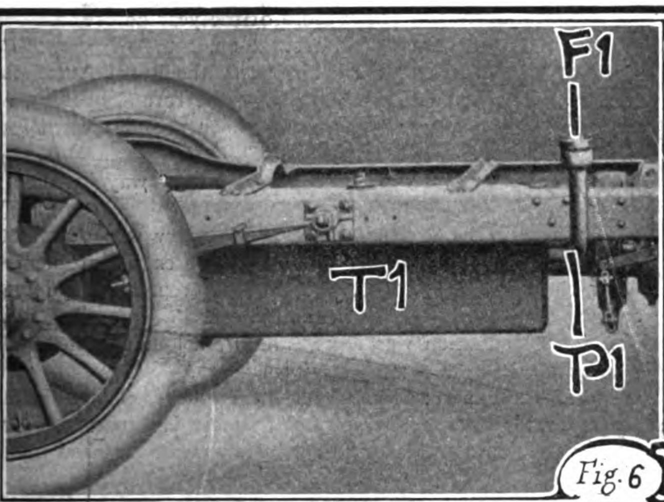


Fig. 6

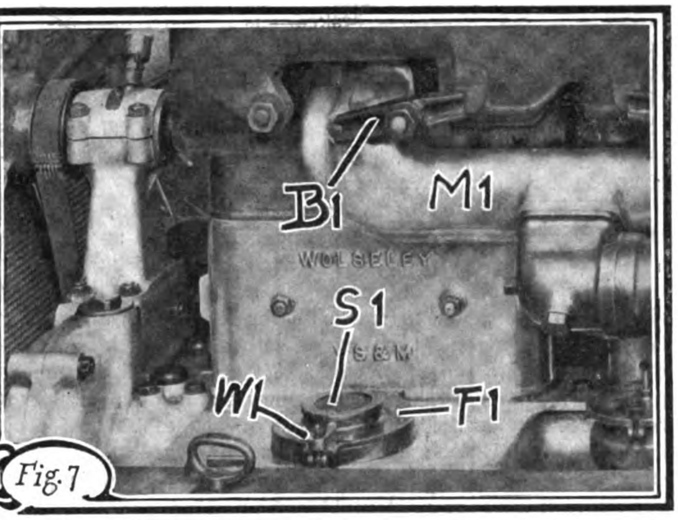


Fig. 7

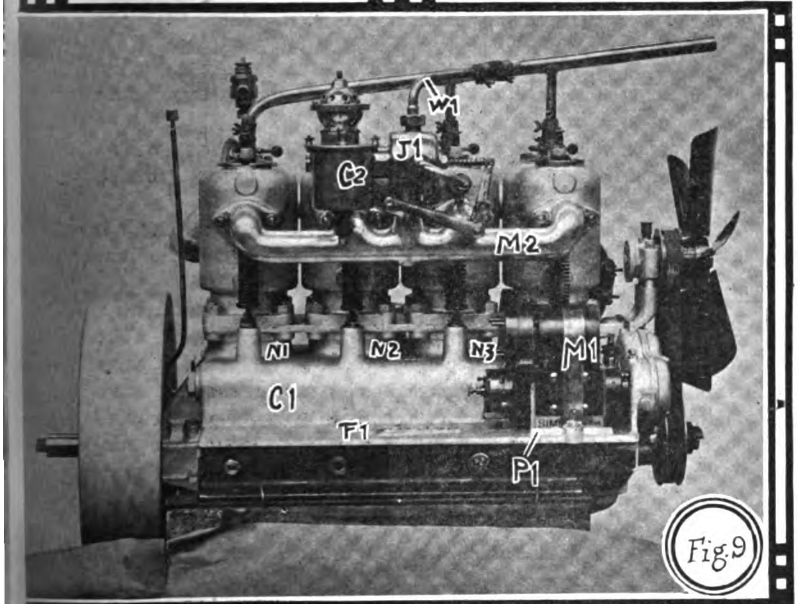


Fig. 9

is shown in Fig. 8, of a 38-horsepower sleeve type of Knight motor. The motor nests in the automobile without looking different from poppet valve types of motors, but attention is here called to a few ramifications, notable among which is the cylindrical spark coil C1, lying along the carbureter manifold M1, with the carbureter below, and the magneto M2 to the fore, with its high-tension leads curling up into a distributing tube T1 on the top of the motor, and for auxiliary ignition purposes the timer T2 shows above the top line of the motor in front of the dash. From the purely mechanical point of view attention is called to the curved veins V1 on the air propeller back of the radiator. The rear shackle S1 of the half-elliptic front spring slides in a cylindrical guide G1 and a grease cup G2 is provided for purposes of lubrication. The English idea of stability of the steering equipment will be appreciated by observing the size of the drag-rod R1, and the steering arm S2 is keyed to the steering gear spindle with a lock nut N1, the spindle coming through the chassis frame in the neutral section, which is half-way between the top and bottom flanges. In other respects, it cannot be claimed that this construction is a great advance. The radiator is extremely heavy and the auxiliaries to the motor seem to be slovenly installed.

In small motor work, to show the trend, attention is called to Fig. 4 of the 10-12-horsepower, two-cylinder Swift design, which is placed in a light construction chassis with relatively large diameter wheels and liberal sizes of pneumatic tires, thus indicating that in English practice the aim is:

(a) Economy of fuel.
(b) Limiting maintenance cost of tires.
(c) Moderate speed.
(d) Good roads.

Referring to Fig. 12 of the 18-24 Deasy chassis, there are a few details that may be worth noting, as, for illustration, the live rear axle A1 is split in the vertical plane and many bolts are used in the clamping together of the two halves. The propeller shaft S1 is of small diameter and relatively long. It is provided with a worm meshing with a worm wheel on the differential within the enlargement of the live rear axle, and the end bearing B1 of the propeller shaft shows clearly at the back. The service brakes with two shoes S2 and S3 are in front of the universal joint U1 at the point of securing of the forward extremity of the propeller shaft S1. Perhaps the equalizers E1 and E2 on the distance rods will attract some attention. These equalizers are spring actuated, comprising a cylinder and a

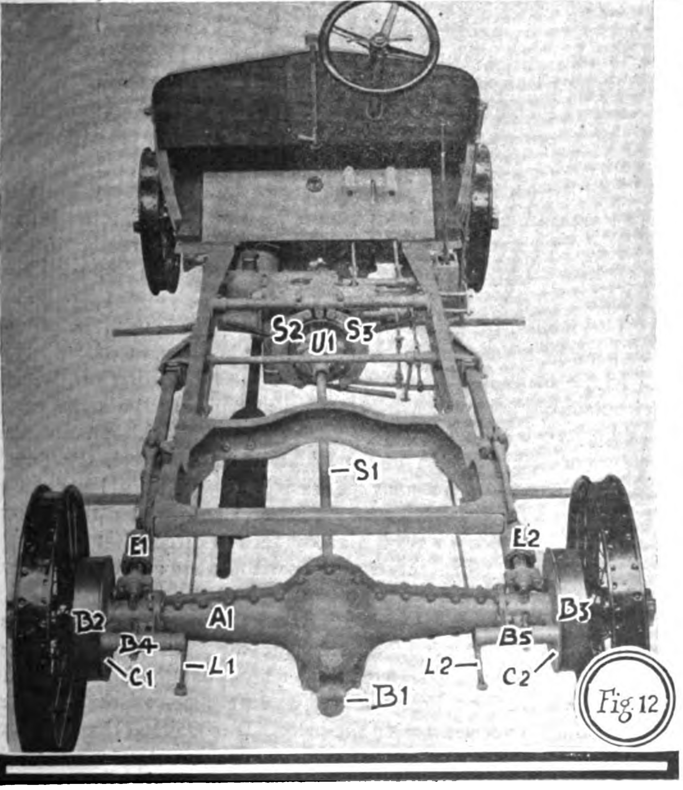


Fig 12

Fig. 6—Location of the gasoline tank on the 24-30-horsepower, six-cylinder Wolseley

Fig. 7—Provision for the storage of lubricating oil in the 50-horsepower, six-cylinder Wolseley

Fig. 9—Scheme of design of the individual-cylinder, 15-horsepower Austin motor

Fig. 12—Looking at the rear of the 18-24 Deasy chassis

piston with limit stops. The brakedrums B2 and B3 are of good diameter and the covers C1 and C2 are tight, thus excluding foreign matter. The actuating levers L1 and L2 are keyed and pinned to camshafts with large bearings B4 and B5, making the construction substantial, but perhaps a little heavy. The remaining details of this chassis, looking at it from the rear, are sufficiently brought out to require no further comment.

Referring to Fig. 11 of the rear of the Rolls-Royce chassis, attention is called to the shock absorbers S1 placed at the inside of the frame at the point of curvature of the kickup, also to the brake adjustment B1, comprising a flanged portion on the shaft S2 and a flange to match on the lever L1, with holding bolts B2 engaging the two flanges with an interlocking means in the form of a seriate of edge-like teeth. The limit stop S3 prevents the lever L1 from oscillating, something of this sort being necessary on account of the use of wire cables C1 for the pull member. There are other indications of substantial construction and the three-quarter elliptic springs of wide plates and eleven laminæ are substantially anchored to the chassis frame.

Another idea which crossed the "Western Ocean" and took lodgment in the crop of a British designer is shown in Fig. 9 of the Austin motor of the four-cylinder type, individual style. The cylinders are shortened and necks N1, N2, N3 and N4 extend up from the aluminum crankcase to make up for the difference in distance. The Simms magneto M1 rests on a pad P1 of the flange F1, extending out from the upper half of the crankcase C1, the magneto being held in place by a steel strap with a foot and a holding bolt. There is one other point in relation to this motor that did not come from America; it is represented in the carbureter C2, located above the intake manifold M2, with a hot water connection W1 to the carbureter jacket J1.

It is just possible that the location of the gasoline tank in the 15-horsepower Argyl, Fig. 5, will be of interest to some American designers. The filler F1 is in the overhanging cowl C1 and the tank occupies the space beneath the overhang and between the dash line and the post of the foredoor. It extends down far enough to afford the requisite gasoline capacity without interfering with the foot room of the occupants of the front seat. Another idea in gasoline tank locations is shown in the Wolseley 24-30-horsepower, six-cylinder model, as presented in Fig. 6, showing the gasoline tank T1 in the fore and aft position on the right-hand side of the chassis in front of the rear axle with the filler F1 outside of the chassis frame and a curved filler pipe P1 passing around the frame and inboard to the front end of the gasoline tank.

The disposition of the lubricating oil supply is evidently regarded as extremely important in 1911 British automobiles and a good example of the most exacting type of practice is shown in Fig. 7 in connection with the 50-horsepower Wolseley, in which the filler F1 for the lubricating oil is in an extension of the crankcase on the left-hand side of the motor just back of the radiator. This filler has a large diameter cap with a wing nut W1 for quick release and a screen S1 placed to keep dirt out and making it possible to use this cap as a "breather." The method of holding the intake manifold M1 comprising a bridge coupling B1 is quite common practice in many of the cars.

As a slight advance over common practice the dash mounting of the Daimler chassis as shown in Fig. 10 is mentioned, presenting stanchions S1 and S2 in sockets S3 and S4, to which the dashboard B1 is secured, the dimensions of the latter being barely sufficient for the kick switch K1 and the telltale T1. When the body is taken away the skeleton-like dash opens the way to the motor at the rear end for inspection and other purposes. When the body is in place this form of dash presents the customary good appearance.

What the Experts Say About the Olympia Show

The genuine buyer was protected by having to pay extra admission; the charge was five shillings on November 8, which was the day set apart for the elimination of the goats by this simple expedient.

Individual orders fell below those of the year before, although it is predicted that the end will average up.

Owing to the death of the chairman of the Royal Automobile Club, H. R. H. Prince Francis of Teck, the formal opening was dispensed with, and the annual press dinner was postponed for a year.

It seems quite certain that the show in every way justified its existence.

Mechanically, the lesson learned at the show was that motor manufacturers have been struggling with the engine problem.

It is claimed for the 1911 product that it represents quietness, economy in gasoline, general flexibility, etc.

The steam situation was represented by a lone car, the White—American.

Quoting the expert: "Every maker, of course, claims absolute silence for his own particular make; silence is, however, only a comparative term, and we have not by any means reached finality in this direction."

The Daimler Company, with seven distinct models, including three 6-cylinder types, with worm drive back axles, with two exceptions, is the center of attraction.

The highest worm drive equipment is represented by a 6-cylinder Daimler, the motor having a bore of 101 millimeters, and a stroke of 130 millimeters.

The smallest Knight engine is rated at 12 horsepower with a 69 millimeter bore, and a stroke of 114 millimeters, 4-cylinder. This motor is cast *en bloc*.

The leather-faced cone clutch is holding its own, although it has always had the preference in Daimler practice. The new Daimler cars dispense with the accelerator pedal.

The smallest Wolseley car is rated at 12-16 horsepower, with a bore of 3 1-8 and a stroke of 4 1-2 inches, 4 cylinders. The Wolseley Tool & Motor Company is owned by Messrs. Vickers Sons & Maxim, so that it is regarded as a power in shaping trend.

The Wolseley Company works 4,000 men, and its plant covers 24 acres. The Wolseley former practice included a transmission with direct drive on the third speed. The new product gives direct drive on the fourth speed.

In the 50-horsepower Wolseley the transmission gear box is fitted with an oil pump which forces the lubricating oil through pipes so that it impinges on the teeth of the meshing gears—this is a step to noiselessness.

In the Rolls-Royce exhibit the 40-50 horsepower, 6-cylinder chassis is a highly polished example of attractive automobile building. The expert says: "The chassis is practically the same as that of last year with a few detailed improvements."

The dashboard on a Rolls-Royce is clean. The control for the magneto and carbureter was removed to the top of the steering post.

The British idea of nomenclature is undergoing crystallization. The expert states: "One of the difficulties of the motor business at the present time lies in the fact that there is really no actual definition as to how much or how little should be included in the chassis."

The Rolls-Royce chassis, according to the expert, is provided with every possible adjustment that can be thought of.

In the Rolls-Royce car pressure of the lubricating oil, which is circulated by a pump, can be varied at will. In the same car the carbureter is of the multiple-jet type, fitted with an automatic valve, and, in addition to the usual throttle control, the flow of gasoline from the jet may be varied at will by a lever on the steering gear. A centrifugal governor also actuates the throttle.

In the Rolls-Royce chassis an oil feed is directed at the leather of the clutch; when the clutch is withdrawn a minute quantity of oil is permitted to pass onto the leather. The 14-16 Delsize chassis, with the same dimensions as the small Wolseley, has a selling price of 255 pounds sterling; the Wolseley price is 400 pounds sterling; this statement indicates that there are high and low-priced automobiles, without a difference, as the purchaser sees things, excepting as to the price. It is claimed that the lower price is due to the fact that the maker concentrates on one model.

Hickory

EXTRACTS FROM A BULLETIN, ISSUED BY THE FOREST SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE; CONCERNING ITS USE IN AUTOMOBILE WORK, WASTE, AND RENEWAL; TESTS AND COMPARISONS

OF American hardwoods entering into the construction of automobiles none would be more difficult to replace than hickory in case of a shortage in supply. Hickory is not remarkable for beauty of color or of grain, it shrinks badly in drying, it is not durable in contact with the ground, and it is very liable to attack by insects; on the other hand it is heavy, hard, strong, stiff, and very tough. No other commercial wood, native or foreign, combines these properties to so great a degree.

The Forest Service has co-operated with the National Hickory Association, an organization of the users of hickory who have foreseen a coming shortage in the supply, and who have united to help prevent it, to study the different species, and to suggest means to produce and maintain the necessary supply.

The census returns for 1908 show a cut of about 200,000,000 board feet. This is intended to include, however, only the material actually cut and sold as lumber, while much of the hickory cut is not lumber. In 1908 an additional cut, equivalent to about 135,000,000 board feet, was worked up directly into other products, such as spoke billets, handle blanks, and rim strips, difficult to reckon in board feet. This gives a total consumption, excluding fuel, of about 335,000,000 board feet, allowing for all necessary waste. If, however, the unnecessary waste, both in the woods and at the mill, were included, the total amount of hickory consumed would probably be not less than 450,000,000 feet.

The vehicle industry in America uses more hickory than any other, is most dependent upon it, and takes about 65 per cent. of the total cut, of which more than one-half is used for spokes. About 1 per cent. of the annual cut of hickory is used in the manufacture of automobile spokes and wheel rims.

To give a relative idea of the real meaning of this statement, the American automobile industry last year used approximately 800,000 wheels, containing about 9,000,000 spokes, not to mention an enormous additional amount of material necessary for the construction of the felloes.

Manufacturers of heavy wagons consume about 9 per cent.; the tool-handle industry about 10 per cent.; the agricultural-implement business about 8 per cent. and oil wells about 2 per cent. of the annual hickory output, together about 95 per cent. of the total cut. The other 5 per cent. is used for many special products.

It is probable that the greater part of all the hickory cut is used for fuel, and this portion may amount to 1,000,000 cords.

A great deal of American hickory is used in the vehicle industry abroad. It is exported chiefly in the form of bent rims, spokes, and shafts, but a great many finished wheels and logs are also sent. About 5 or 10 per cent. of the annual output is used in this way. In addition, large quanities of hickory, both in finished and unfinished form, are sent to Canada. About 40 per cent. of the total output for tool handles is shipped abroad, mainly to Germany, to South Africa, and to Australia.

The original supply of hickory is now approaching exhaustion. East of the Alleghenies and north of the Potomac it has disappeared almost entirely. West of the Alleghenies and north of the Ohio only a few scattered remnants are left, and the bulk of the supply lies south of the Ohio River. Most of the northern manufacturers get their supplies from the South; all of the larger operations are there and competition is very keen.

The cost for logging and lumbering hickory is greater than that for any other common native hardwood. It takes much time and trouble to locate and buy it because it can rarely be secured in large lots; because of the widely scattered supply the mill must be moved a great many times or the logs brought long distances; the wood is hard to cut and heavy to haul, and there is a great amount of waste at the mill—40 per cent. or more of the timber that reaches the mill. In addition, rough stock must always be shipped green, and that makes high freight bills. Altogether, it often costs twice as much to get hickory to the factory as it does oak.

Spoke billets are commonly rived. Rived billets are preferred by the spoke makers and bring the best prices, but riving is wasteful. Skilled hands may get as many rived spokes out of a given bolt as could be obtained by sawing, but fewer cuts are taken from the tree and the material which will not make spokes is never utilized, except occasionally for firewood. There is an additional waste because heartwood and birdpecked wood, which would be used if it were at the mill, is generally left in the woods. Much waste is avoided when the tree is cut into round bolts of the proper length and these are hauled or shipped to the mill to be sawed. A cord of hickory will yield about 700 rived spoke billets, or 900 sawed ones, or from 250 to 300 handle blanks.

The amount of merchantable hickory wasted each year may be conservatively estimated at 40 per cent. of the total cut. It consists both of waste in the woods and waste at the mill.

The greater waste is in the woods and is due chiefly to unnecessary restrictions against heartwood and birdpecked wood. Millions of feet of good hickory are cut each year and left in the woods because of the presence of a few birdpecks, or the large proportion of heartwood makes it unprofitable to market it. Such waste is especially great where spoke billets are rived out

A plantation of big shellbarks 27 years old. (The spacing was originally 4 by 4 feet, but the stand has been thinned)

A group of stump sprouts of pignut hickory

in the woods and only white billets are taken, because the red billets bring little more than half as much as the white. Another source of waste comes from the discrimination against the wood from the upper cuts of the tree in favor of that from the lower cuts. This is due not alone to the knottier character of the upper logs, but also to the prevalent opinion that the wood is considerably inferior to that from the lower cuts. The practice of cutting high stumps prevalent in the South is also very wasteful. It is claimed that the difficulty of sawing out with the grain makes it unprofitable to cut below the flare of the butt; therefore small trees are generally cut more than a foot above the ground and large trees more than 2 feet. Some firms, however, cut low stumps and consider that the greater width of the sap and the greater toughness of the wood in the butt are a sufficient offset to the difficulty of sawing. If the average stump height—at least 2 feet—were reduced only 8 inches, as would easily be possible, there would be saved as much as 10,000,000 board feet annually on the total cut.

A somewhat unavoidable waste arises from the taking out of special products, which leaves a lot of stuff in the woods which would make good handles or spokes, while the spoke or handle makers use up a great deal of material which should really be put into other products. Even where economy is attempted and spoke billets or handle blanks are cut in connection with poles, shafts, or rims, it is often difficult to dispose of the by-product, and it often happens that for lack of a market thousands of feet of hickory are destroyed by insects.

Much of the waste at the mill is due to the discrimination against the heartwood and birdpecked material. Another source is the practice of cutting spoke billets and rim and pole and shaft strips unnecessarily long. This is especially true of spoke billets, which are cut into a uniform length of 30 inches, whereas the spoke lengths range from 18 to 24 inches.

In addition to the waste of merchantable material, in lumbering much promising young growth is used for skids, is swamped out, and is broken by falling trees. This loss is hard to estimate, but it is very great, and will seriously affect the future supply.

To produce spoke and handle material, which takes more than half the annual cut of hickory, no method seems better than reproduction by sprouts. Sprouts grow faster than seedlings for the first fifty or sixty years, and produce heavier yields per acre; where sprout reproduction is at all successful it is less uncertain than seedling reproduction.

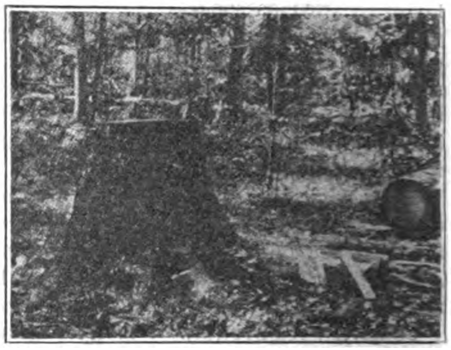
A simple clear-cutting for coppice growth, which can be used with oak and chestnut, will not, however, apply to hickories as they occur in mixed stands, because faster - growing species invariably outstrip and suppress the hickories so that they appear only on the edges or in the openings of such mixed stands. But there are many old fields and pastures, especially in the Ohio Valley, which are coming up to pure stands of hickory, and there the coppice method could be applied successfully. Since the sprouting capacity falls off very rapidly as the tree grows older, the cutting should begin as soon as the trees are large enough to use, which will be when they are from 8 to 9 inches in diameter and from 40 to 50 years old. The stand may then be cut clear.

Hickory sprouts coming up from the roots

Pure stands, however, are uncommon and it will often be advisable to plant hickory with the idea of ultimately managing it as a sprout forest. Because of the danger from squirrels and mice, Fall planting should not be attempted. The nuts should be kept over Winter between layers of sand and planted in the Spring, and since the long taproot makes transplanting impracticable, the nuts should be planted directly in the permanent site, and never in a nursery. The spacing should be about 5 by 5 feet, and two or perhaps three nuts should be placed in each spot about 2 inches under the surface, or it might be well to try a group mixture with a light-seeding species, such as white ash.

Care should be taken to plant only those species which are suited to the soil conditions. On exposed situations or on dry or sandy soils pignut is to be preferred, and even that demands a moderate amount of fertility to produce timber of good quality. On moist or wet soils big shellbark should be selected, and on fresh, fertile soils either shagbark or pignut. The latter furnishes the better grade of wood.

To secure the normally rapid growth essential to the production of strong wood, the stand should not be allowed to become overcrowded. Thinning should begin about the twenty-fifth year. The crooked or defective trees and those which are being crowded and have not room enough to grow should be removed. Eight or ten years later the thinning may be repeated. At the end of the next ten years, if the soil is fertile, it is barely possible that the stand may be ready to cut, but since seedling stands grow more slowly than sprout stands, it will usually be necessary to wait an additional ten years before cutting. In this case another ten-year thinning should be made, and by the fiftieth or sixtieth year the stand should be merchantable, and should then be cut and managed as a sprout forest.



Waste in hickory cut for spokes. (Showing the much too long stump and the workable material left in the woods)

Intelligent cutting can increase greatly the proportion of hickory in the forest and can improve the quality of the wood by hastening its growth. In such a forest the hickories finally should be cut when they have reached a diameter of about 12 inches. At this diameter, on moderately good soil, they will be increasing in volume at the rate of about 4 per cent. a year; at 14 inches the increase is about 3 per cent., and at 16 inches 2 1-2 per cent.

It will not be wise, however, to establish a hard and fast diameter limit, because the condition in which the stand is to be left must be taken into consideration. Smaller trees may be cut wherever there is promising young growth to take their places. If it is desired to increase still further the proportion of hickories in the stand, the trees should be left longer, and they must also be left longer where the other species are cut to a large diameter limit or where it is impossible to give the stand much attention.

Among the true hickories the common shagbark (*Hicoria ovata*), so called because of its peculiar bark, also known as "scalybark" and "shellbark," is the most widely known. The shagbark attains large size, and heights of from 130 to 140 feet, and diameters of from 20 to 30 inches are fairly common in the

Cumberland Mountains. In the river bottoms along the Mississippi the trees grow to larger diameters, but the maximum height growth is usually less. The southern shagbark (*Hicoria carolinæ septentrionalis*) is a recently distinguished species of little commercial importance.

Very similar in appearance to the common shagbark is the big shellbark, or king nut (*Hicoria laciniosa*). Lumbermen rarely differentiate between the two species, although they are quite distinct.

Of all the hickories none is more important than the pignut, and none offers more difficulties to the botanist. It is exceedingly variable and grows under widely differing conditions of soil and climate.

The mockernut (*Hicoria alba*) generally is smaller than either shagbark or pignut. The stem is less likely to be straight, and the branches are heavier.

In the forest the hickories are rarely predominant. Except through the interference of man, they do not grow in pure stands but always in mixture, somewhat group-wise, with other species, and especially with the oaks.

Salient points of the botanical distribution of hickory are the wide distribution of the true hickories, especially the pignut and the shagbark; and the centering of the distribution of nearly all the species in the lower Mississippi Valley, in western Tennessee, eastern Arkansas, and northwestern Mississippi.

Of all the species, shagbark and pignut are most widely and evenly distributed, and these two furnish the bulk of the hickory of commerce. Since most of the remaining virgin hickory is in the lower Mississippi valley, and since cutting is now especially heavy there, it is probable that most of the hickory on the market is shagbark.

The right way to raise hickory—A young stand of trees after the more mature growth has been cut

The commercial distribution of pignut corresponds closely to that of shagbark, except that it extends farther toward the coast in the Southeast.

Mockernut is characteristically a southern species. It is abundant in the lower Mississippi valley, but is commercially less important than shagbark.

Big shellbark has a narrow commercial distribution. It is most prominent in the region around the lower Ohio River, south along the Mississippi to central Arkansas, and northeast through the Wabash valley to northern Indiana and Ohio.

Dust Is a Meddler

Many New Automobiles Had to Be Refinished on Account of It

ONE of the makers of automobiles, during the dull season, had to store some 150 automobiles for several months. These cars were put in shape for shipping, and as the company thought, all that remained was to hunt up customers, which it proceeded to do. When things picked up again it was found that over half of all the finished cars were unacceptable to the agents on account of the state of the body finish; the storage room was dusty and the finish of the body work was soft when the cars were placed on storage.

The cost of the refinishing was not far from $50 per car, not counting the cost of the delay. The work of refinishing was done as follows:

(A) The bodies were removed from the automobiles and were placed in a light, well-ventilated room, protected from dust.

(B) The chassis were rolled into a separate light, well-ventilated room, protected from dust, and carefully gone over.

(C) The bodies were rested on "horses" and gone over to get rid of the free coat of dust.

Spoke bolts cut from pignut hickory. (This shows a close use of material; the stump is cut low and the tree utilized well into the leaf)

(D) With small bunches of waste saturated with turpentine the body surfaces were rubbed down to soften the outer skin of varnish.

(E) Strips of burlap were then used, rubbing vigorously, to remove the accumulation.

(F) By scraping, using a knife or a hook, accumulations that resisted the burlap rub-down were taken off.

(G) A second application of turpentine on waste was given to clean off all the remaining particles and any grease that might have been picked up.

(H) A burlap rub-down followed.

(I) In one or two bad cases, where the accumulations resisted removal, soft soap, with a dash of sal-soda was applied, using a coarse hair rubbing pad in the process.

(J) The next rub-down was with pumice stone flour to remove all the specks. This process also flattened down the surface.

(K) In all the cases that looked promising enough to "finish" with one coat of varnish, the old color was matched up, using enough rubbing varnish in the new match to cause it, when applied to the surface, to dry with enough gloss to counteract the light-absorbing properties of the color.

Judgment had to be used, especially in the bodies that showed "dead," and it was not possible to top off with one application of varnish.

Anti-Advertising

Which Does Not "Create a Favorable Impression on a Possible Customer"

IT would cost about $2 to remove it, and still it remains there for years, visible every day to thousands, or at least hundreds, of more or less impressionable observers. "It" is the large and conspicuous sign of a manufacturer's abandoned selling agency painted in gilt letters on a 30-foot expanse of a deserted building's dust-begrimed windows. It is an effective "anti-ad" against the automobile whose name it announces and couples undeservedly with relinquishment and decay. But it is only a type of many similar anti-ads which meet the eye in every large city. Perhaps a further consideration of the subject of anti-ads, in the form of unobliging clerks or poor stationery, could in many cases be added to the diversions of the advertising expert.

Reproduction of hickory in a field cut over four years ago and pastured severely by sheep, cattle and horses

Devoted to Electric Subjects

PROMINENT PART PLAYED BY ELECTRICITY IN AUTOMOBILE MANUFACTURING; CHART OF IGNITION BATTERY DISCHARGE; ELECTRIC AIR COMPRESSORS

ENORMOUS production in the gasoline automobile field has so attracted the attention of those who have the time to eye-measure the automobile art that they fail to penetrate to the bottom of the situation, and their dreams are of gasoline, and nothing else. Let us have a look at the real situation, and observe what an enormous part is played by electricity, using vast quantities of electrical equipment, in the form of dynamos, motors, and accessories for lighting and power purposes in the plants, and this is all beside the question of electric vehicles and the position they occupy in the art. It is variously estimated that upwards of 270,000 horsepower in electric motors is used in the propelling of machine tools utilized in the building of automobiles.

The power required for these electric motors demands the use of dynamo electric machines of a combined capacity of 67,000 kilowatts, or 90,000 horsepower. The steam engines of the various plants aggregate a delivery of 125,000 horsepower on an average basis as they are employed in the driving of the dynamo electric machines that furnish current for power purposes to the electric motors in the plant, and this takes no account whatever of the lighting requirement.

The blight that has been feeding upon the electric vehicle for years is being eliminated; quality, bereft of an entangling alliance, is forging ahead, and, as in every other art, a contract with Satan is not binding, nor is it advantageous. Just how Satan has kept electric vehicles out of the running is a matter that will not have to be discussed; there is no use of going back into the smoke after emerging, but the future prospect of the electric is too much of a good thing to be entirely ignored, and those who have ever expressed a preference for electric vehicles are now enjoying the situation.

Ignition Battery Discharge

Chart of the Discharge of an Ignition Battery

LEAD-LEAD storage batteries are much used as the source of electrical energy in ignition work, and while it is not possible to present a curve of discharge at a constant rate, for a long period of time, the curve as here offered was over a duration of 55 hours as plotted in the ordinates, and abscissa show voltage, there being three cells in the battery, so that the maximum voltage when the battery was fully charged was 6.6. The discharge was regulated by one 16-candlepower incandescent lamp in circuit, fixing the rate of discharge at about 55 watts. The discharge ran along at a constant rate for 25 hours, and then tapered off to 5.4 volts at the expiration of 45 hours, which represented the end of the safe discharge. The next 10 hours brought the battery down to 2.5 volts, which of course induced a condition of excess sulphation, tending to deteriorate the battery. From the automobilist's point of view, the danger of destroying the battery comes with his lack of knowledge of the state of the discharge or of a means, ready to hand, for determining when the battery should be recharged.

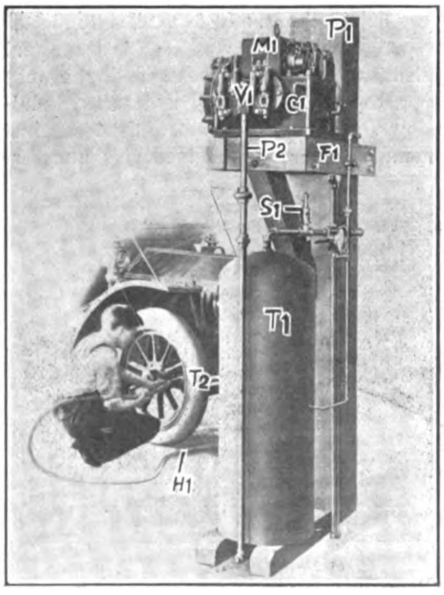
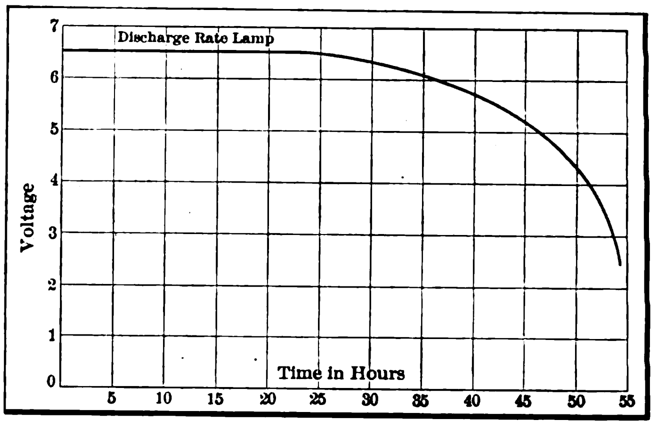


Fig. 1—Compressor unit on a shelf attached to a post with air tank on floor



Curve plotted to show the rate of falling off of the voltage in the course of time

Motor-Driven Air Compressors

Portable Electrically Driven Air Compressors

TIRE life depends absolutely upon the state of inflation, and the latter, in turn, is rarely ever up to the point where safety resides. A staff representative of THE AUTOMOBILE made it his business to examine a considerable number of tires just as they were required to serve, taking the pressures on the street and as the cars were rolled out of garages, invariably obtaining from the chauffeurs their version of the actual pressure obtaining in each case. As an example, one car with 36 x 5 1-2-inch tires registered a pressure of 70 pounds, and the chauffeur said that the pressure was 110 pounds. He was so positive about it that he questioned the accuracy of the 70-pound pressure measurement,

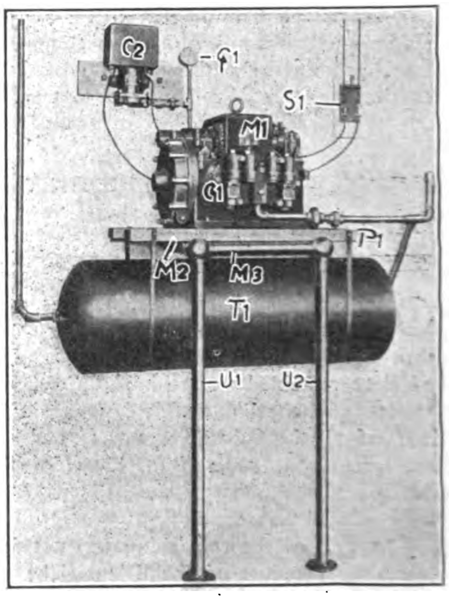


Fig. 2—Compressor unit on a tubular structure with the air tank swung beneath

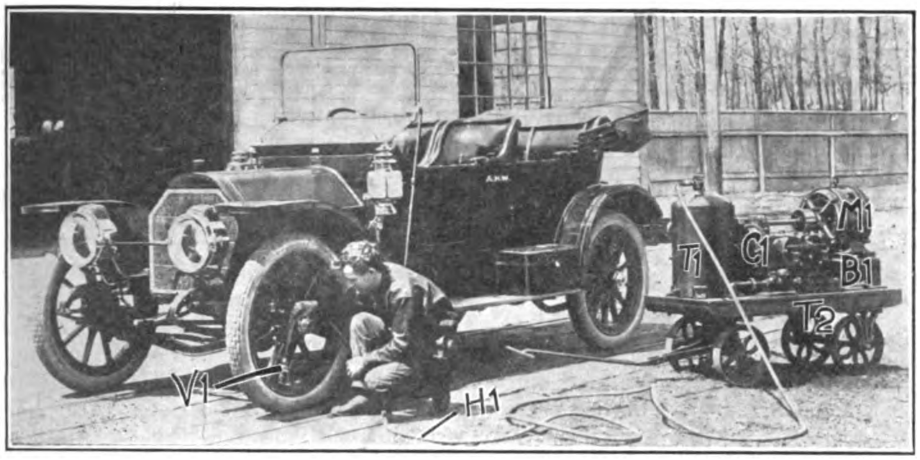


Fig. 3—Compressor unit on a truck for portable work with a long hose connection

putting his gauge on instead of that of the staff man, only to find that the pressure was inside of 75 pounds, but slightly over 70, according to his gauge. In another case, where the chauffeur said he was running pneumatics on a pressure of 80 pounds, the gauge showed that he had 30. In no case whatever, where reliance had been placed upon ordinary tire pumps, was the pressure found to be more than half of what it should be.

Quite a number of garages are fitted out with air compressor units, and in many cases the owners of automobiles use inflating tanks, or some form of power pump that permits of inflating the tires up to the desired point without manual labor. In nearly all of these examples tire pressures have been found up to standard. The inference to be drawn is that the best way to conserve tires is to provide a power method of inflating them, and in a garage there is nothing more efficacious by way of equipment than an electrically-driven air compressor, and a suitable tank as shown in Fig. 1, in which the compressor C1 is driven by an electric motor M1, comprising a unit, resting on a frame F1, the latter being fastened to a post P1. Air is delivered by a pipe P2 to a tank T1, connected with a gauge G1, with a safety valve S1, not forgetting, however, that the motor is started and stopped automatically, and that the pressure is ordinarily maintained at the desired point, through the good office of automatic valves V1, attached to the compressor C1. The air pressure is piped to various convenient points, and tapped off by means of flexible metallic hose H1 for use in the tires T2.

Another and neat installation of this type of compressor is shown in Fig. 2, where the compressor C1 is driven by its motor M1, delivering air into the tank T1, which is fastened to the platform P1 and control is maintained by means of the automatic device C2 with a pressure gauge G1 to show the amount of pressure carried in the tank. The platform P1 is carried on a tubular structure with uprights U1 and U2 resting on the floor with heading members M2 and M3 as shown, the remaining heading member not being shown. The tubular structure is built up of the character of tubes and fittings in common use in railing work. When it is desired to start the motor, the switch S1 is closed, and the automatic starter takes care of the motor thereafter.

Still another application of the electric compressor unit idea is shown in Fig. 3. In this case the motor M1 is mounted on a bed plate B1, driving the compressor C1 which puts air in the tank T1 and the pressure is taken away by the hose H1 for use in the tires in the regular way. A quick acting valve V1 serves as a convenience in attaching the hose to the tire. The compressor and its driving unit together with the tank are placed on a truck T2, and by means of electric cables, together with wall attachments at convenient points, aided by the use of a long pressure hose, it is feasible to roll the compressor unit to the various points of vantage, connecting up the electrical current as the occasion requires, and utilizing the long pressure hose to some extent. The unit is very compact and convenient.

Fig. 4 shows the compressor unit as manufactured by the Allis-Chalmers Co., of Milwaukee, Wis., with the compressor head H1 bolted to the base-casting C1, by means of holding bolts H2, of which there are 10. The valves V1, V2, V3 and V4 are in an accessible position, and power is delivered to the compressor by means of a single reduction square cut gear within an oiltight housing H3. The motor M1 is of the consequent-pole type with liberal main bearings B1 and B2 of the sleeve type, provided with ring oilers in the customary way. The commutator C2 is of large diameter, and the armature is cross-connected, thus reducing the brushes to one set, B3 and B4. The motor is furnished for any of the desired voltages, but in ordering, it is necessary to state the voltage of the circuit to which the unit is to be attached, also whether or not it is direct or alternating current.

Electric Market Active

Widespread Charging Facilities and Low Cost of Energy Popularizing the Type

ACTIVITY in electric vehicle work is the most noticeable feature of the present market. A better understanding of the utility of this type of car, accompanying a more healthy state of the battery situation, coupled with a brisk demand for electric commercial cars, all tend to the betterment of the whole situation, but it must also be remembered that large financial interests are now in a better state of mind about all automobile activities. It was but a short few months ago when financial houses were scared half out of their wits for fear all the money in the world would migrate to the coffers of makers of automobiles; they overlooked the fact that very few men indulge in "white elephants," and to the man who has no use for an automobile it is a white elephant with a vengeance.

There are other influences that the public at large will only learn of in time; it is now possible to obtain a "charge" for a battery in almost every hamlet from Maine to California. What is equally to the point, the cost of electrical energy is relatively low; it compares very favorably with gasoline at $32 per ton.

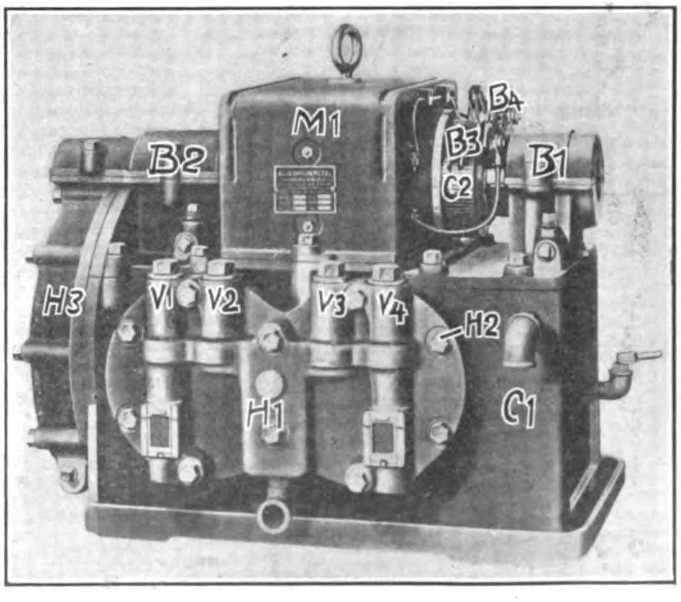


Fig. 4—Air compressor unit with the consequent-pole motor bolted to the base, with a single-reduction square cut gear drive

Operation and Care

DESIGNING FOR NOISELESS PERFORMANCE; KEEPING NOISE OUT; COST OF A TOUR; CANTOR LECTURES; CARBURETER ACTION; PRACTICAL REPAIRING, AND A SERIES OF SHORT ARTICLES

When an automobile is placed in the hands of the user, his main concern lies in utilizing it for the intended service, and the more he can get out of it, the greater will be the return on his investment. There are two principles involved in the operation of a machine. In English locomotive practice, as it obtains on railways there, the locomotives are so designed that they may be readily repaired, and the operating engineers make it a point to use them sparingly, laying them up for repairs, or adjustment, on the slightest provocation, the idea being to husband the machines, with the intention of putting into them as much by way of upkeep as is taken out of them by service. According to this plan, a locomotive is intended to last until progress puts it in the classification of the obsolete. In American railway practice the exact reverse holds. A new locomotive is put into service and it is run to death. It is the claim of the American railway engineer that the value to be kept track of is the number of ton miles that a locomotive pulls in the shortest possible space of time. It is recognized that when the machine is new, with its superabundance of sweet-running qualities, it will do the most work, and that, too, without putting money into it on a repair basis. There is one other advantage to be ascribed to this plan. All the good that resides in the new machine is abstracted from it before it becomes obsolete.

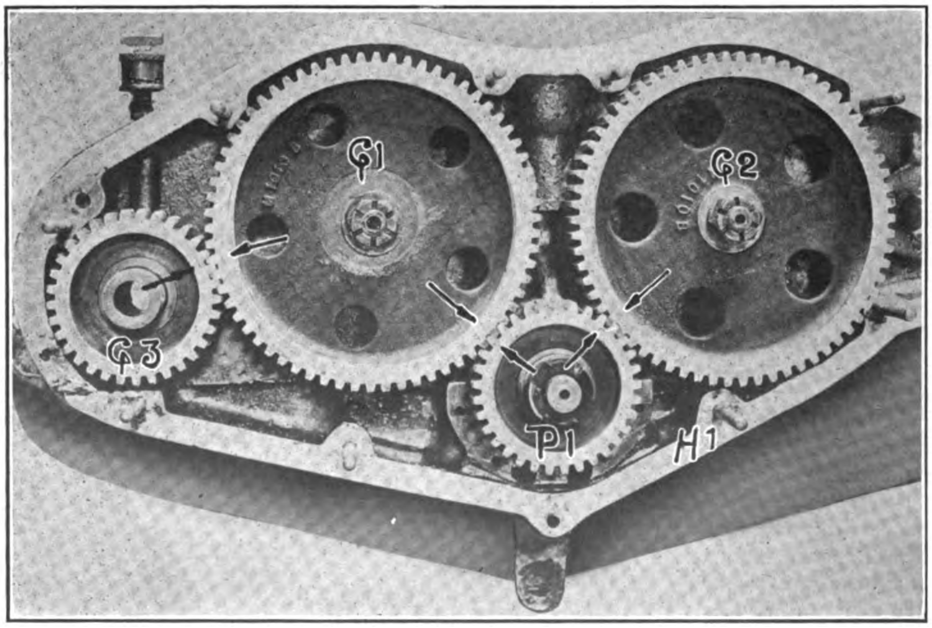
The only difference there is between a railway locomotive and an automobile, from an abstract point of view, lies in the fact that the locomotive has a "permanent way" with steel rails to roll on, and it serves under "factor" conditions. The automobile is excused from doing factor work, but it labors under the disadvantage of having to go in response to the will of the operator over such roads as indifference provides.

It remains, under the circumstances, for the owner of a car to choose the English method if he thinks that his automobile will not become obsolete by virtue of the production of a better one within a year or two after he makes his purchase, or he can pin his faith to the American idea, disregarding the future, getting all the service that the automobile will deliver, with the expectation that it will last long enough to pay for itself, leaving him in a position to take advantage of a new market at the propitious time.

Perhaps a happy medium offers some attraction, in which event the purchaser of an automobile must become familiar with the mechanism and learn how to fix it if the occasion requires. Under such conditions it is believed that the first thing to know is how to time the valves, and remembering that the camshaft runs at half the speed of the crankshaft in a 4-cycle motor, it remains to examine the gear system which actuates the camshafts, and observe (see illustration) that the pinion P1, on the end of the crankshaft, is provided with half as many teeth as the gears G1 and G2 on the ends of the camshafts. The gear G3 is placed to drive the magneto, and in this example it has the same number of teeth as the pinion P1, making the magneto rotor rotate at the speed of the crankshaft. When the cover is removed, exposing these gears, the first thing to observe is that the gears are marked, if the automobile is well made; but if it is, by some chance, the product of an indifferent plant, they must be marked. In the illustration the gears are marked in such a way that the space 3 of the pinion P1 accommodates the tooth 3 of the gear G2, and the tooth 2 of the pinion P1 meshes with the space 2 of the gear G1, whereas the tooth 1 of the gear G1 meshes with the space 1 of the gear G3. In disassembling the gears, unless they are properly marked, it may take one unfamiliar with the situation several days to reassemble them, whereas by observing the markings it becomes a mere matter of putting them together, taking, perhaps, five minutes. This illustration shows the virtue of first deciding what to do and then doing it systematically, but in the absence of system it is recommended that the automobilist adopt and stick to the American practice as it obtains in railway work, *i. e.,* run the car until it becomes unruly, and then scrap it.

But this plan should be carried out with some intelligence, and the mileage obtainable under sweet-running conditions will be a maximum if the automobile is "groomed" on occasions; nor is there any good ground for assuming that the degree of neglect allowable should exceed the amount that other means for transportation will thrive upon. It is not uncommon to see automobilists struggling with well-made cars, looking here and there for troubles they cannot find, destroying the good adjustment that bespeaks harmony of the relating members, when, in all seriousness, the cleaning of the spark plugs would overcome the whole difficulty, revamping more or less a $3,000 investment at the cost of a little labor.

But if the trouble is not quite so close to the surface it may be in the shape of a few globules of water clustered around the orifice of the nozzle in the carbureter, or a little leak in the intake manifold between the carbureter and the combustion chamber, if not due to a valve shutting off the flow of gasoline from the tank to the carbureter, although an empty gasoline tank gets in the way of success every once in a while.



HALF-TIME GEAR SYSTEM OF A TWO-CAMSHAFT MOTOR, SHOWING METHOD OF MARKING FOR FUTURE REFERENCE

Care and Repair of Tires

DEALING WITH THE QUESTION OF WEAR AND SUPERFICIAL AREA OF CONTACT AND LARGE REPAIRS TO CASINGS THAT APPEAR GOOD TO THE NAKED EYE

THE average autoist does not really go into the question of tire upkeep with any degree of thought. What principally interests him is that tires cost so much; when will there be a reduction in price, when will they invent something that will do away with his *bête noir*, "puncturable tires"? It is with the idea of calling his attention to some of the causes of tire wear that this article has been prepared.

It is fair to assume that if friction is applied to two surfaces with a certain pressure the one with the larger area will wear out sooner than the other, and if the pressure is increased (which may be represented by the increased speed of the car), the wear on the larger will take place faster still than on the smaller area.

Fig. 1 shows the length of the tread of a 34-inch x 4-inch tire fitted to the rear wheel of a five-passenger car unloaded, and it will be seen that the amount of tangential contact increases twofold as the tire is underinflated, thereby offering double the amount of tire surface for frictional wear to the ground.

These figures were obtained by lifting the car from the ground by means of a jack and allowing an imprint to be taken of tangential contact without taking into consideration how much a tire will further deflect when driving strain and torque are added. The area in square inches more clearly illustrates the surface presented to the ground as the following table shows:

Pounds per Square Inch	Area of Contact in Square Inches of a 34x4 Tire
80	4.94
70	5.87
60	6.88
50	9.01
40	11.2
30	13.62
20	15.06
10	16.32

Fig. 2 shows the amount of slip that takes place when the steering wheel is moved while the car is traveling, and here we get two distinct actions: first, the rolling action under pressure due to the superimposed weight, and, second, the side friction caused by the necessities of steering. This impression was taken with the tire inflated to 80 pounds and represents a surface slide; but the moment the tire is deflated there is added a pulling at the side walls which tends to weaken them, and in some cases tears them off the rims if a curve is taken too fast. This can be clearly seen in Fig. 3; the top point of contact shows signs of twisting strain in the way it tore the paper, and this means the infliction of a small bruise which has the effect of tearing at the strands of canvas that form the lining of the tire. Repeated bruises similar to this may cause a weakness in the canvas and affect the adhesion of the rubber to it. A small hole caused by a nail or sharp stone at this part starts the trouble and ends in a blowout, as moisture can creep through the bruised canvas, and thus, like a disease, infect a large area around the small initial hole. It is surprising to some autoists that, when they send their tires to the shop for the remedying of what looks to be a two-inch repair, they should be called upon to pay for anything from a 6- to 16-inch insert. The cause is that when the section to be repaired is ripped away the canvas at either side of the section is found to have parted company with the strip to which it was once vulcanized. The repairer is then compelled to cut and rip away till he finds the layers have a firm anchorage. It is about as much use repairing on a bad foundation of canvas as to try to stick a patch on an inner tube that has not first been cleaned off with gasoline or sandpaper. Repairers should pay particular attention to this, and rather than do a job that would not last, endeavoring to vulcanize rubber on a bad foundation, it is better to tell the owner the facts of the case. If a tire is repaired in this condition it will not last any length of time, and this accounts in the majority of instances for retreaded tires giving way almost immediately after they are put on.

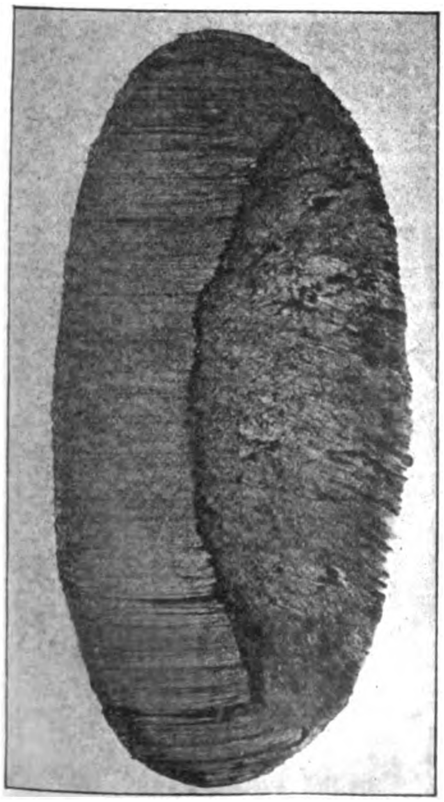


Fig. 2—Slip caused by slight side action of front tire due to steering

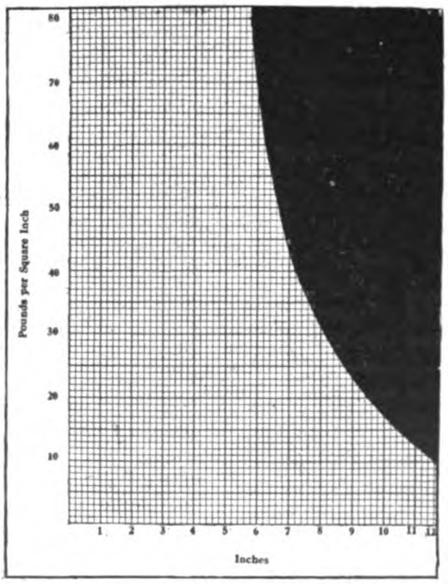
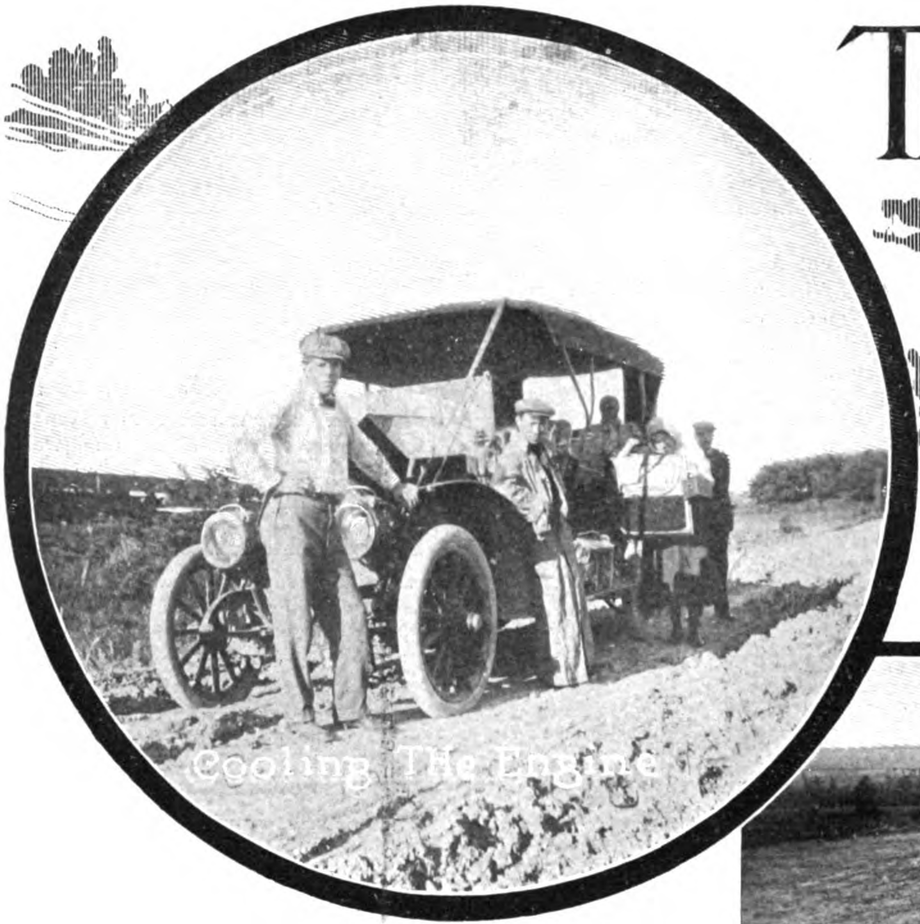


Fig. 1—Length of contact of a 34 by 4 tire at different pressures

Fig. 3—Twisting effect of underinflated tire due to pivoting front wheel

The Cost



Cooling The Engine

INEXPERIENCED automobilists when they first acquire a car permit their ambition to run away with their good judgment. Starting out on a long tour is easy enough for them, but unless their funds in hand far exceed the judgment they display, they fail to enjoy the situations that they originally considered paramount, and are mostly concerned about how they can get home with gasoline, lubricating oil, tire bills, and hotel expenses to pay.

Unfortunately, those who have acquired this character of experience, fail to keep an accurate account of their expenditures, or decline to publish the accounts. The cost of touring, considering the advantages, is really not great, but the trouble encountered is due to the fact that inexperienced automobilists labor under the impression that all they have to do is to steer the automobile and look at the scenery.

The particular tour of which an account is here given of the cost, took departure from Freehold, N. J. (en route to Billings, Mont.), on Tuesday, June 22, 1909, and, as the author of this article states: "Followed very excellent and familiar roads to New York City, via Perth Amboy, and Staten Island."

The owner's log of the trip continues on as follows:

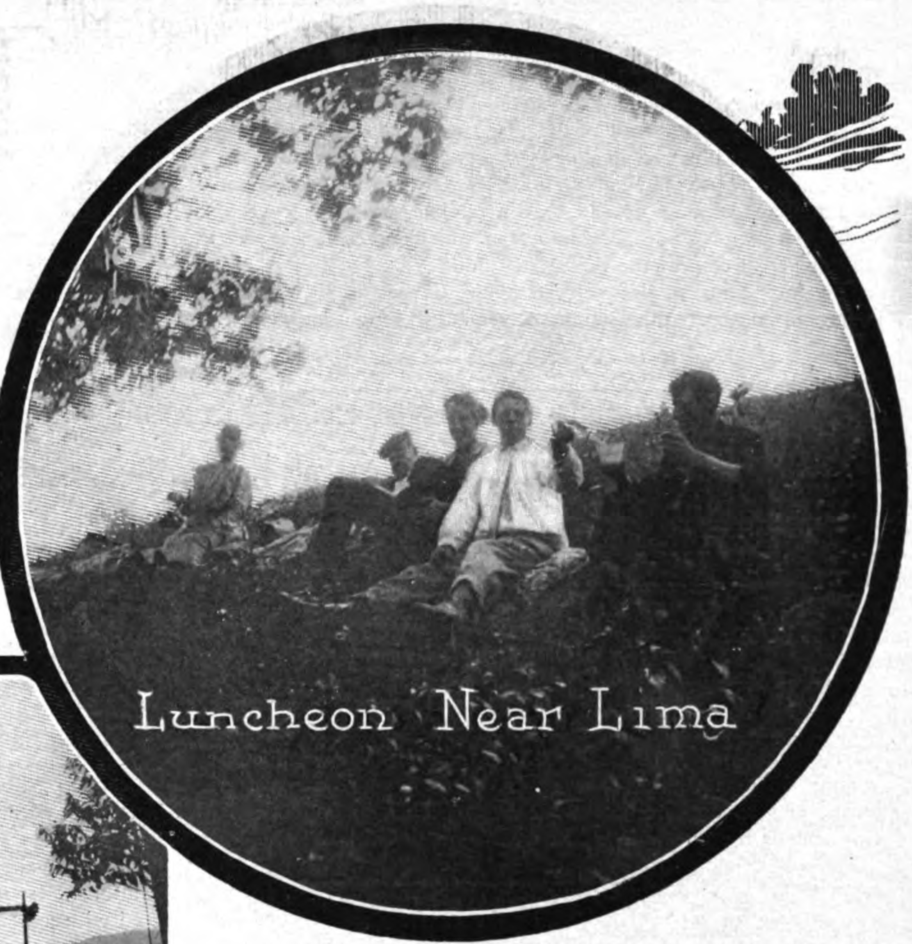
There were several reasons for our undertaking this trip. One was that a rather enjoyable and certainly very instructive vacation would be spent. Another, the desire to see a member of the family who resides in the vicinity of Billings. Another the complete novelty to us of the whole thing and the anticipated pleasure of "burning up" the prairie in an automobile. At the outset, we did not exactly expect to cover the entire distance, yet we had so much confidence in our car and chauffeur that, through our ignorance, we were quite hopeful.

One mistake was made in taking along too great a supply of rugs, coats, sweaters, etc., half of which were never used. The tonneau was littered to such an extent that we had difficulty to get in and out. Then we attempted to carry, on the rear, more trunks and valises than were good for the car. At Erie, Pa., we thought it best to express some of these to Chicago.

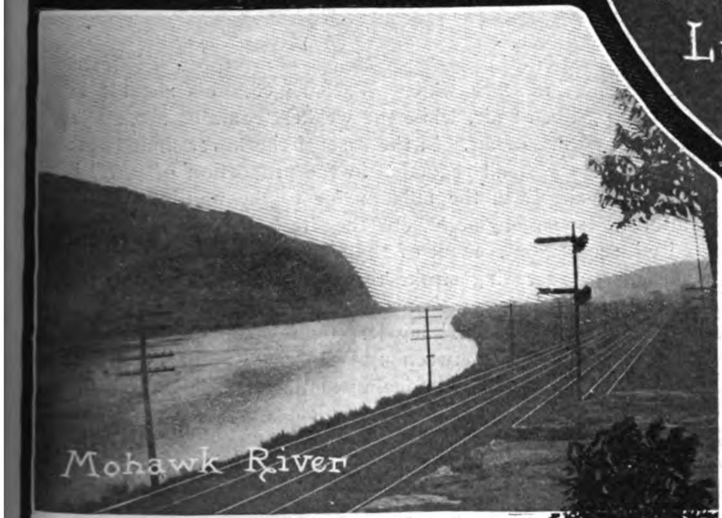
Near Utica

Along the Erie Canal

f A Tour



Luncheon Near Lima



Mohawk River

An Old Covert Bridge in Ohio

At no stage of the tour did we attempt to hurry.

We left Freehold on Tuesday, June 22, 1909, following very excellent and familiar roads to New York City, via Perth Amboy and Staten Island. We had lunch here and about 3 o'clock went up Broadway and followed the Albany Post Road to Tarrytown. This road was very poor. Here we missed our route, taking a back way to Briarcliff, where we spent the night. 80 miles.

June 23. Left Briarcliff late in the forenoon, taking the Post Road again. As far as Fishkill it was the same. From there to Albany it was very good. At Poughkeepsie we had lunch and purchased a Blue Book of N. Y. State, a very necessary item. A few miles outside of that place the shock absorbers in the rear, which had not been put on correctly, were smashed by the bumps and had to be taken off. Kept on the East Side of the river to Albany, where we arrived at 8 o'clock. 132 miles.

June 24. Remained in Albany in the morning to see the Capitol and some historic houses and churches. About noon we took the road to Schenectady and on from there through Amsterdam, where we had lunch, and Herkimer and Utica. To within 15 miles of the latter town the road was rough and generally bad, beyond that excellent. The Mohawk valley was beautiful and we followed the banks of the river for a great many miles. 95 miles.

June 25. Went on through Syracuse to Auburn. Excepting for a few miles the road was fine macadam. Had the first tire trouble this day. Arrived in Auburn in time for lunch and decided to spend the night there, as the hotel was very good. 78 miles.

June 26. Got an early start and went through the Montezuma swamps and Seneca Falls to Geneva. We were very much impressed by this beautiful old town with its colonial houses. Went on from there past Canandaigua Lake and Lima, where we had lunch, to Buffalo. Had two punctures. Excellent road almost all the way. 141 miles.

June 27. Remained in Buffalo to rest and "take in" the sights.

June 28. Good road to Erie, Pa. Went through Fredonia to Westfield in the midst of the Chautauqua County grape section. Had our lunch here and took a look around until 5 o'clock. Expressed surplus baggage to Chicago. One puncture. 95 miles.

June 29. Beautiful road to Cleveland, Ohio. Passed Conneaut over a great viaduct leading into Ashtabula and through Cleveland on the famous Euclid avenue. Here we missed the good road to Sandusky, Ohio, and took a terrible back way covered with deep ruts. Made poor time, but finally reached Norwalk, Ohio, where we spent the night. 160 miles.

June 30. Poor road to Bryan, Ohio. Went to Toledo for lunch and on across the Maumee River and through Archbold to Bryan. The country was beautiful, but did not impress us especially. Were disgusted with the roads. We had a little trouble with the chains, which were loose and kept coming off. 125 miles.

July 1. Fair roads to South Bend, Ind., but fine from there to Chicago. Went through Waterloo to Kimbelville, where we lost our way completely and had a terrible time as far as Rome, Ind. Spent the afternoon in South Bend, going on in the evening to Chicago without a stop. Just outside of Chicago we lost our way again in a maze of roads and railroad tracks. 216 miles.

The distance from Freehold, N. J., to Chicago by our route was 1,122 miles. We used 154 gallons of gasoline. Average, 7 1-4 miles to a gallon.

Cantor Lectures on Motors

PROFESSOR W. WATSON, D.SC., F.R.S., DELIVERED A SERIES OF LECTURES ON THE GASOLINE MOTOR, OF WHICH THIS IS THE FIFTH INSTALLMENT—BY PERMISSION OF THE ROYAL SOCIETY OF ARTS

IT is found that in a mixture of gases which are capable of rapidly combining together when heated sufficiently at one point, the combination or combustion may take place in two entirely distinct manners. In the first of these, called inflammation, the combustion spreads out from the point at which it is started, each portion of gas, as it burns, heating the neighboring portion till its temperature is sufficiently raised so that it itself burns, and so on throughout the mass. This method is quite slow, but is the one with which we are primarily interested.

The other method of combustion is called detonation, and appears to be caused when a wave of compression is set up in the gas, so that the heat developed by the compression is sufficient to fire the mixture. In this case the combustion is spread as fast as the wave of compression travels through the gas, that is, at an enormously greater speed than is the case in inflammation. Thus, when a mixture of carbon monoxide and oxygen is lighted in a tube about a foot long, the progress of the flame can quite easily be followed by the eye, the speed at which the flame travels being about 4.7 feet per second. If, however, I start a compression wave in some of the same mixture contained in a lead pipe, about 20 feet long, by firing a small quantity of electrolytic gas at the end, you will notice that the explosion appears to take place throughout the whole length of the tube, and a length of glass tube at the far end is shattered, at the instant at which I depress the key which causes the passage of the firing spark. The detonation wave is not, of course, quite instantaneous in its passage, but since it will travel 5,500 feet in a second, the time taken to traverse 20 feet is quite inappreciable. The noise produced in the case of the detonation, and the shattering of the glass tube into a fine powder, will suggest to you that detonation, if set up in an engine cylinder, might cause great damage. Luckily the nitrogen, which forms about 79 per cent. of atmospheric air, acts as a preventive, as far as the detonation of air-petrol mixtures is concerned. If, however, pure oxygen is employed, or if such a gas as acetylene is used, then this question of the production of detonation will become of importance. That pressure waves, such as are required to initiate detonation, do, under certain conditions, exist in the cylinder is shown in Fig. 18. In the case of the charge fired by a spark in the exhaust valve-pocket, pressure-waves having an amplitude of as much as 100 pounds to the square inch actually existed when that particular diagram was taken.

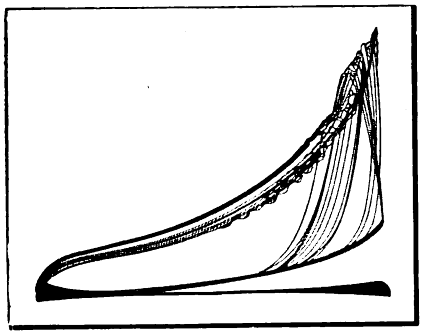


Fig. 20—Manograph card showing earlier and earlier ignition on compression stroke

Returning to the combustion of air-petrol mixtures, it is found that the richest mixture which will burn contains about 1 lb. of petrol to 7 lbs. of air, while the weakest contains about 1 lb. of petrol to 26 lbs. of air. In the case of the lower limit (weak mixtures), a very small reduction in the proportion of petrol is sufficient to pass from the inflammable to the non-inflammable conditions. In an engine where the fresh mixture is always mixed with a certain amount of the products of combustion left over from the preceding stroke the lower limit is about 20 of air to 1 of petrol, but satisfactory working will only be obtained with mixtures containing less than 17.5 of air to one of petrol. For mixtures between 17.5 and 20 of air to one of petrol, there is liable to be popping in the carbureter. This is because these very weak mixtures burn so slowly that the charge is still actually burning even at the end of the exhaust stroke, and hence the incoming charge catches fire, the combustion spreading through the induction pipe to the carbureter.

Although I am not aware that any direct experiments have been made on the temperature to which a mixture of air and petrol must be heated before combustion starts, from the values obtained in the case of other hydro-carbons (methane 700 deg. C., ethane 575 deg., etc.), it is probable that at a temperature somewhere between 600 deg. C. and 700 deg. C. petrol-air mixtures will inflame. This fact limits the amount of compression which can be used in a petrol-engine, for the charge, being compressed practically adiabatically (*i.e.*, without loss of heat), if the compression is carried too far, will fire before the end of the compression stroke, causing the phenomenon called pre-ignition. That one can easily fixe a mixture of petrol and air by compression I can show by an experiment. I have a glass tube closed at one end and fitted with a piston. I drop a small piece of cotton wool soaked in petrol down the tube and rapidly depress the piston, when the petrol vapor burns, causing a bright flash.

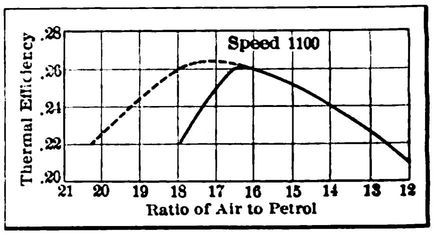


Fig. 23—Chart showing gain in economy by advancing spark when using weak mixtures

Pre-ignition may be started in an engine in which the compression is not great enough to cause the temperature of the mass of the charge to reach the ignition point, if some solid body, such as a projecting wire or piece of carbon, gets sufficiently hot. In such a case the gas in the immediate neighborhood of the hot body starts at a fairly high temperature, and the increase in its temperature, when compressed, may be sufficient to cause ignition. By placing a platinum wire in the combustion space of the engine used to illustrate these lectures, and then gradually heating this wire by the passage of an electric current, we can cause pre-ignition to occur, and you can follow the phenomenon by means of the indicator diagram thrown on the screen. Pre-ignition, once started, rapidly gets earlier and earlier, because when a gas is fired in a closed space the portion of the gas first fired, and which is compressed by the rise of pressure produced as the rest of the charge is fired, reaches a much higher temperature than that reached by the portions which ignite last. Hence, when pre-ignition starts at the wire, the great heat there developed raises the temperature of the wire very rapidly, so that ignition takes place earlier and earlier on the compression stroke, as is shown very clearly in Fig. 20.

The speed at which inflammation travels through mixtures of air and petrol of different strengths has been examined by Dr. K. Neumann, of Dresden, and some of his results are plotted in Fig. 21. It will be observed that the maximum speed is only 7.5 feet per second. This corresponds to a mixture containing 12.5 parts of air to one of petrol; for both richer and weaker mixtures the speed decreases rapidly, so that for those near either limit the speed is less than one foot per second.

The fact that the speed varies with the strength of mixture can be easily shown by experiment. Thus I have a glass tube filled with a weak mixture of petrol vapor and air, and firing this at one end, it will be seen that the flame travels quite slowly down the tube. On refilling the tube with a stronger mixture and repeating the experiment, the flame is seen to travel much more rapidly.

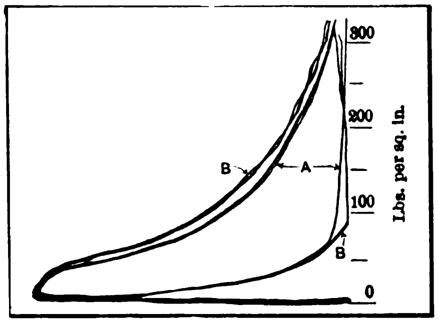


Fig. 24—Manograph showing advantage of advancing spark as speed increases

The slowness with which flame travels through a mixture of petrol and air can also be shown by the following experiment: Such a mixture is caused to escape through a narrow glass jet, the pressure being variable. When the pressure is low, so that the velocity of the escaping mixture is small, the flame, on lighting the gas, remains at the top of the jet. If, however, the pressure is increased, the velocity of the gas is such that near the jet, where the velocity is a maximum, the flame does not travel down as fast as the gas moves up. Hence the flame rises up from the jet and can be kept stationary at two or three inches above the end of the jet. The point at which the flame becomes stationary is that at which the upward velocity of the mixture of air and petrol is exactly equal to the downward velocity of the flame propagation. The question of the velocity of flame propagation is one of considerable importance, particularly in the case of high-speed engines. Thus in the case of an engine having a speed of 3,000 revolutions per minute the whole of the working stroke only occupies 0.01 second. Now, if the combustion of the charge, in place of being complete soon after the top of the stroke, is delayed till the piston has completed a fifth of its stroke, a very marked decrease in the mean effective pressure is observed, so that the instant of attainment of complete combustion must be adjusted to within two thousandths of a second in the case of an engine working at 3,000 revolutions per minute. Further, since the speed with which the flame spreads through the mixture varies with the strength of the mixture, what is a correct spark advance for, say, a strong mixture, will not be enough for a weak and hence more slowly burning mixture. This effect is illustrated in Fig. 22. In the left-hand diagram we have the spark timing adjusted as suited to a fairly strong mixture, and, as a result, the maximum pressure is not reached, that is, the charge is not completely inflamed, till about a quarter of the stroke is completed; the indicated horsepower being 2.36. If, however, the spark is advanced considerably more than would be advisable with a strong mixture, it is possible to obtain complete inflammation near the top of the stroke, as is shown in the right-hand diagram, and, as a result, the indicated horsepower rises to 2.76, an improvement of 17 per cent. The gain in economy by being able to advance the spark more than usual when using weak mixtures—and it is only with such weak mixtures that economical working is obtained—is shown by Fig. 23. The curve shows the efficiency obtainable with different strengths of mixture, obtainable in the case of a certain engine. The full line curve shows the conditions when the spark advance is kept throughout as it would be with the stronger mixtures, while the dotted curve shows the improvement obtainable by suitably advancing the spark.

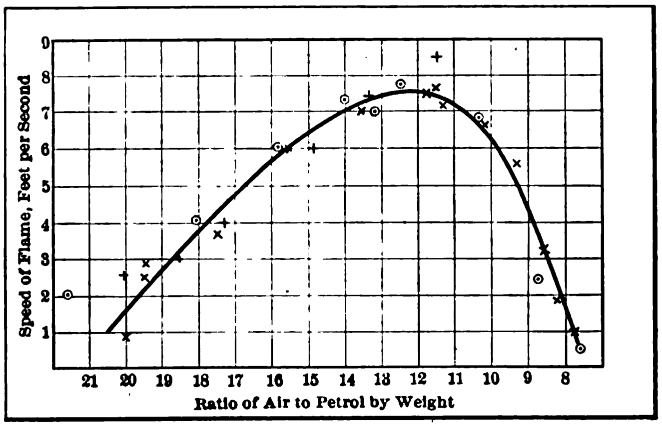


Fig. 21—Chart showing speed at which flame passes through mixtures of air and gasoline of different strengths

Not only is the power of adjusting the timing of the spark of advantage to counteract the change in the velocity of flame propagation, with change in the strength of mixture, but it also allows us to secure the best results at different speeds. It is evident—since the distance the flame has to travel remains the same at all speeds, while, if the timing of the spark is fixed, the time between the passage of the spark and the top of the stroke decreases as the speed of the engine increases—that if the timing is right at slow speeds, then as the speed increases the spark advance will not be great enough, and *vice versa*. This effect is shown in Fig. 24. The diagrams shown were obtained at a speed of 640 revolutions per minute, the spark advance in the case of the diagram marked A being such as to give the best results at a speed of 1,600 revolutions per minute. The diagram marked B is that obtained when the spark advance is reduced to the best value for the speed of 640 revolutions per minute. The indicated horsepower corresponding to A is 2.9, while that corresponding to B is 3.3, a difference of 14 per cent.

It would thus appear that with an engine fitted with a fixed ignition, neither with varying strengths of mixture nor with varying engine speeds can as good results be obtained as if we are able to adjust the spark advance to suit the conditions.

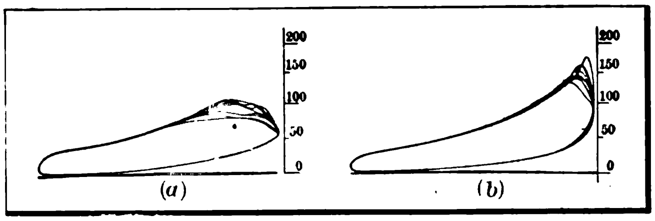


Fig. 22—Manograph cards showing how horsepower is increased by advancing spark

Don'ts for the Autoist

WHAT NOT TO DO ABOUT REPAIRING AN AUTOMOBILE. HOW NOT TO DRIVE ON THE ROAD AND A FEW OTHER INJUNCTIONS

Don't linger on the brink of a bad repair job; if the repairman is a bungler "can" him.

Don't undertake to run a repair shop without competent help; it is extremely difficult to conceal the shells.

Don't forget to look after the insurance policy of your automobile just before you send it to a repair shop; places like that do burn down.

Don't run a repair shop without having everything properly insured; you may have to fix the place up a little before the insurance people will take the risk; why not do so?

Don't try to bribe the inspector from the building department in order that you will be able to evade some of the rules that are promulgated for safety; why not put your money into the building instead of trying to make a crook?

Don't handle gasoline in the garage just as if it were a fire extinguisher; the regulations for the safe handling of this liquid are fairly good—it is cheaper to follow them.

Don't roll your car out of the garage at a racing speed; you might run over your nearest relative, or the man who is on his way to make you his heir.

Don't smoke cigarettes, but if you must hasten the time, why endanger other people by lighting them in a garage, or near a can of gasoline?

Don't clean the garage floor if you have money in the tire business; the way to increase the demand for tires is to soak them in lubricating oil.

Don't attend to your own affairs if you want to have them mismanaged—just leave it to your help to do things wrong.

Don't take advantage of progress; be a back number; that is, if you want a large tire bill to pay; old style clincher rims are at a premium on inactivity, and so the cost goes up.

Don't ask a "native" for directions to the place to which you want to go; natives are notoriously inaccurate—equip yourself with "canned" directions in the form of a reliable guide book.

Don't ramble; it is more enjoyable to map out an itinerary; be sure and include some historical place that will make it an object to travel; something to look forward to.

Don't map out too long a journey per day; there is little enjoyment in a ride of more than 100 miles in 10 hours.

Don't fall in with speed maniacs; let them pass on; you are not bound for the same place.

Don't take any man's dust; all that you have to do to avoid it is to allow him to speed on. True, you will be left in the lurch; it is a rather nice place; beats a hospital.

Don't map out a belated schedule; it will make you work. Touring is work, unless it includes leisure of thought and action.

Don't neglect the advantage that comes from a good average speed in the absence of spurting; all damage is done at the higher speeds.

Don't overlook the story that insurance statistics tell; high-speed automobiles have proven to be inferior insurance risks.

Don't forget that a poorly made automobile will outlast a high-priced creation if the latter is driven at a high speed all the time.

Don't ask the maker to fix your car up with a gear ratio that will permit you to travel like the dickens on a level; the car will then go like a snail up a hill.

Don't forget that good average speed is superior to good level road performing; miles per day should be considered rather than miles per minute.

Don't overlook the advantage of a speedometer of some kind; buy a good one; resolve never to tax it above a certain reasonable speed.

Don't be so short-sighted as to travel by the speedometer to the extent of going by it irrespective of the road condition.

Don't go 20 miles per hour on a road that is only fit for 10 miles per hour.

Don't go as fast at night as you do in the day time, even if the lighting facilities are good.

Don't let the chauffeur drive a foot after he quenches his thirst.

Don't have a thirst of your own if you have to drive an automobile.

Don't entertain any exception to this rule; accidents are invariably urchins of exceptions.

Don't put a tooth in letting the chauffeur know where to jump off if he has a thirst.

Don't assume that there are no temperate chauffeurs; all the good ones are positively temperate.

Don't expect the chauffeur to be without any habits at all; some of them smoke; others may smoke hereafter; choose the one who smokes here.

Don't discover a good chauffeur and then hold him down to poor pay; cut diamonds are worth money.

Don't forget that a good chauffeur can save you a round thousand dollars per year in cost of maintenance—give him a share of the saving.

Don't be blind to the cost to you of a poor chauffeur; he may stretch your purse to the extent of an extra thousand per year; give him half the profit.

Aluminum Alloys

Some Actual Tests of Cast Aluminum Used for Crankcases

ALUMINUM as used in crankcases and transmission gear boxes differs in strength over a wide range, depending upon the composition of the same, whether or not new metal is used in testing and if scrap is put in the charge the purity of the latter must be taken into account. It rarely ever happens that good aluminum castings result from the use of even a small amount of scrap, due to the presence of Babbitt metal, the contents of which has a marked influence upon the performance of the aluminum. Since Babbitt bearings are employed in motors and elsewhere in automobile work, it is almost a moral certainty that some Babbitt metal will find its way into the aluminum scrap, part of which, during the process of turning and scraping the white metal bearings, and for the rest in diverse unaccounted ways, so that for good aluminum castings no reliance is to be placed upon anything but new metal.

No.	Tensile Strength	Elastic Limit	Mod. of Rupture	No. of Vibrations	Deflection at Breaking Load	Elongation per cent. in 8"	Specific Gravity	Melting point (degrees)	
								C.	F.
12	21,500	12,000	30,240	1,215,750	.450"	1.5	2.82	625	1156
31	29,400	13,000	34,100	608,725	.275"	.5	3.10	611	1132
63	42,500	25,000	51,800	510,900	.325"	.8	3.33	595	1100

The above tests are based upon the use of new metal, and show results obtainable only when the greatest care is taken and the foundry is fitted to do the best class of casting work.

It Stands to Reason

RELATING TO MATTERS OF INTEREST TO THE MAN WHO OWNS AND RUNS AN AUTOMOBILE, AND NOT WITHOUT INTEREST TO THE MAN WHO MAKES IT

That the best automobile to purchase and use is the one that will not break out of financial bounds.

That the motor should be large enough to do the work, with a little power in reserve, but there is no need of having a surfeit of reserve power.

That the lubricating system should be simple and reliable, with some way of telling how much oil there is present, and whether or not it is feeding at the proper rate.

That the ignition system should be such that the motor will crank readily and run well.

That the carbureter should be capable of furnishing a suitable mixture of gasoline and air at all speeds and temperatures.

That the clutch should work without slipping, unless the driver wants it to slip.

That the universal joints should hold grease in order that they will work freely and last long.

That the transmission gear system should afford the requisite number of speed changes, be free from noise, and not "clash" badly when the gears are being shifted.

That the propeller shaft should be fitted with such a system of universal joints as will take care of the angularity, but this is no license to have the angle more than a few degrees.

That the live rear axle should be well made, stout, and the bevel drive should make little or no noise.

That the road wheels should be well secured to the jackshafts.

That the tires should be large enough to sustain under the load without squashing down more than a small part of an inch.

That the chassis frame should be of stout design in order that it will serve as a stable platform for the machinery.

That the steering gear should be free from lost motion.

That castings should not be used in any of the parts that have to do with shock work, if the lives of the occupants of the automobile are at stake.

That the body should be made so that it will not "check" when it is exposed to the weather.

That the upholstery should be of a good grade and free from coloring matter that will "fry" out under conditions of Summer heat, only to blacken up the clothing of the occupants of the seats.

That some form of windshield is indispensable to the comfort of the occupants of the automobile.

That a top of some kind is necessary for touring service.

That good lighting is absolutely necessary from the point of view of safety, and the law demands it.

That a proper horn with which to make signals should be provided; but that its presence should not be abused.

That provision should be made for a supply of lubricating oil sufficient to cover 200 miles.

That the automobile should be washed with great regularity, and that this is no license to scour the surfaces of the body with a dirt-laden rag.

That good common sense should be displayed at all times—especially at the time of selecting a new automobile.

That an extra tire should be taken along, and that several tubes should be in the locker.

That tires will give out soon unless they are kept in a state of good repair.

That a vulcanizing set is necessary if it is proposed to maintain the tires in a good state of preservation.

That good tires are conducive to permanent repairing work, and that the reverse is true of the other kind of tires.

That springs will not work well unless they are lubricated; pry the plates apart and squirt lubricating oil in between them.

That a new broom sweeps clean; be a new broom all the time; some automobilists deteriorate rapidly, and the car is then neglected.

That the life of an automobile is short in the hands of the man who makes a mile in a minute on a road that is barely fit to travel at a rate faster than ten miles per hour.

That going around corners fast is not only dangerous, but it is very hard on tires and some parts of the mechanical structure as well.

That racing up a hill may seem like good driving, but it is not.

That the motor serves very well as a retarding mechanism on a down grade.

That it is a good idea to examine the brakes at frequent intervals, making sure that they will stop the car within a reasonable distance.

That a car can only be brought to a stop within a certain distance in any case, and it is proper to find out just what the distance is for every make of automobile.

That the only device that seems to thrive on noise is a drum.

That noise in an automobile is a sign that some part is awry.

That noise must be stopped or the automobile will stop.

That the sooner noise is stopped the more money the owner of the automobile will be able to keep in his pocket.

That noise is the particular friend of the repairman.

That the repairman should extract the noise from a car if he is paid for the undertaking.

Chain Lubrication

Reason for Running a Chain Dry as Compared with the Method Sometimes Used of Covering it with Grease

THE life of a chain is dependent upon the quality of the metal employed and the lubrication, and presuming the chains to be of high-grade work and material, the lubrication becomes the important question. The first point is: What part of the chain requires lubrication? The pins and rollers undoubtedly; consequently, smearing grease on the outside of the chain has about as much utility as putting thick grease inside an engine and expecting it to act by splash. The pins, and these alone, require lubrication, as when the pins are oiled the inside of the rollers is also lubricated. To make an emery valve-grinding paste one takes powdered emery and mixes it with oil. When grease is smeared on the outside of a chain it collects dust and mud and forms an excellent grinding material to wear the chains and sprockets. At the end of a journey in the rain the chains should be rubbed over with a stiff brush dipped in kerosene, to prevent rusting of the pins, and some oil squirted into the rollers with an oil can. Every 2,000 miles or oftener the chains should be removed and allowed to remain in kerosene for about six hours, or overnight if possible, and thoroughly freed from all dirt; then take four pounds of grease of a vaseline consistency and mix into it about half a pound of flake graphite. Over a flame (a blow lamp will do) turn the mixture into a liquid and steep the chain in it for a few minutes, moving it to and fro so that the grease has a chance of finding its way to the pins. Hang the chain up on a nail over the pail in which the grease has been heated and it will drain off. When the mixture has cooled off whatever remains on the chain should be scraped off and the chain is ready for use. Graphite will greatly quiet the chain.

Amount of Wind Resistance

Retarding Influence Not Great Under 20 Miles Per Hour

According to Professor William D. Ennis, when a body bounded by a plane surface is subjected to a normal current of air, or moves normally in still air, a pressure is produced on the plane amounting in pounds per square foot of surface to

$$0.0025\,V^2,$$

in which V is the velocity in miles per hour. The total pressure over an area of A square feet is then

$$0.0025\,AV^2.$$

In an automobile the value of A may be taken as the sum of the areas of the approximately normal surface, since a body partially protected by a wind shield may still be subjected to some resistance as the air eddies around the latter. For the car in question we may then perhaps take A at 28 square feet, whence the resistance is

$$0.0025 \times 28 \times V^2 = 0.07\,V^2 \text{ pound.}$$

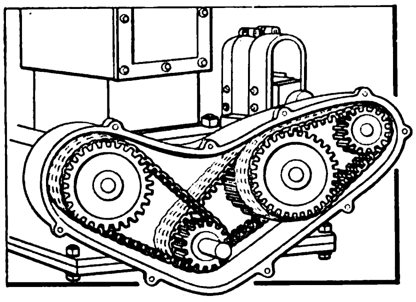


Fig. 1—Cam and magneto shafts operated by silent chains

No provision is made for measuring this in testing cars by the method referred to; for, although a large fan blows air against the front of the radiator for cooling, the car does not move against this current of air nor does the presence of the latter influence the amount of power exerted by the motor. The tractive forces necessary to overcome wind resistance alone are then about as follows:

Speed in miles per hour	Resistance due to velocity in still air, pounds
10	7
20	28
30	63
40	112
50	175
60	252
70	343
80	448
100	700

If there is a head wind, the velocity of the wind must be added to that of the car to obtain the equivalent speed. Thus a car running at 40 miles per hour against a head wind of 20 miles per hour experiences a wind resistance of 252 pounds. It appears that, as in railroad locomotives, wind resistance is of little importance at low speeds (say, below 20 miles per hour), but of serious effect at high speeds. Therefore, a racing car at 70 miles per hour would experience an extra resistance of 3.06 pounds from an extra normal surface 6 inches square—say, a man's head—and this would sacrifice more than half a horsepower.

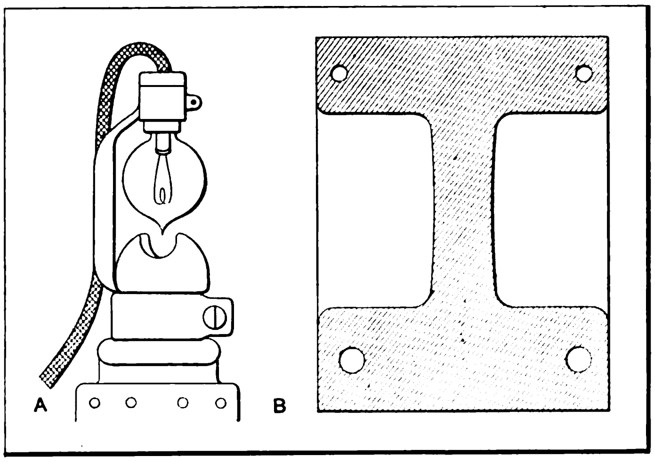


Fig. 2—Method of making electric light holder for oil lamps

Letters from Subscribers

Magneto Wiring and Connections

Editor The Automobile:

[2,428]—Could you tell me how a Bosch Dual magneto should be wired? I can follow the wiring from the magneto to the plug, but where do the wires from the coil go?

Scranton, Pa. R. E. Duff.

Fig. 5 shows how the wires are attached and the different connections to be made:

1—to circuit breaker on magneto.
2—magneto grounding wire.
3—driving end of magneto to switch.
4—center of distributor to coil.
5—to battery from coil.
6—to earth.

Chains for Distribution Gears

Editor The Automobile:

[2,429]—The timing gears on my car are exposed and make a loud humming noise. Is there any means of quieting them?

Findlay, Ohio. R. C. B.

Exposed gears are always apt to rattle, and when made of raw hide or fiber the dirt that is sucked in the hood causes them to wear quickly. Fig. 1 shows a method that is gaining favor in some parts where the gears are enclosed, and there is no reason that it would not act just as well with unenclosed gears. A metal cover made from sheet tin would keep the gears clean, and a little grease with a small quantity of graphite mixed with it sometimes helps to quiet unenclosed metal gears.

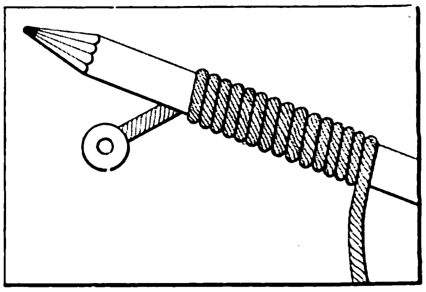


Fig. 3—How to coil electric cable

Grease Gun

Editor The Automobile:

[2,430]—I find great difficulty in filling the rear axle of my car with oil or grease, as the body covers it from the front and the gasoline tank prevents me getting at it from the rear. Could you suggest any method of overcoming this?

Albany, N. Y. L. Henry.

Find out the size of the plug hole and buy a piece of gas piping to fit it and an elbow already threaded. A plunger can be made of wood. To fill the improvised gun, unscrew one end and force it in the grease can and it will fill itself. A small amount of force will send the grease where it is needed. (Fig. 6.) With another elbow the same idea could be used for oil.

New Lamps for Old Ones

Editor The Automobile:

[2,431]—My car is fitted with oil lamps. How can I adapt these for electric light?

Galveston, Tex. W. F. Wright.

There are several adapters on the market for this purpose,

THIS DEPARTMENT IS DEVOTED TO THE ANSWERING OF LETTERS FROM SUBSCRIBERS ON ANY SUBJECT RELATED TO THE RUNNING OF AUTOMOBILES

but if you wish to do the work yourself take a small piece of sheet brass and cut it as shown in Fig. 2; bend it to the holders and drill for small bolts. The back can be looped to take the wire. It would be as well to coil the wire as shown in Fig. 3 somewhere in the circuit, so that when the exposed part wears it will be possible to pull the coiled part out and have sufficient to make new connections without rewiring or making joints. These coils prevent any pulling or breaking of the wire, which should be attached with staples, placing a piece of rubber between the staple and the wire to prevent chafing.

Piston Ring Holder

Editor THE AUTOMOBILE:

[2,432]—I have obtained some new unslotted piston rings from the factory where my car was built, and as I wish to slot them myself, what method do you suggest to hold them firm? My car is fitted with low-tension magneto, and I wish to equip it with high-tension magneto; what is the best method in which to proceed, and do you think I could manage it myself?

New York City. A SUBSCRIBER.

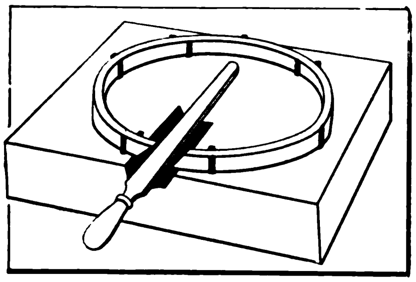


Fig. 4—Method of holding piston ring for slotting

The method of holding rings for slotting is shown in Fig. 4. With this inexpensive tool the rings can either be angle-slotted or step-cut, first using a fine hacksaw and afterwards a fine file. Unless you are used to filing you had better have a mechanic do this part of the work. There is no difficulty in altering the system of ignition. Take the tappets out and make a plate out of quarter-inch metal, bolting it on in place of the tappet. Take out the push rods and cover the holes in a similar manner. Fit gaskets to prevent leaking of compression and oil.

Most low-tension magnetos are run at half-speed, and it is necessary to ascertain if this is the case, as the ordering of the new magneto will depend upon this, the amount of space available on the bedplate and position of the carbureter as to whether the high-tension magneto will fit. The height of the center of the drive from the bedplate must be ascertained, and if this is less on your present magneto than the new one you propose to fit, you can pack up to this with sheet fiber; but if it is more you had better get advice from some one who is used to this class of work.

Cleaning Brass with Salt and Vinegar

Editor THE AUTOMOBILE:

[2,433]—What are the proportions of salt and vinegar for cleaning brass? Will this cleaner injure the brass? J. HARPER.

Gladstone, N. J.

The probability is that salt (sodium chloride) and vinegar (acetic acid) will have a detrimental effect on the brass alloy by eating holes in it and giving it an irregular, rough surface. The abrasive principle is by far the better, as the wear is then at a constant rate and the polish lasts longer.

Calculated Horsepower

Average Autoist Thinks A. L. A. M. Formula Tells Actual Horsepower of a Motor

WHEN a committee of the A. L. A. M. decided to establish a conventional empirical formula for use in comparing motors it was quite well understood that its value would be limited to the advantages to be derived by reducing all motors to a common level and thereafter find out by a more definite means, as a test, how near the motors might perform to the established standard. It was, of course, recognized that some motors would deliver power up to the standard, other motors might fall below the standard, and a few motors might reach to a higher level. It is a great mistake to assume that a designer would take months, or even a whole year, in laying out a motor with no better expectations than to come up to an average formula in private performance. Every designer hopes to be better. The way to ascertain the power of a motor is to test it. The formula states that the power is determined as an approximation at 1,000 feet of piston travel, as follows:

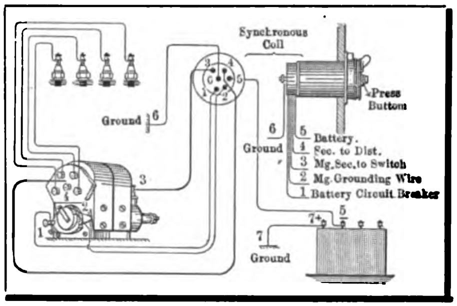


Fig. 5—Wiring of Bosch Dual Ignition

$$\text{HP.} = \frac{d^2\, n}{2.5}$$

when

d^2 = the square of the bore of the cylinder in inches.

n = the number of cylinders.

2.5 = an empirical divisor based upon the average performance of automobile motors and a piston travel of 1,000 feet per minute, thus making it unnecessary to consider the angular velocity of the crankshaft.

A numerical example of the above formula for a four-cylinder, four-cycle motor, with a bore of four inches and a stroke of the same, would be as follows:

$$d^2 = 4 \times 4 = 16$$
$$n = 4$$

when

$$\text{HP.} = \frac{16 \times 4}{2.5} = 25.6 \text{ horsepower.}$$

The mere figuring out of the horsepower in the manner as above shown has no more to do with the actual horsepower of a real motor than the drawing of a battleship would have to do with its gun-power in a real engagement. It is a fortunate circumstance that when a theory gets in the way of a practice the theory gets run over—the facts remain. There are, of course, motors of this size that will deliver 25 horsepower and there may be motors that will deliver more than 25 horsepower, but there are also a large number of motors that will not deliver 25 horsepower, and the great main point is to find out what they will deliver, rather than to assume that they are up to a standard.

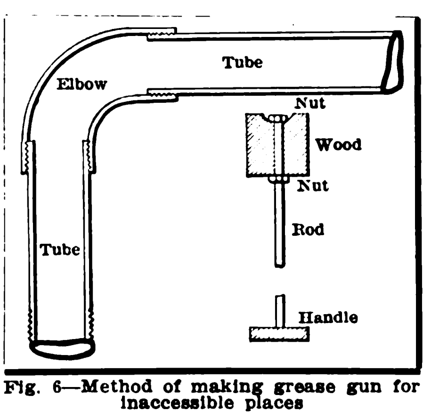


Fig. 6—Method of making grease gun for inaccessible places

Questions That Arise

SOME OF THOSE THAT COME UP IN EVERY-DAY AUTOMOBILING ARE ANSWERED BY THE MATTER WHICH IS BEING PREPARED BY FOREST R. JONES IN THE NEW EDITION OF THE "AUTOMOBILE CATECHISM" THAT WILL SOON GO TO PRESS

[281]—How can the inner tube of a double tire be removed and replaced by another?

First lift the wheel free from the ground with a jack and deflate the tire. If of the clincher type, with tire lugs (clamps), first loosen the nuts on the radial bolts that hold the heads of the lugs down against the inner surface of the outer shoe; also remove the nut, or nuts, from the valve stem. Remove one side of the outer shoe from the clincher groove. A pair of blunt irons (prodders) about 3-4 inch to 1 inch wide and 1-8 inch or less thick at the end are most commonly used for prying the tire off on one side. Care must be taken not to pinch and tear the inner tube. Remove the inner tube by pulling it out by hand, beginning at the part farthest from its valve, and then by the use of an iron suitable in shape for raising the outer shoe somewhat, take out the valve from the rim of the wheel. A double-prong iron can be used by placing a prong under the shoe on each side of the valve.

If the tube has been punctured, feel inside of the shoe to find whether anything is still projecting through the tire that will injure the inner tube when replaced. Also see that there are no sharp points or edges on the tire lugs.

Rub a liberal supply of powdered talcum (soapstone) on the inner tube, also place a liberal supply inside the shoe and rotate the wheel slowly, at the same time kicking or striking the shoe so that the powder will be well distributed over its inner surface. Place the tube in the shoe. Inflate it slightly to straighten it out, which may need some assistance by hand. Pass the hand carefully around the tube to make sure there are no twists or folds. Then, by the use of tire irons, force the shoe back into place, remembering that each clamp must be lifted as the part of the shoe next to it is sprung into position.

Push the clamps up to see whether the inner tube lifts freely. If not it may be pinched under the clamp and should be released. There should be a leather or rubber washer under the clamp nut to prevent the entrance of water and grit to the tire. Tighten the clamp by hand and inflate the tire so that it will bulge only slightly at the sides where it rests on the ground. (Pressure gauges to use with a tire pump can be purchased.) Try the clamps again to see that they are tight. Thumb nuts on the clamps can be made tight enough by hand.

When the outer shoe is to be completely removed from the rim, the clamps or lugs must be taken entirely out after removing the inner tube. A tire iron suitable for lifting the shoe at that point facilitates this operation. Numerous forms of tire irons are in use. None seems to have any great advantage over the others.

A stubborn tire shoe can sometimes be quickly put in place by sitting down and pushing against its side with both feet, at the same time striking the flat part of the bead with a hammer that has well-rounded edges.

Various convenient tools for forcing a tire-shoe back into place on the wheel can be found on the market.

[282]—How can a temporary patch be put on the outside of an inner tube?

Manufactured patches can be secured for this purpose, or a patch can be cut from a sheet of rubber or an old inner tube whose material has not deteriorated appreciably. Only rubber patches should be used on the inner tube. Canvas, etc., will not do, because it does not stretch like rubber.

Rub the tube around the puncture with a piece of sandpaper, emery paper, or a clean fine file over an area somewhat larger than the patch to be used. The space to be covered by the patch must be clean and free from partly torn-out pieces of the rubber. The clean space should be somewhat larger than the patch.

Liquid rubber cement is used for fastening a temporary patch in place. There are almost numberless makes of it. Some dry, or set, much more rapidly than others. The directions for using generally accompany the better grades.

See that the tube is perfectly dry, especially that there is no water on it when beginning to cement on the patch. The patch should also be dry.

In the absence of directions on the cement tube or box, the patch may be put on as follows:

Apply the cement with a brush to the rubber tube and one side of the patch. Wait till the cement dries enough to become sticky. Then place the patch on the tube, taking care to put it on with a rolling motion so as to exclude all air from beneath it. Press the patch on firmly, first pressing at the center and gradually working out toward the edges. A small, narrow roller in the end of the bar is a suitable tool for pressing the patch on. It is used by rolling it back and forth across the patch, gradually working side-wise at the same time. The tube should be laid on a smooth surface under the place where the patch is being applied. Lay a smooth piece of board on the top of the patch and weight it. Leave until the cement sets.

If it is not known how long it will take the cement to set, a couple of test pieces of rubber may be stuck together with some of it after the patch is put on. The test pieces can be pulled apart, a little at a time, to note the condition of the cement.

Coat the patch with talcum or other powder to prevent its sticking to the shoe.

A patch put on in the above manner without vulcanizing will last for some time, if the tire does not become hot, as by rapid running of the car. Heat softens the cement and the patch becomes loose.

The patch is sometimes put inside the tube by the repairman.

[283]—How can a small cut or tear in a tire be repaired?

Scrape the rubber clean in the cut or tear and fill it with prepared plastic rubber. Then vulcanize it at the repaired place.

Drain Cocks

They Must Be Provided for if the Motor Is to Be Properly Protected in Winter

OF the 400,000 automobiles that are now in service, 213,000 were built prior to 1910, and of this considerable number of cars many of them are so lacking in harmony that the hydraulic grade idea is missing from the cooling system. Perhaps nearly all the owners of these cars have gone through at least one Winter's experience, and those of them who succeeded in protecting their motors from the effects of freezing probably did so by putting drain cocks in at various points and taking the pains to open them every night in order to let all the water out. In many cases, no doubt, the freezing question was handled through the proper use of non-freezing solutions, one of which is composed of glycerine and water, using about 30 per cent. glycerine in solution. Of those who rebuilt their automobiles to the extent of putting drain cocks in at low points, some of them found that it took several drain cocks to satisfy the situation. If anti-freezing solutions are taken advantage of, it still remains to have drain cocks at the low points for the purpose of getting rid of the worn-out liquid—it does wear out.

Carbureter Action

BEING AN ABRIDGMENT OF A PAPER READ BEFORE THE BRITISH INCORPORATED INSTITUTION OF AUTOMOBILE ENGINEERS. BY W. MORGAN, B.SC., AND E. B. WOOD, M.A. (CANTAB)* (FIRST INSTALLMENT)

THE work on which the following results and conclusions are based was undertaken at the Daimler Motor Works some three years ago as preliminary to an attempt to design a paraffine carbureter suitable for traction work. The difficulties of the task were twofold, the low volatility of the paraffine giving rise to one set of problems, while the narrower limits of smokeless and odorless combustion, as compared with those of petrol, intensified the difficulties met with in an ordinary carbureter of obtaining suitable fuel mixtures over the wide range of demand required by a modern road engine. It was therefore necessary to find or design a carbureter which could give a mixture of fairly constant composition. Investigations which had been made on carbureter action assumed the steady flow of both air and liquid fuel, with apparently misleading conclusions when applied to designing a carbureter for the engine.

Dr. Watson, in his paper on "Thermal and Combustion Efficiency" (Proc. I. A. E., 1908-9, pp. 387-473), shows the character of the pressure variation in the induction pipe of a four-cylinder petrol engine at a speed of 656 revolutions per minute with open throttle (see Fig. 1, copied from Dr. Watson's paper). In this particular case it appears that actual reversal of flow takes place. so that any argument based on steady flow must be regarded with suspicion.

It was decided to ignore as far as possible all formulæ relating to steady flow, and to measure directly the related quantities of gas and liquid induced under the engine suction. In the first series of experiments, as will be seen, the writers fell from grace, and estimated from pressure the amount of exhaust gas dealt with. The possible danger of error was recognized, but as the necessary apparatus for directly measuring the volume of air was unobtainable and the correctness of the conclusions based on this method was confirmed by gas analysis, no misgivings were entertained as to the general accuracy of the results.

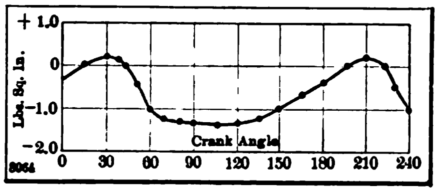


Fig. 1—Chart showing pressure variation in the induction pipe

Last year it was found possible to lay down a more complete equipment at the Merchant Venturers' Technical College, Bristol, and to confirm the results of the previous work.

The outfit at the Daimler works consisted of a standard four-cylinder engine, 124 millimeters bore by 150 millimeters stroke with tappet valves, driven through a belt and speed cones by a two-phase motor. The engine was fitted with a graduated petrol gauge and the exhaust passed into a small tank of about 2 cubic feet capacity perforated with several 1-2-inch holes; the pressure in this tank was read on a suitable gauge and converted into volumes. The motor was an 8-horsepower, direct-connected, and the speed regulated by inserting a water resistance in the armature circuit. Great constancy of speed was obtained and over a 10-minute run the speed variation was less than 0.4 per cent.

The petrol gauge was designed with the object of enabling readings of petrol consumption to be taken with an engine running under its own power without stopping from time to time to refill the gauge.

The carbureters used in the first experiments varied in form, but the plain-tube carbureter used at Bristol will serve as a type of the others. The section is shown in Fig. 2 and it is seen to have consisted of a gas cock in a straight tube fitted with bushes of various diameters and standing over a petrol jet which stood inside the bush. Pressures at the jet were read by means of a fine brass tube fixed near the jet.

The earlier carbureters used were simply lengths of 1-1-4 inch copper pipe swept horizontally so that the air flowed across the jet and not along it. In the later experiments the air was measured by observing the time required to pass 30 cubic feet into the gas-holder, observations of temperature and barometric pressure being made. In the last series of experiments which were taken to confirm previous work, the barometer, temperature and humidity were so nearly constant that it was thought unnecessary to apply an atmospheric correction which would affect all readings proportionally. In several cases the correction factor was found to be 1.005. Again, no correction has been made for the volume of petrol vapor, as this correction does not affect the main conclusions which follow, as will be shown later.

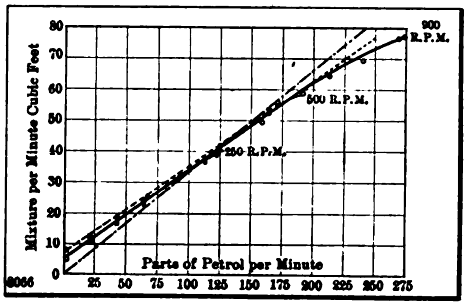


Fig. 3—Characteristic graph for plain-tube carbureter

The gas measurements further required a correction for leakage on the induction and the exhaust side of the engine. On the induction side, beyond making the induction pipe joints gas tight, no attempt was made to prevent leakage. There was no perceptible leakage past the pistons, but at high vacua there were indications of considerable air flow up the valve guides, although the valve stems were a good fit and were well lubricated. It was decided to allow this leakage to continue as it was a factor with which the carbureter must deal. Afterward it was argued that this leakage could have varying relative values with different engines, so that it was desirable to obtain a value for it; accordingly a correction was obtained in the following manner. The engine was first run with closed throttle and the quantity of air passed into the tank per minute measured; at the same time the suction in the induction pipe on the engine side of the throttle was taken.

The throttle was then opened to successive marked positions with the engine running at a constant speed and the suction in the induction pipe noted at each position. The value of this correction is shown by means of the dash line in Fig. 3. In this petrol per minute is plotted against air per minute taken by the engine at different speeds and throttle positions; the plain line graphs are corrected for leakage and give the relationship between petrol and air which has passed the jet.

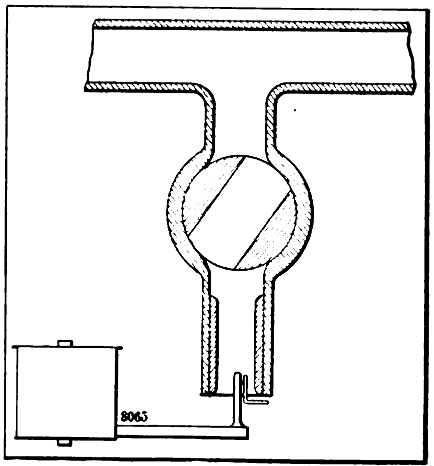


Fig. 2—Diagram of plain-tube carbureter used for tests

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*From "The Commercial Motor."

With regard to the correction for losses on the exhaust side it was found that with clear exhaust pipes the back pressure never exceeded 48 inches of water and with the 500 revolutions per minute series of experiments 24 inches. The leakage at this pressure was less than 1-2 cubic foot per minute at open throttle and fell away very rapidly with closing throttle. No correction was made for this leakage.

The results are presented in the form of graphs, which have been obtained from simultaneous readings of petrol and air as shown in Fig. 3 and those following.

Fig. 3 may be taken as typical of the whole. This is the petrol-air graph of the plain-tube carbureter at the approximate speed of 250, 500 and 900 revolutions per minute with a bush 3-4 inch in diameter. It will be seen that the main parts of the superimposed curves lie on a straight line and that the upper end of the graph for each speed droops toward the petrol axis. Neglecting the drooping parts of the graphs for the present, it then follows that the law connecting the flow of petrol and air in a carbureter of this type is of the form $y = a \times bx$. This conclusion is borne out by every similar experiment made by the authors on various engines, which include four old type Daimlers, two new type Daimlers, one Talbot and a Darracq.

Accepting this law connecting petrol and air in plain-tube carbureters, the running of an engine with such a carbureter is at once explained. The chain line in Fig. 3 shows the graph of constant fuel mixture of such composition as will approximately give complete combustion of both air and petrol; this may be called the ideal line or line of correct mixture. Any point on a graph lying between the air axis and the ideal line indicates a weak mixture, while a point on the other side of the ideal line indicates a rich mixture. It is now clear that this plain-tube carbureter must give a weak mixture until the consumption reaches 30 cubic feet per minute; for higher gas consumption the mixture becomes richer. Hence the graph shows, as is borne out by experience, that with this carbureter the engine would be difficult to start without flooding, would not run or pull at a low speed and when opened out the mixture would be slightly rich. It is a defect of this type of graph that it does not readily show the percentage variation from constant mixture. Fig. 3 shows the percentage composition of the mixture plotted against air.

It should be borne in mind that all the graphs shown are corrected for leakage on the induction side of the engine, hence the point of intersection on the air axis appears lower than actually is the case. This correction leaves the type of the graph unchanged; the same is true of the correction which could be made for the volume of vaporized petrol. The volume of petrol vapor is proportional to the quantity of petrol taken, hence the correction would tend to slightly decrease the inclination of a graph. Here, again, the type of graph is unaltered, so that the main conclusions are unaffected. The value of the point of intersection of the curve with the air axis is of importance, for if this were lowered to zero the plain-tube carbureter could be made to give quite good results.

Effects on engine speed are at once obvious from Fig. 3. The straight line part of the characteristic is extended along the line $y = ax + b$, which is peculiar to that arrangement of the carbureter, while the droop is but very slightly modified, if at all.

The size of the jet modifies the slope of the straight line characteristic as might be expected. Fig. 3 gives the graphs obtained with two jets, the smaller having an aperture one-half the area of the larger. The characteristic is seen to swing on the point of intersection with the air axis, so that by suitably setting the jet the characteristic of such a carbureter may be set parallel to or at any desired angle with the ideal line.

Economy and Speed

The Relation Between Rate of Speed and Amount of Fuel Used Is Fixed

IS it not strange that there is so much talk about economy in the use of fuel in automobile work, and an inclination on the part of many autoists to look for more economical machines in some form of construction that is not now commercialized, as if to point out that present practice is ill-advised? It is like trying to show that experience is wrong, that the designers who have industriously labored for a number of years failed to take the right road, and are afraid to turn back. Observation seems to indicate that the men who dream the most, and articulate the loudest, are the very automobilists who disregard every consideration for economy, entirely overlooking the fact that if they fail to conform to the reasonable demands of the situation, it is up to them to pay the penalty, whatever it is. There is an economical speed for every automobile, and this speed depends upon the weight of the car. Designers are compelled to provide motors that are capable of driving automobiles on the level, hard road at speeds that are higher than economy dictates. This excess speed comes from the necessity of providing power enough to propel the automobiles up steep hills and through long stretches of soft going. The economical speed for weight is about as follows:

PROPER SPEED TO DRIVE A CAR OF A GIVEN WEIGHT

Miles per hour	Weight in pounds (maximum)
28	1,000
20	2,000
17	3,000
13	4,000
12.5	5,000

These speeds are all too low to suit the average automobilist, but disregarding them is at the extra cost of tires, and the man who elects to go faster has no rightful ground for complaining about the life of the tires.

Standardization Suggestion

Maintaining the Appearance of a Car May Demand a New Body

FREQUENTLY it is found that an automobile is doing good work even after two or three years' service, but the practice of bringing out new models every year has the demerit of rendering old models passé. One way to recoup this loss is to put a new body on the old car and thereafter refinish, thus bringing it up to date, in so far as it is possible to do so, and within a reasonable cost. Reasonableness of cost must always be judged in the light of the broad possibility. If there is no standard to go by, so that bodies cannot be produced for stock, the reasonable cost will be based upon the production of one body for the specific purpose, as a special effort. It would be a step in the right direction to write "reasonable" in front of a much lower cost than that due to the making of one body, but this can only be brought about if bodies are standardized. In France it has been the practice for seven or eight years to make bodies to a standard width, and some of the lengths, as follows:

RULING LENGTHS OF BODIES IN FRENCH AUTOMOBILES

Length in metres	Equivalent in inches
2.00	78.74
2.10	82.67
2.20	86.61
2.30	90.55
2.40	94.48
2.50	98.42

Unless American body builders will adopt the metric system of measurement it might be well to fix upon a standard of length of American bodies, arranged in even inches, as 75, 80, 85, 90, 95, 100, 105, 110, etc., or 72, 78, 84, 90, 96, 102 and 108. Perhaps the latter arrangement would be the most appealing in view of the six-inch increments intervening, thus affording a definite relation to the English foot.

Ravages of Tinkeritis

Herbert L. Towle Fell In With Carrington Again

I FELL in with Carrington again on the train the other day. Carrington, you know, owns a Hurriup runabout, and from the height of his four years' experience with successive models of that celebrated make, he surveys with much edification the 'prentice efforts of his friends to get along peaceably with similar machines. His last experience was with Snyder, who has had his little red Hurriup for about five months.

"I got a telephone call last Sunday," said Carrington, "begging me to run over and see if I could help Snyder get his car started. Previous adventures in helping Snyder out of his troubles had made me wary, so I asked him where the machine was. It was just down the hill, a couple of yards from Snyder's house, the other side of town. So I got into my car and ran over. I found that Snyder and a darky, who had appeared out of nowhere to help him, had been taking turns at the crank for an hour or two. Snyder or the darky would whirl the crank to beat the band; the motor would spit once or twice, or would do nothing whatever, and after each whirl Snyder would give the vibrator screws a twist. The vibrators were working as well as could be expected under such treatment, so after adjusting them properly I investigated the sparks at the plugs.

"After finding the sparks O. K. I turned the crank. I got four or five explosions and the engine stopped. After repeating, with a like result, I looked at the carbureter. The needle valve was two full turns open, though half a turn was more than enough. How under the canopy that man had ever persuaded his engine to run at all with such a dose beats me. I screwed the needle valve down to where it ought to be, judging from the feel, but still the engine did not run. Then I took the needle out, and found it had been bent four ways from Sunday by my friend's strenuous efforts with a screwdriver on some previous occasion. No wonder I couldn't get the right mixture! Snyder promptly declared he could straighten the thing, and was off with it to the garage before I could stop him. So I went up on the porch and chatted with the ladies. After a while Snyder came back, announcing that he had straightened the needle, and asked me to put it in. I laughed at him.

" 'Not on your life,' I said. 'I'll put in a new one, if you like, but I won't waste a minute fooling with that busted thing."

"It is funny," I observed, "how hard it is to teach amateurs the importance of a hundredth of an inch in things like that."

"Indeed it is!" responded Carrington. "As I was saying, I refused to touch the thing further, and the end of it was that Snyder got a mob of boys together and he and they and the darky pushed the runabout to the garage while I steered."

"A man like that makes more trouble for himself than the slickest chauffeur could for him," I observed.

"Say," burst out Carrington, "it just beats creation how many ways Snyder can find of queering a perfectly good machine. I'll bet anything that by ten o'clock this morning he will have either a cylinder or an axle or the radiator off his car, hunting for some fool thing that would have been all right if he had only let it alone. You expect to see amateurs meddle with the little things, like adjustments, but this man is not satisfied with that. It is only the big things that interest him. For example, his high-tension system was leaking like a basket the other day. I touched it somewhere, and it knocked me about six feet. I told him he had better run new cables to his spark plugs, but such a matter was too trivial to interest him."

"He must need education badly," I said.

"He has the worst case of tinkeritis I ever saw," responded my friend. "If his car was running beautifully, like a sewing machine, with absolutely nothing the matter with it, he'd want to know why it was running beautifully, so he'd take off the cylinders. And when he got them on again he'd mix the valves or do something else so the car wouldn't get out of its own way.

"You know the front axles of those cars are guided by a wishbone of steel tubing. Well, lately, Snyder thought that the connections from the wishbone to the front axle didn't look just to suit him, so he took off the wishbone, plugged it with sand, and put a neat bend in each leg close to the front axle. The result is that the knuckle pivots now rake backward like a bicycle fork reversed, and it is almost impossible to steer the car at all. It tries to slow off, first to one side, then to the other, in spite of anything you can do."

"Is he really a natural mechanic, who has simply not learned to apply his bent, or is he just one of those who rush in—you know the line?"

"He isn't a mechanic in any sense of the word," replied Carrington. "He has a certain amount of common sense, but his ignorance of mechanics is wonderful. He is learning, though! You bet he is learning, and he is paying for it, too. For example, I noticed a while ago that one of his rear tires had a flat spot on it, where apparently it had slid when he set his brakes a trifle hard. A few inches of fabric were exposed, and I advised him to take the shoe off and send it to a vulcanizing shop. But no, that was too simple for him! All the tire needed was a patch, and he guessed he could put the patch on as well as anyone. So he spent a couple of hours cutting a piece from an old inner tube, scarfing its edges down as neatly as he could, and cementing it over the flat spot."

"What sort of cement did he use?" I asked, with a grin.

"Just common ordinary cement; the kind that comes in tin tubes. Well, of course, the patch came off right away when he ran the thing. Then he thought the reason it came off was that the front edge could peel up, and that the way to make it stick was to have an endless band all around. So Snyder actually put in half a day peeling all the rest of the tread from that perfectly good tire, and cementing an endless band from an inner tube all around it."

I gasped.

"Needless to say, his beautiful endless band parted company with the tire without much ceremony. A few days later, he invited my nephew to go with him for a ride. I knew what that meant, and warned the boy that he would probably have to work his passage. He went, however; guess he wanted to see the fun. Before they had gone fifteen miles that re-treaded tire went bang! where water and his surgery had weakened it.

"The other day, after I had steered his car into the garage, he asked me what I thought he ought to do with it. I said to him, 'Snyder, I'm your friend, and I'll help you with this car to the point of getting it so it will run. But that is absolutely all I'll do. You have put the rig on the bum in too many ways for me to feel inclined to have a hand in it. When you get it so it will run, take it to town and ask the agent for his best offer in part trade for a new car. Take his offer, even if it is only fifty cents. And, when you get the new car, for Heaven's sake *let it alone!*' "

Properties of Aluminum

Specific Gravity Changes with Thickness of Castings

IT has been shown that the strength of aluminum castings is greater for thin than for thick walls, and it is also true that the specific gravity of the metal is increased as the walls are cast thinner. The approximate variation in specific gravity of the metal is as follows:

Thickness in inches	Specific gravity corresponding
1 (square)	2.964
3-4	3.004
5-8	3.002
9-16	3.004
1-2	3.012
3-8	3.024
1-4	3.007
1-8	3.007

Note.—It is true that the variations in specific weight, as noted, were not uniformly increasing as the thicknesses of walls decreased, but the indication is pointedly in favor of increasing weight with decreasing thicknesses of walls.

Practical Repairing

DISCUSSING THE OVERHAULING AND REPAIRING OF CYLINDERS; WITH AN ILLUSTRATION AND DESCRIPTION OF AN AIR TEST AND A REPLACEMENT

CAST gray iron is universally employed for cylinders, it being a product that pours into moulds with a fluidity sufficient to produce thin walls, and under proper conditions a closeness of texture that holds compression sufficiently for the intended purpose. It is also true of this material that it withstands heat changes, as they obtain in motor work, and the wearing surfaces take on a darkened bronze-like luster that is quite permanent, excepting when the design is inferior and the castings are below the customary standard. But the best-made cylinder must wear in time, and in order to hold compression thereafter it becomes necessary to refinish the bore, make new pistons to fit, and supply new piston rings to match. It not infrequently happens that the cost of the overhauling work is greater than the cost of a new set of cylinders; this depends upon the price asked for the repair parts by the maker of the automobile as against the amount of work that will have to be done to put worn-out cylinders in a state where they will perform efficient service.

There is no way of stating clearly the best course to pursue, excepting after an examination of each individual repair case. Some cylinders wear to an elliptical bore, due to great angularity of the connecting rod coupled with high compression and high speed. In such cases it is easy enough to measure the difference between the major and minor axis of ellipse, and if it amounts to more than two or three thousandths of an inch nothing remains but to refinish the bore. In refinishing work the first consideration is to measure the thickness of the wall of the cylinder, and if it is not of the uniform thickness account of this fact must be taken. If the thinnest point in the cylinder wall is under 3-16 of an inch, it is scarcely to be supposed that it will be worth while to undertake reboring, on the ground that the strength of the wall will be insufficient for the purpose. If the finished section of the cylinder wall is found to be ¼ of an inch or better, reboring becomes an excellent possibility, although these questions are coupled up with the dimensions of the cylinders, it being the case that the greater the bore the thicker the wall should be.

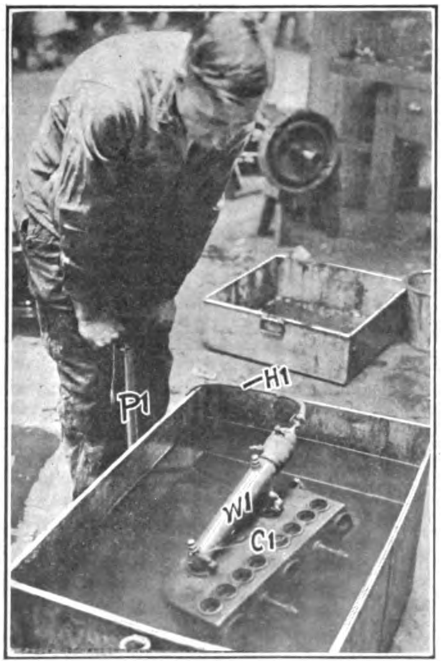

Fig. 1—Method of air-testing cylinders, showing casting in a tank of water, and compressed air being forced into water jacket

Independent of the dimensions of the cylinder the pressure varies depending upon the compression, efficiency of the ignition system, and quality of the mixture, the latter depending upon the carbureter. It is not uncommon to take manograph cards from cylinders of motors that show an explosion pressure of 300 pounds per square inch, and certainly in considering the maximum possibility it would not be too much to expect that this pressure might go up to possibly 400 pounds per square inch, not as a regular thing, but under a conceivable set of conditions, and it must be remembered that breakages do not come from a long series of abuses, but, as a rule, from a single excess.

Granting that an examination of the cylinders of a motor discloses a sufficiency of the elliptic condition to require that reboring be done, it remains to fix upon the method to pursue, and, if the repair man has a choice of facilities, he will readily select the grinder without resorting to reboring, not only on account of the speed at which grinding can be done, but because of the excellence of the result. If there is no grinder at hand, and the difference in bore is a matter of two or three thousandths of an inch, a reamer suggests itself, or even a cat-head will do. In either event the cutters must be sized to precision, and fairly inserted in the bore of the cylinder by a repair man of some skill. The work can be done upon either a drill press or a lathe.

There still remains a very excellent means for refinishing cylinders if the difference is within ten thousandths of an inch. Cast a disc of lead or Babbitt metal to a diameter slightly greater than that of the cylinder, with an axlewise thickness of perhaps two inches. Bore a hole in the lead disc, or cast it with a chord hole, and clamp the disc so made on a mandrel, fetching it up tight, thereafter setting the mandrel up in centers, and turning the disc down to a diameter of three or four thousandths of an inch greater than the bore of the cylinder to be finished, tapering the diametral face of the so made lead lap slightly to give it "entrance." When the lead lap is ready it remains to smear it over with cylinder grinding compound, the latter being of ground glass rather than of emery or carborundum, starting with a relatively coarse grade of the abradant, ending with the finest grade in order that the bore will be perfectly smooth. In operating this equipment the work may be done on a drill press, or better yet, on a platen type of lathe, unless a vertical milling machine is available, in which event the cylinder may be set up on the platen, and the lead lap may be chucked. With the cylinder adjusted on the platen so that its axis coincides with the axis of rotation of the lead lap, it remains to feed the cylinder up against the tool, rotating the latter at some convenient speed, and it will be found that by feeding the cylinder up and down a few times the bore will be increased perhaps two thousandths of an inch per feed, and the elliptic condition

Fig. 2—Process of replacing cylinders, showing how two workmen guide cylinders over pistons without damaging the rings

will be taken out of it, leaving the bore perfectly round and quite smooth. As a last resort, the cylinder may be tooled out on a drill press.

It might have been stated that there is no use of boring out a cylinder if the valve seats are worn down so much that no metal will be available for dressing them. Leaving this part of the repair question for future treatment, assuming only for the time being that the seats are not worn too much, it remains to point out that after refinishing the bore it will be desirable to test the cylinder for tightness, and this may be done in the manner as shown in Fig. 1, in which C1 is the cylinder, W1 is the water pipe, H1 is a hose connection, and P1 is an air pump of the hand variety. The cylinder is submerged in water, and air is pumped into the water jacket proper under pressure, with the result that if there are any leaks bubbles of air will show up in the water.

One of the hazardous undertakings in connection with cylinder repair work comes when it is desired to replace the cylinders, as shown in Fig. 2. In this case the cylinders C1 are being slipped over the pistons P1, and one man is engaged in holding the cylinders in the vertical position while a helper compresses the piston rings and guides the cylinders over, both operators working together and exercising great pains in order not to damage the piston rings. The helper is holding the rings firmly in the slot, with the right hand, and with a flat-blade knife in the left hand he is guiding the piston into the bore, taking advantage of the bevel around the extremity and compressing the rings at the same time. It is a tedious operation at best, resulting too often in the damaging of the rings, which can only be known when the motor is started up and it is found that the compression is poor.

Expense Account Compiled

U. S. Jameson, of Worcester, Mass., Shows How to Operate an Automobile

EVERY man understands how easy it is to get rid of money if no account is kept of the individual expenditures. The pennies mount into dollars, and the dollars pile up, until finally the victim is brought to a halt by the glaring evidences of a shortage in his funds, there being no other way out of it under such conditions. It cannot be said that the coming of the automobile has altered this fundamental situation; some automobilists maintain that the trouble is even more acute. From time to time level-headed automobilists send in their well-kept expense accounts, one of which is here given, and in addition to the direct evidence of cost afforded there is the possibility of finding out just what are the most troublesome items, after which it is possible to treat with them, hoping, perchance, that they will bow to intelligent action.

In this particular example the car was operated from April to October, inclusive, covering 8,750 miles, and the largest item of total expense was for repairs and painting. Particular attention is called to the foresight of the automobilist who had the good sense to include repairs and painting in the cost of maintenance. The next largest item was for the salary and maintenance of the chauffeur, and then come tires and tubes. It is just possible that the repair account could be reduced were the chauffeur more capable; it is not the purpose here to state that this particular chauffeur received too much money, or that he was in any way negligent, but the fact remains that if the owner had driven himself he would have saved $355.20 that he paid the chauffeur, and he might have saved some of his repair and painting account. Moreover, the tire and tube account of $344.22 presents a rich field in which a careful owner has a wide opportunity to distinguish himself. Mr. Jameson, in offering this evidence of cost, states:

"Your readers may be interested in the carefully kept expense of operating a touring car on its fifth season. The following figures are reliable:

"Five-passenger, 4-cylinder touring car of standard American make, built in 1906. Weight, 3,300 pounds. Tires, 34 x 4 and 34 x 4½. Season, April to October, inclusive. Mileage, 8,750, half in city, half in country."

Items	Total expenses	Cents per mile
Repairs and painting	$433.04	4.94
Tires and tubes	344.22	3.94
Supplies and miscellaneous	96.65	1.10
Chauffeur	355.20	4.06
Storage and washing	123.88	1.42
Gasoline	191.89	2.19
Oil	48.80	.56
Grease	5.35	.06
	$1,599.03	18.27

"Civilization is a function of industrial production and industrial production is a function of technical insight." This epigram is somewhat widely quoted in Germany as expressing the protest of the technical world against the domination of the untechnical, lawyers, legislators and merchants, for example, in shaping the living conditions and institutions. It is the gist of an article on the subject in *Automobil-Welt* that technical bodies should make themselves felt in political activities and assert their superior rights for deciding ways and means in the advancement of civilization.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL-CLIMBS, ETC.

Nov. 19-26	Oakland, Cal., Idora Park Show, Under Management of Oakland Automobile Dealers' Association.
Dec. 1	Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 11-12	New York, Annual Meeting, Society of Automobile Engineers.
Jan. 14-28, 1911	Philadelphia, Annual Show, Philadelphia Licensed Automobile Dealers' Association, Third Regiment Armory.
Jan. 15-21, 1911	Detroit, Wayne Gardens, Detroit Automobile Dealers' Association.
Jan. 16-21, 1911	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Jan. 28-Feb. 4, '11	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11, '11	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Feb. 18-25	Minneapolis, Minn., Annual Show Minneapolis Automobile Show Association, National Guard Armory.
Feb. 18-25	Binghamton, N. Y., Second Annual Show, Binghamton Automobile Club and Chamber of Commerce, State Armory.
Feb. 18-25	Newark, N. J., Annual Show, New Jersey Automobile Exhibition Co.
Feb. 24-27	New Orleans, La., Annual Show, New Orleans Automobile Club.
Mch. 4-11, 1911	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.
Mar. 25-April 1	Buffalo, N. Y., Fourth Power Boat and Sportsmen's Show, Sixty-fifth Regiment Arsenal, Buffalo Launch Club.
Mch. 25-Apr. 8	Pittsburg, Annual Show, First week, pleasure cars; second week, commercial trucks. Automobile Dealers' Association of Pittsburg, Inc.

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IGNITION problems, of which there are a number, are in a more or less chaotic state in certain respects, despite the strides that were made and the relatively perfect methods, of which there is so much to be said in a favorable way. The introduction of the manograph as a means of photographing the wave of pressure during the power stroke affords an insight and a means of comparing the various classes of ignition equipment and the efficacy of the several plans. The most recent investigations of the thermic performance of motors utilizing the manograph show that one spark, well timed, is all that the occasion requires when the speed is low. The result is precisely the same with or without a magneto at this low speed, provided only that the timing is propitious. As the speed is increased difficulty is experienced, and an acute ambition creeps in as the speed advances from approximately 800 revolutions per minute. One safe conclusion is that the spark plug should be located in the region of the intake valve. There is a positive gain also if two sparks are delivered in the mixture simultaneously.

* * *

REVIEWING the practice abroad as it is being displayed at the Olympia Show in London, is not disconcerting from the point of view of the American designer; British practice, as it is reflected for 1911, indicates that the "economy bug" is in full control of the thinking apparatus of the English engineer. The reports coming over, however, to the effect that small cars are ruling, fails to take into account the overshadowing influence of a surfeit of taxicabs. Take the taxicabs away and English automobile practice will then be found more or less as it was last year. Discussion in the past is father to the thought that the English were bent on eliminating poppet valve types of motors, substituting rotary and sleeve-valve mechanisms, taking the Knight motor as the standard to go by, or the thing to get around, as the case may be. An examination of the Olympia Show proves quite conclusively that the English designers failed to get around the Knight patents. The prevailing opinion is that trouble was encountered and most of the innovators are delighted to be back home among poppet-valve motors. If the English designers failed in their attempt to substitute something better than poppet valves for motors, they have at least introduced many little refinements, and the cars, taking them as a whole, are refined.

* * *

WIRE wheels are used more extensively than ever in English automobile work, but an article on hickory, which appears this week in THE AUTOMOBILE, presents the main reason for this partiality to wire construction. Every man who ever had anything to do with a bicycle will have a positive opinion that will not be entirely favorable to wire wheels. The other side of the story is that hickory is not a familiar product in Great Britain and the time has arrived in American forestry when the conservation of the hickory supply is a paramount issue. The Forest Service of the United States Department of Agriculture is giving this important problem distinguished consideration, pointing out the waste that runs riot, and how wood-choppers disregard every consideration for economy. The support of the automobile industry is due the Department in this important undertaking and it is believed that the threatening invasion of the wire wheel, and all it implies, should suffice for the impetus.

* * *

RECOUNTING the incidents and cost of a long tour opens in THE AUTOMOBILE this week. This character of information has been extremely difficult to obtain bereft of trade cant, but in this case the incidents of the tour were very carefully recorded log fashion and the final summing up of the cost will be good information for the new automobilist who may be too much inclined to the belief that touring is a one-sided affair, with pleasure holding the center of the stage. The real pith of the matter is that touring, under well-regulated conditions, with a studied itinerary, provision for the cost, and a proper outfit, holds no equal in the field of recreation. It is a great mistake, however, to mar the pleasures of a tour through a short-sighted disregard of the simple expedients which even a journey on a railroad train would naturally suggest.

* * *

THIS year seems to be the most promising for the introduction of commercial (freight) automobiles. The several plants throughout the country are giving this part of the industry more and better attention than formerly and the users of freight automobiles are intelligently receptive now. The second week at the Garden Show should prove most interesting to makers and users alike.

News Section

HAPPENINGS OF THE WEEK IN VARIOUS SECTIONS OF THE COUNTRY AS GATHERED BY THE 84 SPECIAL WRITERS AND CORRESPONDENTS OF "THE AUTOMOBILE"

Selden Patent case on hearing in United States Circuit Court of Appeals—Arguments will be concluded on Friday—News of the coming automobile shows—A. L. A. M. announces list of freight truck exhibits for second week of Garden show—Special article on Olympia show in London—W. H. Cameron says British makers use unnecessary labor—Motor Club of Harrisburg conducts its autumn endurance run—New York Automobile Trade Association has many entries for its coming two-day run—Briscoe will make and sell "Utility" cars in England—Peeps through auto goggles at distant lands—Other snappy news from all around.

Curtain Rises on Last Scene of Selden Fight

WITH impressive pomp and circumstance the curtain has risen upon what may prove the final scene of the long-drawn-out Selden Patent litigation. The stage is set in the Federal Circuit Court of Appeals and the full bench, consisting of the venerable judges, McComb, Ward and Noyes, are hearing argument *pro* and *con* with regard to the most momentous question ever raised in the history of motordom.

Both sides are represented by eminent counsel and the court room at each session is filled with interested audiences.

The status of the matter is as follows: Appeal was perfected by the Ford Motor Company and others from the decision of District Judge Hough, who upheld the Selden Patent and granted an injunction against them.

The patents involved are those covering the gasoline engine and its chief auxiliary elements as applied to locomotion on the roads. The complainants originally were George B. Selden and the Electric Vehicle Company, and later the Columbia Motor Car Company succeeded to the rights of the Electric Vehicle Company. The A. L. A. M. is interested through its administration of the licensing power conveyed to it through the other parties in interest.

A decision sustaining Judge Hough's ruling would mean a readjustment of motordom to meet the new condition. An adverse decision would prove even more radical in its effects, as it would lift the present restrictions from the motor-making trade.

Henry Ford, president of the Ford company, a battler of the first rank, is attending every session, as are attorneys representing many of the independent organizations and corporations. On the other hand, the A. L. A. M. is represented by a battery of legal talent, and Alfred Reeves and a number of other officers are watching each step in the proceedings with intense interest.

The proceedings were opened by Livingston Gifford on behalf of the appellant Ford company. His argument dealt chiefly with the facts, leaving the discussion of the law principally to the closing argument of Edmund Wetmore.

In Mr. Gifford's argument he traced the history of the automobile, beginning with steam vehicles in England prior to the introduction of the railroad and carried it down to the time of Selden's application for patents. He referred to delays in the patent extending from 1889 to 1895 and then continued with the history of the development of the modern automobile. He particularly referred to the exhibition of a Benz car at the Paris Exposition of 1893 and continued up to the present. He spoke in detail of the contributions to the art by Daimler, Ford, Duryea and Maxwell.

Taking another line, his argument went into the history of hydro-carbon gas engines, commencing with Lenoir in 1861; Brayton in 1872; Otto in 1876, and subsequent developments of them.

His deductions from his array of facts were that Selden had contributed nothing to the art; that the Selden vehicle was wrong in every particular, including his wagon, his engine and his combination of wagon and engine. Finally Mr. Gifford concluded that the Selden patent was invalid in toto; that nobody had ever infringed it and that Selden himself had never built a vehicle or an engine that would run.

At the opening Tuesday morning, Samuel R. Betts, for the appellees, opened the other side of the argument. Mr. Betts treated of the case generally, upholding the Selden device at every point where Mr. Gifford had assailed it. He asserted that the patent was valid and that courts had so adjudicated it. He was followed by William A. Redding, who took up the facts involved in the case. He pointed out the fact that there were no automobiles in use prior to the Selden patent and made an emphatic point that no patents are on file covering the subject matter that antedate those of George B. Selden.

Time for adjournment cut off Mr. Redding's address and it will be continued Wednesday morning.

Following him will come Frederick P. Fish, a noted orator, who will complete the case of the A. L. A. M., treating upon the law of the action.

Edmund Wetmore will conclude for the Ford company, except for an address by Frederic Coudert, who has been representing the Panhard interests.

It was found that the case could not be finished by Wednesday night and two hours will be allowed the attorneys on both sides to wind up the presentation, on Friday.

Already the attorneys are figuring upon the future of the litigation. In case the patents are overturned the case may go to the Supreme Court of the United States under the same procedure that obtained in the Carnegie case. On the other hand, if the decision of the lower court is sustained, the attorneys for the appellants figure that a certificate of importance will be sufficient to take the case to the highest court.

Both sides express the utmost confidence in the merits of their cases, but neither principals nor attorneys would express any opinion as to the outcome.

Throughout the arguments, the judges were attentively interested and numerous pertinent queries were directed at attorneys for both sides from the bench. Judge McComb particularly questioned Mr. Betts on several points made by the lawyer. This single fact seemed to enliven the opposing attorneys. On the other hand Mr. Gifford had to answer numerous queries while he was addressing the court.

A decision of the case is not expected immediately and may be delayed in regular order for several weeks.

News Notes of the Coming Automobile Shows

AUTOMOBILE exhibitions are now the foremost element of interest in motordom. Shows of every kind, ranging from those of national scope to local exhibitions of a few styles and makes, are in the process of making. Every center of motoring is preparing for its show and as a result there is a stirring and activity of interest wherever two or three live dealers are gathered together.

Preparations for the New York shows are moving along steadily and while nothing radical with regard to them has developed during the past week, distinct progress has been made.

In the coming A. L. A. M. show at Madison Square Garden the announcement is made that the following cars that have never been shown at a licensed exhibition will be displayed:

Marmon, Reo, Maxwell, Overland, Premier, Mitchell, National, Jackson, Brush, Regal, Stoddard-Dayton, Hupmobile, Midland, Moline, Moon, Oakland, Ohio, Pullman, Speedwell, American, Amplex, Atlas, Cartercar, Case, Chadwick, Inter-State, Kissel, Buckeye, McIntyre, Marion, Courier, Morgan, Garford, Mack, Rapid, Reliance and Grabowsky.

The above are in addition to the old members of the Association of Licensed Automobile Manufacturers and the importers, the total number of car exhibitors for the big show being 68.

A.M.C.M.E.A. List Includes 61 Makers

Two more motor car manufacturers were signed up for space in the Palace show during the past week. These are: The De Tamble Motor Co., of Anderson, Ind., and the L. M. Hartman Sales Agency, of York, Pa., which handles the Hart Kraft truck.

The Chase Motor Truck Company will have a full line displayed at this show, as will also the Henry Motor Car Sales Co. The list now contains the names of 61 concerns that may be classed as manufacturers or special representatives of the makers.

Dealers and Club Clash in Milwaukee

MILWAUKEE, Nov. 21—The motor show situation in Milwaukee, Wis., has taken a serious turn and the split between the Milwaukee Automobile Club and the dealers, which threatened to weaken the second annual club show last February, has been made complete. The dealers now have organized a permanent association and at a meeting last week decided to hold the first annual show during the week beginning January 15, 1911.

The club, as usual, had planned to hold its third show during the week following the Chicago show, or February 12. The club has an option on the Auditorium for this period, while the dealers' association has contracted for the use of the building during the week of January 15.

At a special meeting of the Milwaukee Automobile Club, on November 18, a committee was appointed to confer with the dealers' association with the idea of combining the two shows. It is known that it would be ill advised to have two shows in Milwaukee.

The dealers' association is proceeding with its plans and has appointed Bart J. Ruddle as general manager of the show. The show committee consists of Frank J. Edwards, manager of the Kissel Kar Co.; Emil Estberg; R. G. Bates, of the Bates-Odenbrett Automobile Co.; Waldemar Kopmeier, of the Kopmeier Motor Car Co., and Edgar F. Sanger, of the E. F. Sanger Co.

Applications for space have been made by the following named dealers. all members of the association:

American Automobile Co., Pierce-Arrow: Bates-Odenbrett Automobile Co., Winton, Overland. Marion and Marmon: Curtis Auto Co., Reo and Corbin: Emil Estberg. Pope-Hartford and Woods and Waverley electrics: Franklyn Auto & Supply Co., Franklin and Babcock electric: Hickman-Lauson-Diener Co., Ford; Jonas Automobile Co., Peerless and Cadillac; Johnson-Burnham Sales Co., Interstate; Kopmeier Motor Car Co., Detroit electric and Chalmers; Kissel Kar Co., Kissel; Rambler Garage Co., Rambler; Studebaker Automobile Co., Studebaker, E-M-F and Flanders; Albert Smith, Palmer-Singer; Edgar F. Sanger Co., Stearns, Maxwell and Columbia; Welch Bros. Motor Car Co., Packard and Rauch & Lang electric.

Clifford E. Golder has been elected president of the Milwaukee Dealers' Association. Other officers are: Secretary, H. B. Pruden; treasurer, August A. Jonas.

Newark Show Dates Are Selected

NEWARK, N. J., Nov. 21—Dates for the Newark automobile show have been fixed for the week of February 18-25, and the New Jersey Automobile Exhibition Company is now busy trying to find a suitable hall. Former shows have been held in the Sussex County armory, but as the indications point to a much larger list of exhibitors than ever before, it is thought the armory would prove too small. The company is considering the First Regiment armory. The show has the support of the New Jersey Trade Association and the Associated Automobile Club of New Jersey.

Big Show Promised in Boston

BOSTON, Mass., Nov. 21—The ninth annual automobile show will be held in this city from March 4 to 11, and already the Boston Automobile Dealers' Association is confronted with the problem of supplying space for all those who wish to exhibit. A plan to limit the amount of space to be allotted is under consideration. A corps of architects and engineers has surveyed Mechanics building and it is thought that considerable additions to the available space can be made by slight alterations.

Electric Division Quaker Feature

PHILADELPHIA, Pa., Nov. 21—One of the features of the Philadelphia Automobile Show this year, which is scheduled for the Third Regiment armory the two weeks of February 14-28, will be the display of electrics. Among the cars that will be shown in this division are: Woods, Rauch & Lang, Baker, Babcock, Studebaker, Columbia, Detroit and Waverley.

Columbus Club May Abandon Show

COLUMBUS, O., Nov. 21—At a meeting of the board of governors of the Columbus Automobile Club it was decided to abandon the proposed automobile show unless a suitable hall can be secured, nearer to the heart of the city than the Ohio State Fair Grounds. The committee to secure a site for the show failed to report much progress.

Chauffeurs' Strike Still Critical

"Closed Shop" and no quarter is the demand of the striking chauffeurs in New York, and a settlement of the strike seems as far away as ever. The Motor Cab Owners' Association has issued a statement that the difficulty is about over, and while the taxis are moving with a trifle more freedom than heretofore with the aid of the police, the strike is still on.

A meeting of the strikers was held Sunday night, at which resolutions were passed to continue the strike to a conclusion. As we go to press every taxicab on the street is "riding" a policeman and of "fares" there are none at all.

Fifty Per Cent. of Clean Scores in Harrisburg Club Run

HARRISBURG, PA., Nov. 21—The fall endurance run of the Motor Club of Harrisburg started to-day with an entry list of 22 cars. To-day's run was 170 miles through York, Hanover, Hagerstown, Chambersburg and back to Harrisburg. The entries are classified in four divisions from 3A to 6A, which means that they are strictly stock cars valued at from $1201 to $4000 each. The list of entries includes:

DIVISION 3A—$1,201 TO $1,600

Car	Entrant	Driver
Crawford	Crawford Auto Co.	A. A. Miller
Reo	Harrisburg Auto Co.	G. G. McFarland
Everitt	W. Wayne Davis Co.	Davis
	Runabouts	
Maxwell	And. Redmond	Redmond
Firestone-Columbus	Seltzer & McCowen	Rasmussen
KlineKar	Ideal M. C. Co.	Vandergrift
Warren-Detroit	Taylor Mot. Dis. Co.	Kinginger
	DIVISION 4A—$1,601-$2,000	
Inter-State	Cent. Pa. Auto Co.	I. W. Dill
Velie	Zimmerman M. C. Co.	P. W. Walker
Maxwell	A. Redmond	H. E. Walls
Velie	Rockefeller and By'y	Rockefeller
Kline	B. C. K. M. C. Co.	Fletcher
Pullman	Keystone M. C. Co.	Brown
	DIVISION 5A—$2,001-$3,000	
Pullman	Pullman M. C. Co.	Steins
Pullman	Pullman M. C. Co.	Gallatin
Kline	B. C. K. M. C. Co.	C. C. Fairman
	Runabouts	
Kline	B. C. K. M. C. Co.	Seig
Pullman	Keystone M. C. Co.	Jones
	DIVISION 6A—$3,001-$4,000	
Columbia	A. Redmond	Smith
Matheson	Ideal M. C. Co.	Hall
	Runabouts	
Pullman	Pullman M. C. Co.	Welker
Kline	B. C. K. M. C. Co.	Kline

HARRISBURG, PA., Nov. 22—Eleven out of the 21 starters in the two-day run of the Motor Club of Harrisburg came through yesterday's trial with clean road scores. Three Klines were penalized; a Maxwell had oiler troubles and was withdrawn, while another drew a penalty for work on the road. The Firestone-Columbus turned turtle and the Inter-State entry met with a bad accident caused by skidding. One of the Crawfords broke an axle. A Velie car was penalized 21 points for lateness at control.

The run to-day is over a route that is quite as trying as yesterday's, with more and stiffer hills to climb. Tire troubles were much in evidence yesterday.

Two Thanksgiving Day Race Meetings

Thanksgiving Day will be celebrated by two race meetings within a short distance from New York. O. D. Corbett, who is secretary of the Automobile Club of Hudson County, is head of an enterprise to hold a race program at the old Guttenburg race track. This meeting has attracted a large list of entries and is sanctioned by the Contest Board.

The other meeting will be held at the track of the Bridgetown, N. J., Driving Association, under the auspices of the newly formed South Jersey Motor Club. Harvey Ringler is one of the promoters of this meet.

Aviation Meetings Present and to Come

PHILADELPHIA, Nov. 21—Aviation has succeeded the other important things in life as the most interesting phase of existence in Philadelphia this week. The flyers started last week at Point Breeze, and the Quaker City has acquired a crick in the neck from looking upward to see if a stray machine or two might not be hovering over the town.

A big section of the population was rewarded by seeing Grahame-White swoop across the navy yard, flying in a Farman close to the latticed fighting masts of the anchored battleships, and other feature flights have attracted attention. The meeting will continue until Friday.

HAVANA, CUBA, Nov. 21—John B. Moisant, winner of the Statue of Liberty flight in New York recently, and an aggregation of flying talent will show in Havana during the coming season. It is announced that Mr. Moisant's company will consist of half a dozen prominent airmen.

Racers Ready for Santa Monica Trial

LOS ANGELES, Nov. 21—Eight racing cars, entered for the annual Santa Monica road race, are being sent along at speed over the smooth 8.4-mile course in preparation for the big event which is scheduled for Thanksgiving day. The entries so far include: Apperson, Fiat, Isotta, Pope-Hartford, Lozier, Knox, Ohio and Only Car. It is predicted by the drivers that last year's record of 64.45 miles an hour will be excelled. The race is 24 laps of the course. A light-car race and a stock-car race will precede the main event. Both are fairly well filled.

Through an error in THE AUTOMOBILE's account of the recent electric run promoted by the Philadelphia *North American* it was made to appear that the second-prize-winning Studebaker car was a Waverley. The car was splendidly driven by Mrs. E. V. Stratton, wife of the Studebaker manager in Philadelphia.

Naphtha Given Service Test on Road

CHICAGO, Nov. 21—Benzine as motor fuel was given a test last week under the direction of the Chicago Motor Club. The Falcar that tied with two Molines with perfect score in the recent 1,000-mile reliability run, equipped with a Rayfield carbureter, was used in the test.

The tanks of the car were drained and filled with naphtha, commercially known as benzine, testing .55 specific gravity at 40 degrees Fahrenheit. A gallon of pure lubricating oil was put into the crankcase reservoir.

Starting from Van Dyke's garage last Thursday the car was run 670 miles to Cincinnati and return by way of Indianapolis and Lafayette. The average running time was 22 miles an hour and the total fuel consumption was 36 gallons, an average of 18.6 miles a gallon. Oil was taken on at Cincinnati and at Indianapolis on the return trip.

No motor trouble was reported except difficulty in starting on the final leg of the trip after the car had stood all night in a cold garage. Then it required priming with gasoline several times before it would start. The car weighed 3,600 pounds with three passengers.

Benzine test on a Fal-Car fitted with a Rayfield carbureter made to determine the feasibility of using heavy hydrocarbon fuel instead of gasoline proper

Big Crowds Attend Olympia Show

LONDON, Nov. 10—Wonderful, indeed, is the London Olympia Show, both as regards number of cars exhibited and attendance of visitors. At the moment of writing, right in the middle of the week, the official figures of those passing the turnstiles on the first four days is 102,200. The regular price of admission for six of the days is 24 cents from 10 a. m. to 10 p. m., continuously; on one day it is $1.25 and on one day 60 cents, and even on the highest priced day 16,000 persons put their money down at the turnstiles.

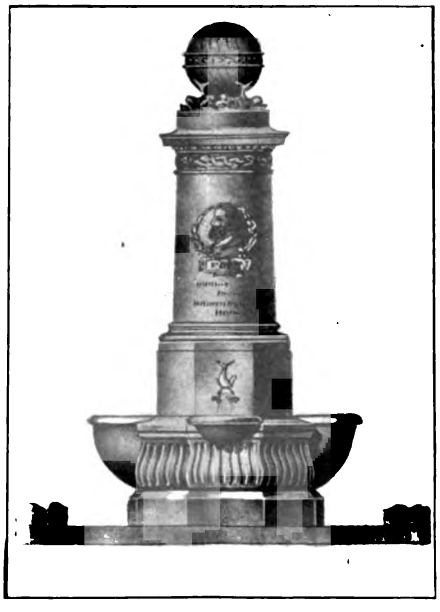
There are in the building a total of 589 cars and polished chassis (8 less than were seen at the last Olympia show) made up of 294 British, 185 French, 29 German, 28 Italian, 25 Belgium, 18 United States, 7 Swiss and 3 Austrian. The total number of exhibitors of all kinds being 298.

The first inspection gave an impression that there was little alteration from last season's models on the polished chassis and it was only by carefully examining the details that one could learn of the real changes effected in the engine and transmission. There is no likelihood of any maker in England standardizing in large quantity which has so materially aided in the success of several well-known United States cars.

The extent to which the wire wheel is now used can be realized from the statement that all the leading British car makers fit these as their regular pattern and almost all of them will only fit wood wheels to special order and will not promise any time for delivery.

One English maker who catalogued a four-cylinder block casting during 1910 has reverted to single-cylinder casting and this is about the only exception that can be discovered on the increasing use of the block casting for engines up to about 80 millimeters diameter. For the first time at any show a six-cylinder block casting is displayed by a French maker and the Fiat Company has something on the same lines; both engines rate at 24 horsepower.

As regards number of cylinders, the four holds 95 per cent. of the trade, only four English makers turning out a single-cylinder engine and not more than half a dozen make the two cylinder. The six cylinder, hitherto thought too costly for other than large cars, is being introduced for as small as 15 horsepower by the Delauney-Belleville and slightly larger engines by some dozen companies, hardly any exceeding 24 horsepower.



Good roads memorial to be erected in honor of Colonel Pope

The big valves talked about last show time is still upon paper and whilst sizes are fractionally increased, more attention has been devoted to cam profiles, silencing of the tappet rods, reducing strength of valve springs to a minimum and completely guarding springs and valve stems against dirt by enclosing with oil-tight covers.

One English firm stands by the overhead valve, both for inlet and exhaust, Darracqs show overhead valves on their new model 15 horsepower and a Belgium house introduces similar valves driven by an enclosed chain from the tail end of the engine. Engine noises are decreasing, the timing gears coming in for much attention from designers, helical or skew wheels making an otherwise noisy engine quiet.

The ratio of bore to stroke, taking an average through quite a long list of cars, is 1 to 1 1-4, although a French house is intending to sell a chassis with the ratio of 1 to 2, viz., 80-mm. bore and 160-mm. stroke. Practicable limits of compression have been reached and 80 lbs. to the square inch is the standard. Piston speed is increasing and how many revolutions a minute will be reached only a year hence, no one would care to predict. To give an idea of what English designers are trying for in this direction, it may be remarked that a week before these words were written a four-cylinder Vauxhall, 90-mm. bore by 130-mm. stroke was driven for a flying half mile on Brooklands track at the officially certified speed of 100.08 miles per hour and this same car is capable of over 90 m.p.h. for a ten-mile spin.

Oiling systems for moderate-priced cars, selling complete for $1,000, have an oil pump in the crank chamber.

Small air pumps for raising and maintaining pressure in gasoline tanks are regular features of nearly all the new models, these air pumps receiving motion from the camshaft.

On moderate powered and small cars, say below 26-30 horsepower, thermo-syphon circulation is on 75 per cent.

In connection with the water circulating system some makers are prepared to install devices for heating the interiors of limousine and landaulet bodied cars.

"Silent" Knight Inventor Coming

Charles Y. Knight, inventor of the "Silent" Knight motor, which has found immense favor abroad, is en route for America. Mr. Knight is expected to arrive in New York the last of this week. He is a native American, although his residence is in Coventry, England, where his extensive business is located.

His trip to the United States at this time will arouse much speculation as to its significance. It is understood that several American manufacturers have been negotiating with Mr. Knight.

Delay in 1911 Model Announcements

Almost at the opening of the current year it seemed as if many of the big automobile manufacturers of America would announce their lines for the coming year long before the business of 1910 had been finished.

There are several of good reasons why undue haste should not be used in making announcements of this character, and the trade is to be congratulated that a number of makers have restrained, even thus far, from prematurity in this regard. Prominent among the concerns which have shown a high degree of conservatism in this particular are the Pierce and others, which concerns probably will not make the annual announcements until just before show time, or even at the show.

Pope Memorial as Tribute for Road Work

HARTFORD, Nov. 21—As a tribute to the work for good roads done by the late Colonel Albert A. Pope, of Boston, a movement which was started a short time after his death to collect funds and build a memorial to Colonel Pope in Hartford, Conn., promises to be successful. The memorial will be placed in Pope Park, which Colonel Pope presented to the city of Hartford.

The Hartford Board of Trade has been collecting money and working to interest the users of the roads in the movement, and the announcement is made that nearly $4,500 has been realized. It is proposed to erect a handsome drinking fountain to cost about $7,500.

"Good Cars, but Labor Is Wasted," Comments Cameron

LONDON, Nov. 12—W. H. Cameron, chief engineer of the Willys-Overland Company, who is now abroad on a tour of investigation of various automobile plants, was interviewed exclusively for THE AUTOMOBILE during his visit to England. Mr. Cameron had nothing to say about the foreign plans of the Overland company, but he did make some interesting comments on British motor car manufacture after personal inspection of several plants and visiting the Olympia show.

"I am struck with the amount of unnecessary work done on many of the British cars," said Mr. Cameron, "and I believe that the education of the automobile-buying public in England has been given a wrong turn by reason of it. In my opinion too much stress is laid upon finishing. It seems to me that a saving could be made by abandoning the practice of machining up the throw of crankshafts and similar parts.

"This extra and unnecessary labor must add to the cost of the car without increasing its value, which, naturally, makes the finished product unduly expensive. The workmanship on English-made automobiles is equal to the best anywhere."

While Mr. Cameron was in France he met with some difficulty in inspecting the motor-car plants on account of the attitude of the French makers with regard to visiting engineers. He is about to leave for Italy and expects to return to America in three weeks.

Receiver for Barnes Motor Co.

DETROIT, MICH., Nov. 21—The long expected crisis in the affairs of the Barnes Motor Co., formerly the Anhut Motor Car Co., came Tuesday last, when Frank Howard, of this city, on behalf of a number of creditors, filed a petition in the United States District Court here, asking that the concern be declared bankrupt. Following the formal order of adjudication, William M. Walker, president of the company, was appointed receiver with a bond of $15,000.

The schedules place the total liabilities at $64,242.33 and the assets at $143,540.25. Many of the latter are of a doubtful character, however, and the creditors will not realize anywhere near the full amount of their claims.

The bankruptcy proceedings were forecasted by Mr. Walker more than a week ago, when about $14,000 was distributed among the creditors through the Union Trust Co.

Among the principal creditors are: The Peninsular Savings bank, Detroit, $4,000; American Ball Bearing Co., Cleveland, $3,697.40; Anhut-Robinson Auto Sales Co., Detroit, $1,960; R. C. Day, Toledo, $1,648; R. C. Durant, son of W. C. Durant, of the General Motors, $2,812; Fez Auto Sales Co., Chicago, $2,500; Griswold Motor & Body Co., $6,245; N. B. O'Connor, $3,000.

Assets include auto parts, machinery and partly completed motor cars in the plant at No. 510 Howard street, on which a valuation of $21,500 is placed; a factory and real estate in Chatham, Ont., valued at $50,000; $2,116 due the company in notes, and $26,571.23 in open accounts, but included in the latter item is about $20,000 in fire insurance policies.

Gaeth Assets Sold to Stuyvesant Co.

CLEVELAND, Nov. 21—The Stuyvesant Motor Car Co. has purchased the assets of the Gaeth Automobile Co., which recently went into the hands of a receiver. The Stuyvesant Co. is now building a 6-cylinder car called the Stuyvesant and has a large factory at Sandusky, covering 150,000 square feet of floor space.

The Gaeth plant will be removed to Sandusky and the company will continue to build the Gaeth model. It is the intention to build 200 4-cylinder Gaeths and 100 Stuyvesant Six models for 1911. The board of directors of the Stuyvesant Co. are F. E. Stuyvesant, for a number of years with the White Co., A. H. Frunfelder, A. C. Newton, and C. J. Castle.

Matheson Reorganization Perfected

WILKES-BARRE, Pa., Nov. 21—Under a rule of the Court of Common Pleas of Luzerne County, the assets of the Matheson Motor Car Company have been ordered transferred to the Matheson Automobile Company. The order was directed to Asher Miner and W. C. Shepherd, receivers of the manufacturing company and required them to turn over the property, franchises and rights to the New York concern.

Under the plan of reorganization the following directors have been named for the Matheson Automobile Company: W. C. Shepherd, J. W. Hollenback, Asher Miner, W. H. Conyngham, John A. Turner, W. H. Son, John C. Bridgman, R. N. Bennett, I. M. Thomas, C. W. Matheson, M. M. O'Boyle, Henry Hess, E. S. Fretz, J. B. Russell and Cortez Jennings. The capitalization of the new company has been increased by $700,000, making the security issues total $1,100,000 plus a new bond issue of $300,000. On the face of the situation the company is now in much better financial shape than ever in its history.

The wholesale sales department has been transferred to Wilkes-Barre, and the New York salesrooms and other departments will be operated as a retail branch. The company will confine itself to the manufacture of its Big Four and Silent Six exclusively. W. C. Shepherd is president and general manager.

American Invasion Will Become a Reality

If the English persist in over-finishing the cars made there.
If unnecessary labor is thrown promiscuously into English cars.
If French makers continue to hide behind a Chinese wall.

Bretz Company Takes Larger Quarters

Changing from its location in the Times building, the J. S. Bretz Company, which handles a number of imported accessories, has secured the whole of the sixth floor of the Motor Hall, 250 West Fifty-fourth street.

Clubman Proves Ability as Race Manager

Otto F. Rost, who was active in conducting the race meeting of the Mt. Vernon Automobile Club at the Empire City track November 12, accomplished quite a feat in making the meeting a success. It was postponed twice on account of bad weather, and the day finally selected to hold it was anything but favorable. Nevertheless, the paid attendance was sufficient to meet all expenses and the sport was interesting.

Mr. Rost is a native of Hamburg, Germany, and has been in the automobile business for about three years. He started as a salesman for the Black Manufacturing Company, of Chicago, and after one year was made New York manager of the Black Crow line.

Otto F. Rost, who promoted the recent Mt. Vernon Club Meet.

Two-Day Autumn Run Attracts Big Entry List

WITH an entry list including many more cars than were expected, the two-day endurance run under the auspices of the New York Automobile Trade Association, which will be held November 29 and 30, promises to be one of the most interesting affairs of its kind given about New York this season. The contest is restricted to stock cars under Class A rules.

There are seven divisions in Class A, ranging from under $800 to over $4,000, and sterling silver trophies will be provided for the winners in as many of the classes as fill. In addition to the trophies hung up by the association, a number of firms and corporations have signified their intention of furnishing trophies for the contest.

The first day's run starts at 8 o'clock Tuesday morning, November 29, from Columbus Circle. The route is through Stamford, Conn., via New Rochelle, Larchmont, Mamaroneck, Rye, Port Chester and Greenwich. Thence through Springfield, New Canaan and Ridgefield to Danbury, where noon control will be established, 62 miles from the start. Returning, the column will go through Mill Plains, Brewster, Carmel, Lake Mahopac, Baldwin Place, Briarcliff, Elmsford, Harts Corners and Greenville to New York. Checking stations will be established at Briarcliff, Danbury and Stamford, and, of course, at the start and finish. The total distance of the first day's run will be 136 miles.

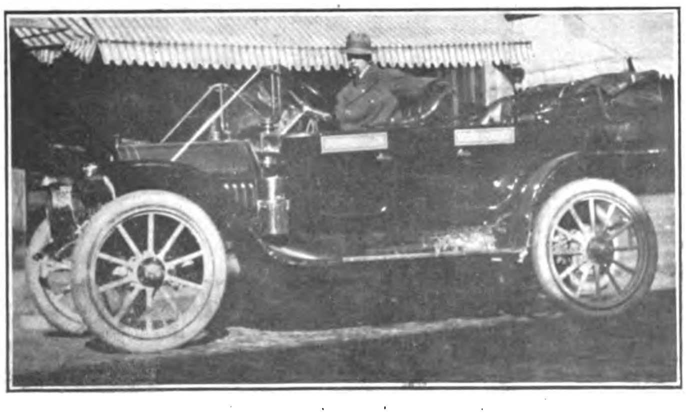
The final day will be through New Jersey. The cars will be checked out on the Jersey side of the Forty-second street ferry at 8 o'clock and will proceed through Hackensack, Suffern, Ramapo, Tuxedo, South Field, Vails Gate to Newburg, noon control. The return trip will be via Little Britain, Goshen, Chester, Munroe and South Field; thence following in reverse the route taken in the morning. Entries close tomorrow.

The list of entrants includes the following to date:

The B. F. Goodrich Co., of New York; Maxwell-Briscoe, Inc.; Mitchell Motor Co., of New York; The A. Elliott Ranney Co.; Pope-Hartford Auto Co.; Union Automobile Co.; Cimiotti Bros.; The Gordin Motor Vehicle Corporation, of New York; The Allen Auto Specialty Co.; Jackson Motor Co.; Poertner Motor Car Co.; Oldsmobile Co., of New York; Warner Inst. Co.; Carl H. Page & Co.; Pennsylvania Motor Car Co.; Short & Wright; Garland Automobile Co.; Atlantic Motor Co.; Chas. E. Reiss; R. M. Owen; The White Co.; Ford Motor Co.; Victor Auto Storage Co.; Haynes Automobile Co.; Stearns Motor Co.; Zust Motor Co.

Everitt "30" Shows Well Over the Hills

BOSTON, Nov. 21—J. E. Brown, of the J. W. Bowman Company, of this city, recently drove an Everitt "30" from Portland, Maine, to Concord, N. H., via York Beach and Dover, a distance of 108 miles, at an average speed of 20 miles an hour, using one gallon of gasoline for each 15 miles traveled over the heavy roads and stiff grades and did not suffer any tire trouble. Mr. Brown was accompanied on the trip by G. R. Lewis, of the *Engineering Review*.



Everitt "30" which recently made a creditable trans-Maine record

New Racers Will Speed at New Orleans

NEW ORLEANS, Nov. 21—The début of the Case car in racing will be made at the Mardi Gras speed carnival, which will be run off at the Fair Grounds race track February 25-27. This car was formerly known as the Pierce-Racine, but so far its part in contest work has been limited to a few reliability runs. The Cino will also make its bow. Entries have been made of several Cole "30s," Jacksons and Buicks.

Ohio Car Starts Across Continent

NEW YORK, Nov. 22—Starting from the ancient City Hall at noon Tuesday, an Ohio car took up the first leg of a run that has San Francisco as its terminus. It is planned to make 150 miles each day and to reach the Golden Gate on Christmas Day. An accurate record of gasoline and oil consumption will be kept throughout the trip.

The car, known as the "Mud Hen, is driven by Charles Thacher. E. L. Ferguson and Guy W. Finney are passengers.

R. E. Ross Resigns from Q. C. M. C.

PHILADELPHIA, PA., Nov. 21—Robert E. Ross, one of the most active members of the Quaker City Motor Club, and head of the contest committee of that organization, has resigned from the club. Mr. Ross ascribes as a cause for his action the pressure of private business. Recently the concern with which he is identified secured some large paving contracts in and about Philadelphia.

The annual election of the club is scheduled for November 30 and a full report of the recent Fairmount Park road race will be submitted. Some of the officers declare that the report may contain the real reason for the withdrawal of Mr. Ross.

Ray Harroun to Make Aeroplanes

INDIANAPOLIS, Nov. 21—The retirement of Ray Harroun as a driver of racing automobiles has been announced. Mr. Harroun has entered the field of manufacturing aeroplane engines and aeroplanes and will be seen no more in the yellow-jacketed Marmon racing cars. His appearance in the Grand Prix race was his final exhibition of that sort.

In racing Mr. Harroun has enjoyed a big measure of success, although engaged in it only a comparatively short time. He has been head of the racing team of the Marmon-Nordyke Company for a little over one year. He is a college-bred man and has a degree of M. E.

Military Automobile Arouses Interest

Recent editions of newspapers in different sections of the country contained an interesting article, quoting E. H. Barnum, New York branch manager of the Regal Motor Car Co., and a National Guard officer in his State, relative to the possibilities of the automobile in the army.

Mr. Barnum says that as a result of the article he has received many letters from inventors, would-be inventors and fanatics, making inquiries and soliciting his aid with a view of bringing forward to public attention inventions and proposed inventions of their creation. Mr. Barnum believes that there are tremendous possibilities for the automobile in the army.

Briscoe to Make and Market "Utility" Cars

LONDON, Nov. 5—Benjamin F. Briscoe, president of the United States Motor Company, who is now visiting England and Continental Europe for the purpose of founding the United International Motors, Limited, a company affiliated with the big American concern of which he is the head, has departed for Paris after a stay here of considerable length. The company was launched during his stay, although a site for the British factory has not yet been selected.

In speaking about the situation before leaving, Mr. Briscoe in an interview exclusively for THE AUTOMOBILE had the following to say:

"An examination of the motor situation in England shows the opportunity for the 'utility' car. By 'utility' car I do not mean an automobile limited to the carrying of freight, but such a car as will lend itself to the use of physicians, contractors, salesmen, farmers and other persons who are now using horse-drawn vehicles for personal transportation in their callings. In fact, the field might be extended to many who do not feel that they can afford a horse and buggy in business, but who could easily afford a small car that would have a much wider range of usefulness than the horse.

"Such a car, to cost from $575 to $1,500, would find a ready market not only in England, but upon the Continent as well, in my opinion, and the production of such types will be the mission of the United International Motors, Limited. From my personal observation there is a dearth of such cars in England.

"Careful investigation of the motor conditions here shows that the total production of motor cars in England amounts to about 12,000 or 14,000 annually. In addition there are some 7,000 imported each year. I believe that cars such as we propose to build here, with all the advantage that we have of a strong technical staff of engineers connected with our American factories and the cumulative experience they have had in construction work and experimentation, will fill a gap of considerable proportions.

"We have been looking for a suitable site for the erection of our first factory in England, but have not definitely fixed upon it. It appears to me that many of the automobile factories are not scientifically located as regards transportation, labor and other important particulars. We wish to secure the most available site possible and will be very careful in selecting it.

"I believe that motor cars can be manufactured in England at less expense than they can in the United States, particularly with the aid of our engineers and their staffs now engaged in America, utilizing English labor and material."

Upon leaving London Mr. Briscoe went to Paris and from there he will go to Berlin with the idea of arranging branches of United International Motors. He will return to England before sailing for home.

The plans of Mr. Briscoe and those associated with him have attracted much attention in England, and as a general thing it may be said that the establishment of the factory will be welcomed by the British public.

Reno Valveless Motor Interests France

PARIS, Nov. 14—Europe has plenty of valveless motors, but very few besides the Knight that have given satisfactory results under working conditions. There is an exception in the Reno, a slide valve motor of French origin, just placed on the market by Hart O. Berg.

The cylinders of the Reno have two circular ports; the upper one is for the intake, the lower one for the exhaust. Within the cylinders is a split ring—a compression ring—with a face depth of about 1 1-2 inches. This depth is sufficient for the ring to cover both ports, thus giving a compression-tight chamber. When the ring is moved upward it uncovers the exhaust port; when brought downward it uncovers the intake and at the same time closes the exhaust port. The main idea is remarkably simple, and the adoption of this principle results in a reduction in the number of parts required for the motor, with, contrary to the generality of slide valve motors, a considerable reduction in manufacturing cost.

For accessibility and ease of upkeep the motor compares well with the poppet valve type.

Lubrication has been provided for by means of an oil pump worked off the camshaft, which delivers oil to the four rocker arms, which are encased with their actuating rods. The supply of oil is carried along the rocker arm to the ball and socket at the inner end, a sufficient quantity passes through to the walls of the compression ring, and the surplus flows down the outside of the cylinder and within the push rod housing to a hole in the base of the cylinder through which it flows onto the connecting rod. Crankshaft bearings and cylinders are lubricated by splash.

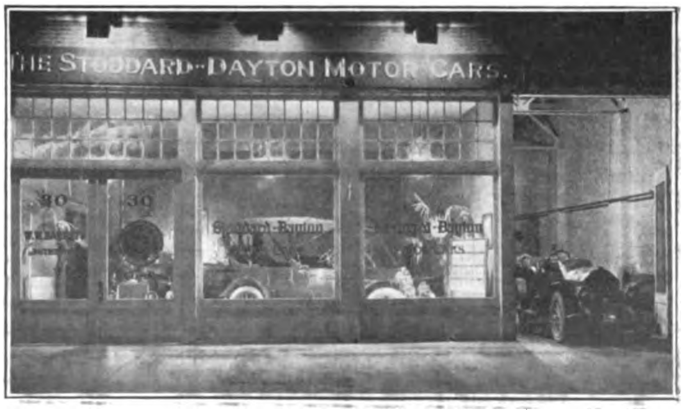
So far as can be judged from road tests, it has the advantage of big valve area, ensuring complete filling of the cylinder and a quick and complete scavenging. At the same time the large valve area is secured without the enlargement of the combustion chamber and the loss of efficiency through the formation of pockets. The split rings have been found to retain compression as well as poppet valves in the best condition. On the bench the motor develops 28 horsepower at 1,350 revolutions, which is found to be its most efficient speed. It can be accelerated up to 2,200 revolutions a minute.

Congressmen Campaigned in Stoddard

DENVER, COL., Nov. 21—Congressman G. M. Hitchcock, candidate for the United States Senate, and Congressman Latta, candidate for re-election at the recent election, made a tour of certain portions of Colorado during the campaign that is as unique in politics as it is in motoring.

In a Stoddard-Dayton car, driven by a son of Mr. Latta, the two politicians made a trip of over 1,000 miles through the mountains and deserts in nine days, making from seven to a dozen speeches each day. The actual running speed of the car was about twenty miles an hour over going that would be hard to equal anywhere. One whole day was consumed on roads that ran across typical Colorado sand ridges, a terror to motorists.

The car made the trip without mechanical trouble and only a small amount of tire difficulty was experienced. Other candidates have used the automobile in making their canvasses, but the tour of Messrs. Hitchcock and Latta is probably a record of its kind. The accompanying picture shows the Colorado home of the Stoddard-Dayton.



Home of the Stoddard-Dayton in Denver—at night

Peeps Through Auto Goggles at Distant Lands

IN the City of Jerusalem there are but two automobiles. Like Jerusalem, like Palestine. It may be many years before the automobile becomes a popular vehicle, even for purposes of pleasure, in Palestine. But there is a plausible reason for the holding back of improvements in the way of locomotion. The trouble is with the roads. It is doubtful if much worse roads exist in any part of the so-called civilized world. Up to this time, there has been but one tourist who has had the bravery to attempt to thread the roads of Palestine with an automobile.

From Ceylon comes the news that the taxicab has to a certain degree found favor. Bombay and Calcutta have taken their place among the modern cities of the world in the matter of calling for up-to-date methods of locomotion. Cars to the number of sixty are to be introduced at once into these cities, a company having been organized with a view to the undertaking. Cab hire is at the rate of 16 cents a mile.

There has yet to be seen an automobile upon the streets of Sandakan, the capital of British North Borneo. It has 6,000 or 7,000 inhabitants and is situated on Sandakan Bay. The Chinese town is on the flat, near the sea. The European bungalows are principally on the hills at the back of the town. Sandakan Harbor runs inland 17 miles. There is limited opportunity for automobiles just within and around the town. It takes from four days to a month to reach the interior, formerly called the "head-hunting country"; but now gradually giving way to industries, and especially in the Para rubber line. Later reports from there say that the plantations devoted to rubber-raising are doing well.

Until within a few years, transportation in Portuguese East Africa by means of the automobile seemed a question of wild speculation. But quite recently conditions changed materially for the better. Formerly, there were only "rivers of sand" in this portion of the world. In Lourenço, which is the capital of the province, an automobile appeared upon the street recently. It was the first ever seen there. The automobile in question is of the pattern which sells in America for $750, or thereabouts. By the time that the middleman and the tariff each had their bit out of the deal, the automobile stood the purchaser $1,400. Since the day that this machine made its appearance, four other automobiles have been put into active service in Lourenço. The streets of the town have just been paved with stones brought 50 miles by rail from the borders of the Transvaal, and they are now in excellent condition for automobiling. There is a market here for a limited number of cheap-grade automobiles.

Within the reef district in Johannesburg there are at least 1,000 motor cars in practical use. This number includes about 60 taxicabs, of European make. The types of automobiles which seem to be particularly in demand are cars of from 16 to 28 horsepower. The prices which seem to be most favored are from $1,250 to $2,500.

In the hilly island of Porto Rico, where the roads were built originally for heavy traffic, and particularly for military service, with very slight regard for grades, there is now a demand for automobiles in excess of the supply. There are about 750 miles of splendid roads on the island. But the humidity of the climate is exceedingly hard on automobiles.

During the last fiscal year Canada imported 1,424 automobiles, their value being $1,732,215, of which $1,569,227 came from the United States. Canada manufactured and exported automobiles to the value of $405,011.

At Huddersfield, in the West Riding of Yorkshire, England, where the fox-hunt has for years been one of the glorious sports, the automobile is creeping in. There are already 539 machines of various makes in that city. Of the total number of automobiles in use in Great Britain, 90 per cent. are in England and Wales; although there are 20,000 machines in Ireland and Scotland.

There being but one small automobile factory in Denmark, practically all of the automobiles in service are imported. Small runabouts, costing $750, for use by professional men are seen in considerable numbers. There is a low import duty on automobiles—2.68 cents per 2.2 pounds.

One sees few small automobiles in Germany. The demand runs to touring cars. In Nuremberg gasoline costs 32 cents per gallon.

Owing to lack of facilities for repairing automobiles in Rio de Janeiro, Brazil, the field for American-made automobiles has not been encouraging.

There are 44,769 automobiles, with 569,276 horsepower, registered in France.

The Italian Minister of Public Works has granted licenses for the opening of 52 new automobile lines, whose total length represents 1,864 miles, for the transportation of passengers and small freight throughout the Kingdom. Three taxicabs were recently put into commission in Palermo. There never have been any American-made automobiles in Palermo.

There are only 22 motor cars in use in British Guiana, in addition to five motor busses, which are in operation in Georgetown. Of the 22 machines, 11 were manufactured in America. The streets of Georgetown are wide, and well built. The automobiles are used to a considerable extent to run the distance to the Bartica rubber belt, where there are a number of rubber plantations. Gasoline is quite expensive in British Guiana, the price being $3.60 per drum of ten gallons.

The roads in the vicinity of Nanking, China, are in exceptionally good condition for automobiling and there are many pleasant drives. But there are only two automobiles owned by residents, these being the property of Chinese.

In the Amazon River region the owners of the rubber plantations are pressing automobiles into service to some extent, for the purpose of running between the estates. But as the South Americans are slow to adopt modernisms, the enterprise is not gaining ground rapidly.

Foreign automobiles without an international passport may be admitted to Germany, provided the driver can present to the customs officials at the border, or to the appropriate officials in uniform, a certificate from the proper officials in the foreign country, or if the vehicle in question complies with the local requirements of the driver's own country.

A person making application to become the driver of a motor vehicle in Germany is obliged to present his birth certificate, together with an unmounted photograph of himself; and he must also submit a doctor's certificate relating to his physical condition, especially with reference to eyesight and hearing.

Personal and Trade Notes

MINNEAPOLIS, MINN., Nov. 21—A. N. Smith, sales manager for the Royal Automobile Company, returned from Redfield, S. D., Saturday, where he closed with the Redfield Motor Car Company for the State agency on Abbott-Detroit cars. The deal involved the placing of 50 cars of this make on the initial order.

CHICAGO, Nov. 21—F. W. Eisele, who has been acting as a special factory representative of the Stromberg Motor Devices Company during the last year, has been appointed Ohio and Indiana manager, and will open up branch offices at Indianapolis.

DETROIT, MICH., Nov. 21—C. E. Gordon, formerly vice-president of the Western Malleable Iron Company, has joined the sales staff of the Timken-Detroit Axle Company.

CINCINNATI, O., Nov. 21—B. F. Gramm, vice-president and general manager of the Gramm Motor Truck & Car Company, which is completing a $300,000 factory at Lima, O., states that the concern will start off in January with a working force of 400 men. F. E. Castle, of the Castle Lamp Company, has removed from

Detroit to New York, and the New York offices of the Castle Lamp Company will be opened in the Fitzgerald Building, Forty-third street and Broadway.

Fargo, N. D., Nov. 21—This city has been selected as the location of the twenty-fifth branch house for the Ford Motor Company. The territory covered comprises North and South Dakota, and will be in charge of C. F. Reynolds, formerly with the Ford branch at Chicago.

Newark, Nov. 21—On the opening day of the next State Legislature, the New Jersey Automobile and Motor Club will present a bill remedying the present defects in the motor vehicle law. This bill is now being whipped into shape by the Legal Committee of the club, of which Vice-President Harry D. Bowman is chairman.

Boston, Nov. 21—The salesrooms of the Cole "30" in Boston are now located with the other motor agencies on Massachusetts avenue, the G. E. and H. J. Habich Co. having moved from Berkeley street last week.

Boston, Nov. 21—Fred P. O'Brien of the J. W. Maguire Co., Boston, agents for the Pierce-Arrow, was married last week to Miss Mary Elizabeth Mullins, of Cambridge. They went West on their wedding tour.

Boston, Nov. 21—John I. Taylor, owner of the Boston American baseball club, has embarked in the motor business with a company known as the Taylor Motor Sales Company, of which he is president. The company has taken on the Herreshoff for a start, but later on will take also a larger car and a commercial vehicle.

St. Louis, Nov. 21—The new branch house of the Hartford Rubber Works Co. has been opened at the southwest corner of Nineteenth and Locust streets. O. O. Petty, until recently manager of the local Firestone branch, is manager. A well equipped tire repair department has been made an important feature of the new business.

New York, Nov. 21—The Packard Motor Car Co. of New York has opened its new service building at Long Island City. The completion of this mammoth structure, after delays caused by quicksands, labor troubles, etc.. marks another important step in the progress of the Packard Co.

New York, Nov. 21—Louis Mansbach, treasurer of the Times Square Automobile Co., has left on the 20th Century for an extended visit to their western branches at Chicago, St. Louis and Kansas City.

Jacksonville, Nov. 21—The Glide Auto Co. of Florida has been formed to handle the Glide line for 1911. W. A. Jones will be manager of the new company, with headquarters in Jacksonville, where a new salesroom will be opened shortly.

Peoria, Nov. 21—The Bartholomew Co. of Peoria, Ill., is rushing the work on two extensive additions at Peoria Heights.

Wilmington, Del., Nov. 21—The Studebaker Automobile Co. has taken possession of its new building, 210 West Tenth street, where it has large and commodious quarters. The local agency is in charge of E. Gerry Brown. The Wilmington Automobile Co. has taken the local agency for the Lozier car, and during the past few days a representative of the company has been here demonstrating the machine. The West Side Garage, Inc., whose establishment is at Third and Connell streets, has taken the agency here for the Metz car. Andrew Johnson is the manager. Having taken the agency for the Hudson car, the Bradford Automobile Co. this week received a carload of 1911 models for local distribution.

Batavia, N. Y., Nov. 21—The Batavia Machine Co., Hilts & Kennedy, has dissolved partnership and the business has been taken over and will be continued by T. J. Kennedy.

Racine, Wis., Nov. 21—The entire force of the Mitchell-Lewis Motor Co. of Racine, Wis., has been placed on a ten-hour workday schedule. For some time the plant has been running eight hours a day, but the increase in the demand has forced the company to lengthen the workday and add more workmen.

Cleveland, Nov. 21—The business formerly conducted by the Auto Electric Co., 227 Jefferson avenue, Detroit, selling agents for the Willard Storage Battery Co. of Cleveland, Ohio, will in the future be conducted as a factory branch of the Willard Storage Battery Co., under the management of Max Hillman, formerly of the Auto Electric Co.

Mannheim, Germany, Nov. 11—Benz & Cie Rheinische Gasmotorenfabrik A. G. announce that Director Nammesfahr has retired from the management of that company.

Book Reviews

"EDISON: HIS LIFE AND INVENTIONS," IN WHICH ARE SET FORTH MANY HITHERTO UNKNOWN HAPPENINGS IN THE CAREER OF THE GREAT INVENTOR; "THE ART OF AVIATION," AND OTHER BOOKS

"EDISON, HIS LIFE AND INVENTIONS," Harper & Brothers, two volumes, 472 and 516 pages respectively, blue pebble cloth, gilt top and lettering, uncut edges, large type, charmingly illustrated, 16mo, and conspicuously good printshop work. The price is $4.00 per set.

EDISON, of popular conception, is not destroyed in this work; its virtue lies in its clearness of the putting of a long series of potential incidents, beginning with telegraphy before the war, following through the "great internal struggle," describing many amusing scenes not without their instructive side, with Edison in the foreground.

The first volume takes up "the age of electricity," presents Edison's pedigree, his boyhood days at Port Huron, Mich., are dwelt upon; it is pointed out how Edison as a telegrapher was none too satisfactory in view of his penchant for experimenting. From the crude instruments of war-time telegraphy to the stock ticker, and the introduction of automatic, duplex and quadruplex telegraphy, form intensely interesting chapters; then comes the telephone, for which Edison has done so much, to be followed by the motograph and microphone.

Perhaps the early struggles with the phonograph will hold interest for the average reader, but the coming of the incandescent lamp, coupled with the many ramifications of electric lighting, including the "world hunt for filament material," the contriving of a complete system of lighting, and the building of the first Edison station are all matters that make interesting and instructive reading, from the point of view of the audience without class or distinction. These were days devoted to the making of history for the historian, romance for the romancer, and the foundation of the greatest industry that the world has ever known. The first volume ends with the electric railway, but in closing the book reluctantly, Edison, as a boy, and his ambitious effort in the publication of a weekly newspaper known as the *Herald*, is one of the incidents that occupies a prominent position in a vast array of agreeable memories.

The second book opens with Edison at the office door of the ore-concentrating plant at Edison, N. J., presenting a characteristic likeness of the man who prefers to be known as an inventor, at a time when invention almost failed. It was at this period in Edison's life when the world discovered that his process of elimination, instead of being empirical, as some were wont to say, took on the form of a cold critical turning over of every stone for a mile on each side of the pathway which led from the birth of an idea to the absolute end.

Edison turned to the making of Portland cement when he found that his success in the magnetic ore milling field was not approved by nature. He must have concluded that if New Jersey as a State held too little of the magnetic ore to render his separator commercially valuable, that there was at least enough of raw materials to permit him to carry out a large idea, involving Portland cement, and the casting of the poor man's dwelling on a basis so well contrived that the rich man would look upon it with envy. But the scenery shifts; the great struggle for the perfection of motion pictures was entered into, resulting finally in the erection of 5-cent theaters in every hamlet, everywhere, which, as an educational undertaking, ranks next to the Bible.

Every automobilist will be interested in the storage battery development, and Edison's method of going about it, he having decided not to use all the things that seem to have crept into storage batteries up to that time, holding, as he said, to the idea that Nature must have one or two unexplored secrets. While these volumes should prove of absorbing interest to every man who has had to do with the building up of the electrical art, and to those who like a good story, there still remains scattered all through these two volumes the best exposé of the vicissitudes of the inventor that has yet been put into print. Edison not only tells of his inventions and how he perfected them, but he also offers the best school of experience of the inventor, his pitfalls and tribulations, that can be constructed from the cloth of experience.

No budding inventor can afford to risk his time, money and future happiness on a voyage bent on invention and exploitation without first ascertaining how the inventor himself is exploited by his friends and his enemies alike, and how he is likely to deceive himself at every turn with disappointment as the most promising reward. The history of Edison's work is rich in lore of the Patent Office, crammed to the brim with reminiscences which partake strongly of the wiles of those who have ever made it a practice to feed upon fat from the brains of inventors, and, with a certain nonchalance, busy themselves thereafter in weaving a romance around their alleged ancestors, paying the score from the ample fund that the inventive mind stands sponsor for. They are fine books for the inventor to read; if he has experience they are even more attractive, nor is it strange that there should be a groundwork for absorbing interest in these same books for the man who simply wishes to be amused and entertained.

"THE ART OF AVIATION," by R. W. A. Brewer. McGraw-Hill Book Company, 239 West Thirty-ninth street, New York City.

In view of the intense interest in the navigation of the air and its rapid development, the issuance of a practical handbook upon aeroplanes and their engines is a peculiarly appropriate and timely work. Mr. Brewer in his carefully compiled book traces the history of the heavier-than-air flying device from the popular viewpoint. While the technique of the volume is profound, it is purposely couched in terms easy of comprehension by the layman. A chapter is devoted to learning to fly and another to the general principles of flight, while the mechanical sections describe in minute detail the various types of engines adaptable to aeroplanes and structural plans of several of the leading varieties of machines.

"LEAVES FROM A MOTORIST'S LOG BOOK."

A most interesting account of a 4,000-mile trip through France, Spain and Italy, taken by Walter Hale and party in a stock Studebaker car, has been issued by the Studebaker Automobile Company. Mr. Hale's notes are illuminative and there are recounted dozens of entertaining and amusing incidents, all in terse style. Many valuable hints are conveyed to tourists who contemplate similar trips, for Mr. Hale's powers of description are of a high order and his observation of passing conditions was evidently comprehensive. Tabulation of the expense of operating the car during the whole trip shows that the actual cost was 2 4-5 cents for each passenger each mile. Fred Niblo, who accompanied the party, took a number of fine photographs and moving picture films, some of which are used to illustrate the book.

"IN UNFAMILIAR ENGLAND," by Thos. D. Murphy. Press of L. C. Page & Company, Boston.

As the name implies, the author has endeavored to bring out the most interesting points of England which the average tourist does not see, and about which nothing much has heretofore been published, touching lightly on what he calls "tourist frequented spots." This book will be found a most excellent guide to the tourist, and at the same time contains a wealth of information of historical interest. It deals more particularly with the author's travels in England, and also contains a brief résumé of his trip through Scotland and Wales, omitting nothing which should be of interest to the tourist traveling through these two arms of Great Britain. The book is also beautifully illustrated with sixteen full-page color plates and forty-eight duogravures of a character certainly more sumptuous than will be found in similar publications. As an appendix are included two folding inserts of maps, one of England and Wales, and one of Scotland and Ireland. These maps show in red lines a number of suggested touring routes which will be helpful to the autoist.

"REPORT OF STATE (N. Y.) COMMISSION OF HIGHWAYS."

Ever since the enactment of what is known as the "Money System Act" in 1898, by which the State obligated itself to pay to the various towns that abandoned the antiquated idea of working out the road tax a sum equal to 25 per cent. of the road taxes that were collected in cash, the highway system of New York has made a number of radical improvements in the character of the roads. These improvements are partially accountable to the operation of the so-called Higbie-Armstrong Act, which provided State co-operation to the extent of 50 per cent. in the cost of building improved roads. The road laws were amended in 1909 so that 100 per cent., instead of 25 per cent., was paid to the towns that collected their road taxes in money, and gave the State Engineer and Surveyor supervisory powers over the expenditure of the road taxes.

The foregoing is a brief résumé of the evolution of highway legislation in New York, which is detailed in the preface of the above-named volume. The work contains the first annual report of the commission, which recommends among other things that 500 miles of roadway be built annually, at a cost of $1,000,000. It shows the organization of the Highway Commission, and contains detailed reports on road construction and material. One table submitted is particularly illuminative. It shows the cost per mile of road construction in every county in the State. This ranged from $5,900 a mile in Niagara to $14,000 a mile in Oswego County. The total expenditure by the State up to January 1, 1900, for road improvements totals about $11,000,000.

Under the caption "Report of the First Deputy Regarding the Maintenance and Repair of State and County Highways" the results of experimentation with various kinds of road materials are set forth in detail, as well as a summary of the work actually accomplished. The report of the second deputy shows the supervision of town highways. According to the financial appendix the expenses of the administrative offices were $103,554, and those of the six divisions and two bureaus $394,224; those of the district superintendent $582, and for furniture and supplies $50,836, while the expenses of the Bureau of Town Highways cost $57,158 and the Bureau of Maintenance and Repair under it $49,207, making a total of $655,561 for salaries and expenses of the State supervision. The commission expended $3,771,000 on road construction. The report is the same as that transmitted to the Legislature January 12, 1910.

With the Commercials

LIST OF EXHIBITORS DURING THE SECOND WEEK OF THE A. L. A. M. SHOW—THE PENN-UNIT DELIVERY—OTHER NEWS OF INTEREST

WITH thirty-four exhibits of freight trucks and a comprehensive show of electrics, motorcycles and accessories the second week of the A. L. A. M. show at the Garden promises to be a memorable and historic affair. The manufacture of trucks has made big strides in the recent past and the line of cars to be shown is the largest ever gathered under one roof. The full list of motor trucks is as follows:

Morgan
Knox
Hewitt
Rapid
Lansden
Packard
General Vehicle
Cartercar
Franklin
Overland
McIntyre
Brasier
Pierce-Arrow
Hupp-Yeats
Autocar
Sampson
Studebaker
Mack
Anderson
Courier
Reo
Atlas
Garford
Lozier
Peerless
Reliance
Grubowsky
White
Alco
Buick
Glide
Brush
Randolph
Kissel

The Penn-Unit Delivery Wagon

As the name implies the Penn-Unit cars are so constructed that in the event of any part of their mechanism getting out of order the particular part can be replaced in a short time without removing the load, or disturbing any other parts of the car. To accomplish this it is absolutely necessary that every part of the chassis should be made to accurate gauge, obviating any fitting on the part of the mechanic who has to replace same, otherwise the utility would be lost. It resolves itself to a question as to whether it is cheaper to keep a separate unit on hand in case of accident or breakage of any part so that the car may be kept in commission or to have to lay the car up and lose the earning power of the vehicle while it is in the shop idle. There is not only the cost of the parts to be replaced but the time the car is out of service. The makers claim that almost every part of the car is made in their own shops, so that they have a control over the standardization and they give an absolute guarantee of interchangeability of parts. The vehicle is made by the Penn-Unit Car Company, Allentown, Pa., in one model to carry a normal load of 1,500 pounds and two men, suitable alike for the owner of a fleet of cars and the small trader who has only work enough for one. The unit system will particularly appeal to both as the latter is always sure to have his deliveries made and the former require less space for repair shops, as the units can be changed where the car stands in the ordinary way. The maximum speed of the car is 18 miles per hour, and the price of the truck as illustrated is $1,900.

This power unit consists of the motor, clutch, magneto, carbureter and oiling device, all of which are assembled on a sub-frame independently of the car-frame members. By removing two bolts and breaking several connections the complete unit can be drawn forward until it is completely detached from the car. The motor is of the two-cylinder, four-cycle opposed type, 20 horsepower (A. L. A. M. rating), water cooled, 5-inch bore and 5-inch stroke. Each cylinder casting forms one-half of the crankcase, making a very rigid construction. The cylinders are bored and ground to within 1-1000 part of an inch. The valves are mechanically operated. The crankshaft is made from a one-piece drop-forging, heat-treated, and ground to size. The large main bearings are of Parson's white brass.

The motor lubricating device is extremely simple and beyond the control of the driver. A constant supply of lubricant is fed through a sight-feed manifold to the main bearings and pistons, the overflow returning to a specially formed splash chamber in the crankcase wherein a constant level of oil is maintained. Any overflow is filtered and returned to the main supply reservoir.

The clutch is a special application of the Hele-Shaw clutch, made up of 21 corrugated pressed discs alternately phosphor bronze and steel.

A Bosch high-tension, gear-driven magneto furnishes the current for ignition, thereby eliminating the use of batteries, wiring, coil box, commutator and extra set of plugs. A Stromberg carbureter of the float-feed, constant-level type is provided.

The power unit is suspended at three points. Any undue distortion of the frame or stresses that the car may be subjected to will not be transmitted to the power plant.

The transmission is of the selective sliding-gear type, with a range of three speeds forward and one reverse.

The gears and shafts are made from chrome-nickel steel, heat-treated, hardened and ground. Double-row, annular ballbearings are provided throughout. There is no chance for leakage of oil and grease from the transmission, as there are no joints below the level of the lubricant. The Penn-Unit car has a straight-line drive which eliminates the use of power-consuming universal joints and gives a longer life to the wearing parts. The transmission case is made of an aluminum alloy, the tensile strength of which is 44,000 pounds to the square inch.

The differential is included in the transmission unit and is an integral part of same. Jackshafts and bearings are enclosed within seamless steel tubing, which not only adds strength but retains the lubricant and excludes dust and dirt. The jackshafts are of the semi-floating type and can at any time be withdrawn from the car without disturbing any other part of the construction. The transmission, differential and jackshafts together form a complete unit, suspended at three points similar to the power plant and can be dismounted entirely from the car quite as readily. Final drive is by means of two side roller chains direct to the rear wheels.

The braking system provides two sets of brakes, both being positive in their action and independent of each other. They are of the internal-expanding type and are mounted in large pressed-steel drums on the rear wheels. The drums are dust and waterproof. The expanding shoes are covered with an asbestos material.

The steering mechanism is of the irreversible worm and sector

Penn-Unit Delivery, in which speedy replacements may be made without removing load type with ball thrust bearings and eccentric bushes to take up wear. The entire control is on the left side of the car, giving the driver an unobstructed passage from the seat to the sidewalk, facilitating the quick delivery of goods.

The frame is made from chrome nickel steel pressed cold with a 4 x 1-2 inch channel section, rigidly braced by a number of cross-sections and four gusset plates of large dimensions reinforce the corners of the frame.

Front springs are semi-elliptic, 2 inches wide, 38 inches long. Platform springs, 2 inches wide and 42 inches long, are used in the rear. Graphite is placed between the leaves before assembling, and all spring shackles are fitted with oil cups. The spring eyes are fitted with Tobin bronze bushings and can be replaced any time at very small cost.

Axles are forged from high-grade steel and the hubs are fitted with ballbearings.

The sizes of the front wheels are 36 x 2 1-2 inches and rear wheels 40 x 2 1-2 inches. Wheelbase 90 inches and track 56 inches.

Cooling is accomplished by the simple and efficient thermo-syphon system, eliminating the water pump. A honeycomb radiator of large capacity is mounted directly over the motor and need not be removed or disturbed in any way when removing the power plant.

The gasoline tank is placed under the driver's seat and has a capacity of 12 gallons, 2 gallons always being held for an emergency by a novel device.

The standard carrying space for freight is 80 inches in length and 44 inches in width, but if desired the platfrom can be lengthened to 96 inches.

Four-Cylinder Rapid Truck Announced

PONTIAC, MICH., Nov. 21—The Rapid Motor Vehicle Company, of this city, has begun the construction of a new truck. A sample truck, which is the design of Engineer F. C. Frank, has been in use on the streets here. The new Rapid is of two-ton capacity and has the engine under a hood on the front of the car instead of under it. The engine is of the four-cylinder type. The new model, after being thoroughly tested, will be exhibited at various automobile shows throughout the country. It is planned to ultimately discontinue the manufacture of the old two-cylinder truck.

Syracuse Dealer Swells Auto Line

SYRACUSE, N. Y., Nov. 21—The Willis Motor Car Co. plans to enlarge its sales organization during the coming year, and instead of three will represent seven cars. The Selden and Baker Electric, which the Central Auto Sales Co. has previously represented in Syracuse, will be taken over, and J. Rathbun, who has been local manager for the former company, will be garage manager of the Willis concern. The Oldsmobile and Oakland pleasure cars and the Rapid and Reliance freight automobiles comprise the remainder of the line.

Thomas Creditors Not Discouraged

BUFFALO, Nov. 22—Creditors of the E. R. Thomas Motor Company, who have been in session since yesterday, declare that they are convinced that the company is not insolvent and state that there is much to encourage them in the situation. The business will be continued and the records of the company show that orders are coming in beyond the capacity of the plant to fill.

A plan has been perfected to place the company on a satisfactory financial basis, but the details of the plan will not be announced until the latter part of the week. The meeting will continue through to-morrow, when a recess will be taken over the holiday. It is though that the whole matter will be worked out by Friday night.

New Plant for Windshield Company

The Troy Carriage Sun Shade Company, of Troy, Ohio, has just built another factory in which will be manufactured exclusively the Troy automatic windshields and speedometers.

This plant is of gray steam-pressed brick, and will contain the general offices of the system.

Brief News from the Commercial Field

—The Dixon C. Walker Automobile Company, of Baltimore, Md., has taken on the agency for the Grabowsky Power Wagon Company.

—J. V. Dillman, formerly with the Wentworth Motor Car Company, has accepted the sales management of the Atterbury truck line for the American Auto Sales Company, 5015 Euclid avenue.

—The Columbus, Ohio, Motor Car Transportation Company, of Columbus, Ohio, was incorporated recently with an authorized capital of $100,000 for the purpose of operating a number of motor buses on the streets of Columbus.

—The S. Mack Motor Truck Company, of Baltimore, Md., was incorporated in Dover, Del., with a capital stock of $50,000. The incorporators are J. J. Smith, of Baltimore; Harry C. Yarrow, Jr., George Yarrow, and W. K. Yarrow, of Philadelphia.

—A Commercial Truck Show will be given in Pittsburg from April 4 to 8, 1911, under the auspices of the Automobile Dealers' Association of Pittsburg. The regular pleasure vehicle show will be held March 25 to April 1. Both will be in Duquesne Garden.

Electric Sound Signalling

ILLUSTRATING THE DETAILS OF THE EQUIPMENT WHICH IS USED TO TURN ELECTRICAL ENERGY INTO SOUND FOR SIGNALLING PURPOSES

ENERGY, of which there is a fixed quantity in the universe, is rendered manifest in various forms and may be converted from one to the other with more or less efficiency. The greatest storage battery in nature is represented by a ton of coal, storing in its mass 28,000 British thermal units of heat, all of which originated in the sun of our universe and was transferred across interplanetary space in the form of "radiant" energy with substantially no loss. There seems to be no authoritative statement of the precise efficiency of the transmission of radiant energy in the luminiferous ether, which is a body of a jelly-like consistency that permeates all space, even into the interstices of the elements and compounds as they obtain on the earth. The fact that radiant energy is transformed into energy in the form of heat by mere contact rather goes to show that just a little of the radiant energy may be transformed into heat, electricity or other vibrations as it traverses the luminiferous ether, the latter having body and substance, however attenuated; the density of the luminiferous, ether being estimated as producing a pressure of one pound per square mile on the surface of the earth.

It might be said that all these scientific problems are remote from the proper consideration of a mere device for use in signalling work, and yet the difference between a disagreeable noise and an efficacious signal is represented in the mere adaptation of the means at hand, and the intelligence displayed in working out the details. It is true that the man who rides in the driver's seat of an automobile and who presses the button when he desires to indicate to a pedestrian that he is in too close proximity to a moving automobile may be quite satisfied if his effort produces the desired result. He may never know that the desired result has two phases, one of which is represented in the agreeableness of the sound from his point of vantage, and the other in the fact that the pedestrian is warned, which he indicates by moving out of the way. Were the sound improperly produced, it would pile up around the automobile, becoming a mere disagreeable noise to the occupant of the seat, failing utterly as a warning to the pedestrian ahead. When the sound is efficiently produced there is barely enough of it given off in the immediate vicinity of the automobile to tell the driver that he has done his part, and the major portion of the wave is projected for a distance ahead, thereby serving as a necessary warning signal. Under efficient conditions the sound produced is agreeable to the ear of the occupant of the automobile, partly because there is so little of it from his point of vantage and again on account of the rate of vibration and the tone produced.

From the designer's point of view, under the circumstances, it is necessary for him to know all there is of knowledge in relation to energy and its transformation; he traces the energy of the sun as it was vibrated across space, perhaps in the carboniferous age, or long before, resulting in the chemical reduction of vegetation, due to contact with the sun's rays, and, in view of the processes then going on in the formation of coal, which, as before stated, became Nature's storage battery.

Following along in the process it was logically deduced that the energy stored in the coal could be unlocked by the application of heat and perhaps by chemical transformations and electrolytic work, which, according to the law of the conservation of energy, could be transformed into light, heat, electricity, sound and the mechanical equivalent, work.

When James Watt unraveled the philosophy of the tea-kettle and reached the conclusion that the steam rushing out of the spout held a force that could be turned to good account he furnished the groundwork for steam engines, by means of which the energy, as it is stored in coal, may be turned into mechanical work. Analytical chemists had their curiosity aroused, and they said: "If Watt can get power out of water by turning it into steam, the question is, where does it come from?" It required no analysis to show that he put a fire under the kettle, and that coal was the fuel, and so it became a mere matter of determining how much energy there resides in coal, and the British thermal unit of heat was ultimately established as the means of definitely measuring the same. The value of this heat unit is equal to that amount of energy which will raise the temperature of 1 pound of water 1 degree Fahrenheit at the point of its maximum density, which is 39.1 degrees. In the investigation of coal it was ascertained that the heating value is not the same in all samples, and that it varies considerably under the different conditions in every commercial grade, but it was finally concluded that a good average sample of coal should give up 14,000 British thermal units of heat when it is burned to complete combustion, resulting in carbonic acid, water and ash—so much for steam.

In 1801 some of the leading physicists discovered that by chemical action and reaction it was possible to produce electricity, and the storage battery, as it is known to-day, took form. Commercially, the electrochemical art, as it is represented in the storage battery, languished until perhaps 1860, when M. Gaston Plance commercially produced a type of storage battery that made it possible to utilize considerable quantities of energy from coal, storing it in the lead plates by an oxidizing process, giving it off, more or less at will, in the form of electricity. There are definite means at hand for determining the equivalent value of the energy as it resides in coal, in mechanical work as it is produced by a steam engine, or electrical energy as it is given out by a storage battery, and then, too, there is the method of taking the mechanical work of a steam engine, utilizing it to drive dynamo-electric machines in which electromagnetic process the energy originally residing in the coal is passed through succeeding cycles, as follows:

(a) The coal is burned under a steam boiler.
(b) The steam is passed into a steam engine, and its energy is utilized to drive the same.
(c) The mechanical work of the steam engine is used to drive the dynamo-electric machine.
(d) The dynamo-electric machine delivers equivalent electrical energy.
(e) The electrical energy may be used for lighting, heating, power purposes, electrochemical transformations and signaling, as in the Klaxon horn.

It is only a step from the consideration of coal as the source of energy to the utilization of gasoline as an equivalent source of the same energy. If coal is Nature's storage battery in the solid state of aggregation, gasoline (hydrocarbon liquids) is Nature's secondary battery in liquid form. It is convenient to use gasoline instead of coal because the fire is then built directly in the cylinder of the motor instead of being kindled under a boiler, requiring a ramification before the energy can be transformed into mechanical work. Nature foresaw the many wants of man and provided for them in divers ways; not the least of which is represented in the automobile, utilizing liquid fuel rather than coal.

Having thus roughly traced the energy that is used in the propulsion of automobiles from the dawn of day down to the present time, it remains to deal with contemporary and familiar things and to come to the point, calling attention to the fact that the underlying principle of the Klaxon horn relies upon the utilization of the energy as it was radiated from our sun of remotest time, transforming it by means of a battery into electricity, and then by the horn into sound, or instead of a battery a dynamo-electric machine is connected mechanically to the automobile motor and is driven thereby, furnishing the necessary electrical energy for actuating the horn in the production of sound. Briefly stated, then, the signal as given may be traced back to the energy of the sun by the man who knows, but from the point of view of the man who does not know, it is produced by pushing a button.

It will be apropos just here to describe the Klaxon horn, showing its details of design and construction, telling how it serves as the transformer of energy, resulting in the production of controlled sound for warning purposes, utilizing electricity as the immediate form of energy.

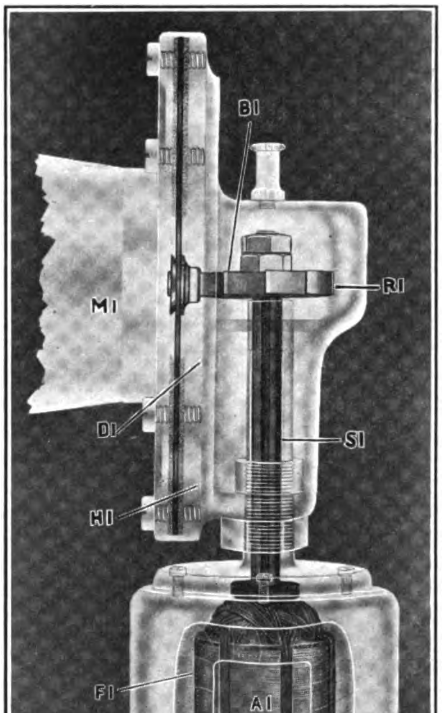


Fig. 1—X-ray of the Klaxon horn, showing the armature and knocker in relation to the diaphragm

Referring to Fig. 1, the device is shown complete, with the field F1 of the motor resting in the vertical position, and the armature A1 revolving within the field, with its spindle S1 projecting up and a ratchet R1 keyed to the end thereof. The teeth of the ratchet make contact with the button B1, which is centrally located in the diaphragm D1, the latter being in the housing H1, to which the megaphone M1 is also fastened. Electrical energy is applied to the terminals T1 and T2 when the motor becomes energized, and the armature A1 rotates in response thereto. This rotation is imparted to the ratchet wheel R1, and the latter being eccentrically disposed, the teeth thereof synchronizingly contact with the hardened button B1 of the diaphragm D1, setting up vibration therein. It is this vibration which pushes the air in and out of the megaphone, producing waves, and they, being of a predetermined length and amplitude, produce sound of the desired pitch, intensity and *Klangfarbe*. But this is not all. The sound must be produced where it is wanted. It is not wanted in the ear of the man who is driving the automobile, but it is desired to awaken the person ahead, warning him of the approach of the automobile, telling him (not to get out of the way) to obey the law, and keep to his proper side of the road, permitting the approaching automobile to go on its way in safety without endangering others. In order to accomplish this latter necessity there is a peculiar condition to be satisfied—the vibrations as they emanate from the megaphone of the instrument must be projected for a considerable distance ahead without interfering with each other, notwithstanding the fact that "complex sounds" have to be utilized. The problem is not different from that which must be solved in the cultivation of the human voice; the refined, well modulated utterances of the famed speaker may be projected for a considerable distance, and yet those who are in the immediate vicinity of the speaker are attracted by the agreeableness of the effort.

A better understanding of the ways and means for arriving at the desired result must of course come with a study of the refinements incorporated into the apparatus. It goes without saying that a crude device like the uncultured voice will evolve a noise, but the introduction of the necessary refinements, coupled with the proper harmony of the interrelating members, is what is needed for the more elevating result. Referring to Fig. 2, which is the shell-like field of the motor, attention is called to the eccentric bearing B1, to which reference was made in describing Fig. 1, showing how the teeth of the ratchet wheel or knocker were brought into contact with the button on the diaphragm. In this case the shaft S1 passes out through the bearing B1 at a point distant from the true axis of rotation, and when the automobilist essays to extend a warning, what he really does is to rotate the whole motor, thus bringing the shaft S1 in closer proximity to the button on the diaphragm, producing a greater or lesser interference, depending upon the amount of sound it is desired to produce.

In order to show some of the niceties of design and construction the armature of the motor is presented in Fig. 7, at A, showing the armature core of the built-up laminated slotted type on its spindle before it is prepared for the windings; B, showing the armature in a further state of preparation; C, presenting the same after it is wound; D, offering another view when the armature is baked ready for the commutator to be mounted into place, and E showing the armature A1 with the commutator C1 on the shaft S1, with the ratchet wheel R1 in place.

It will be understood that there is a great difference between a professionally made commutator as it is employed in standard dynamo building and the improvised affairs which accompany toy motors, and even some that are not supposed to be in the toy class. Fig. 6 shows the commutator of this motor in the finished

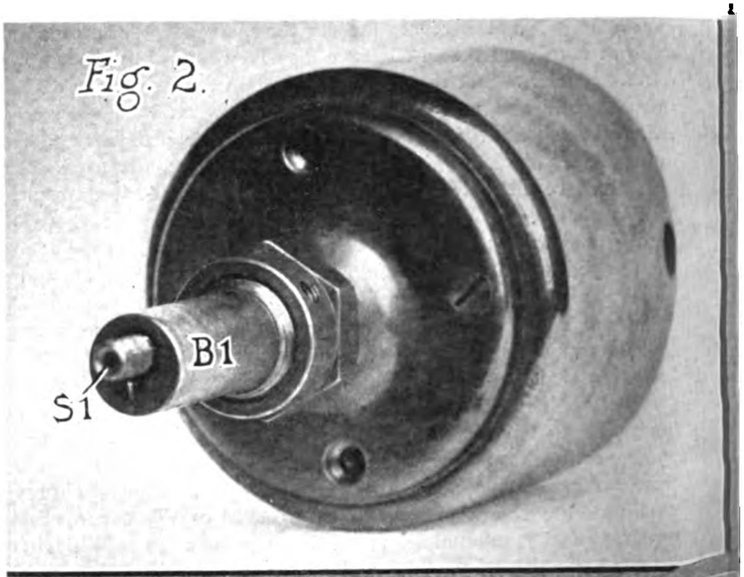


Fig. 2.

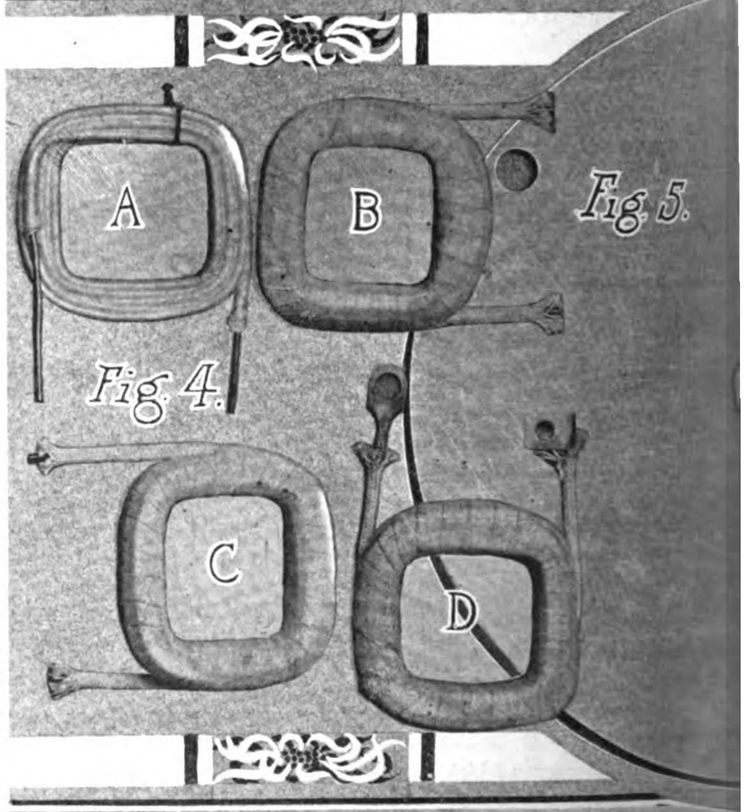


Fig. 4.
Fig. 5.

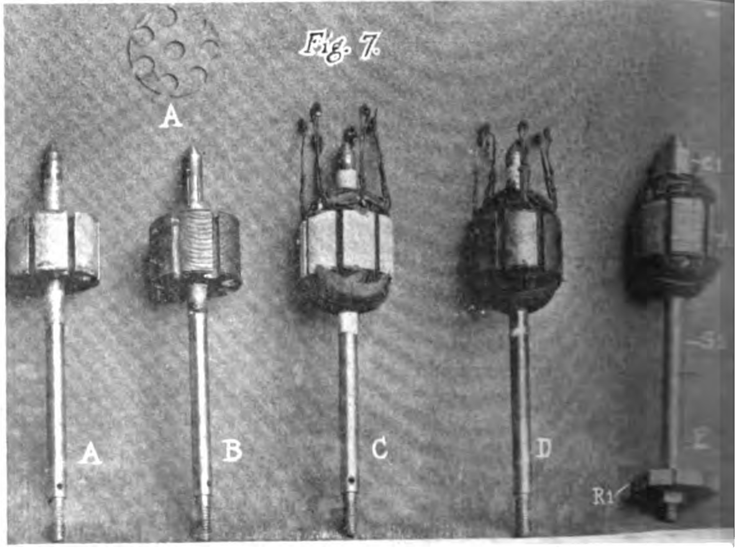


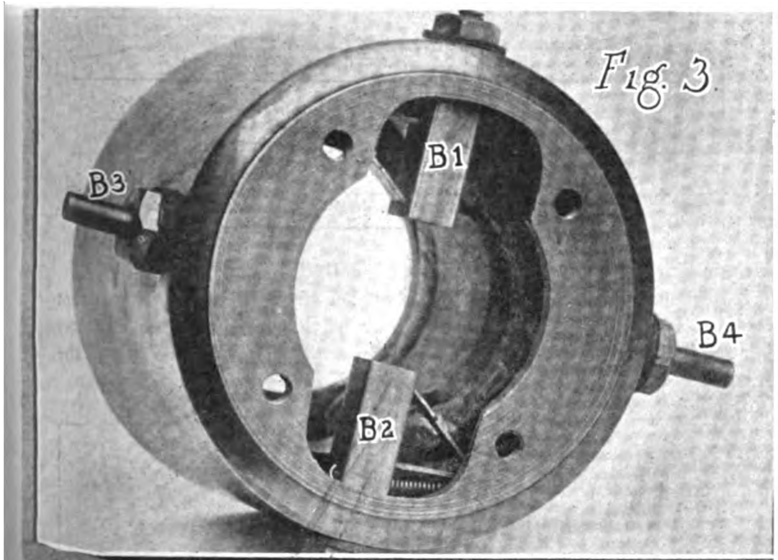
Fig. 7.

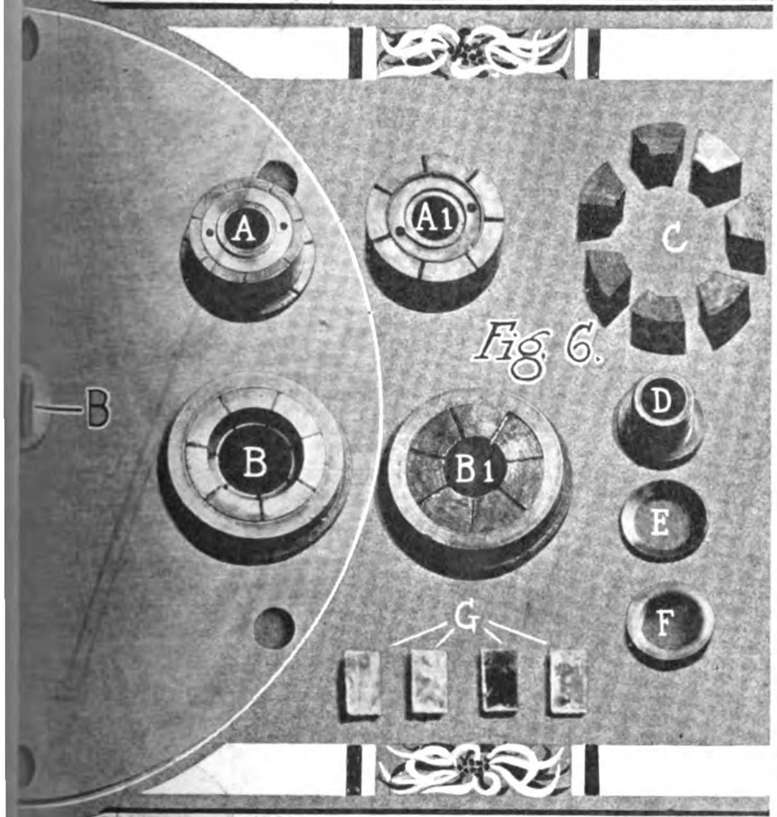
Fig. 2—Exterior view of the motor, showing the eccentric relation of the shaft to the end-bearing

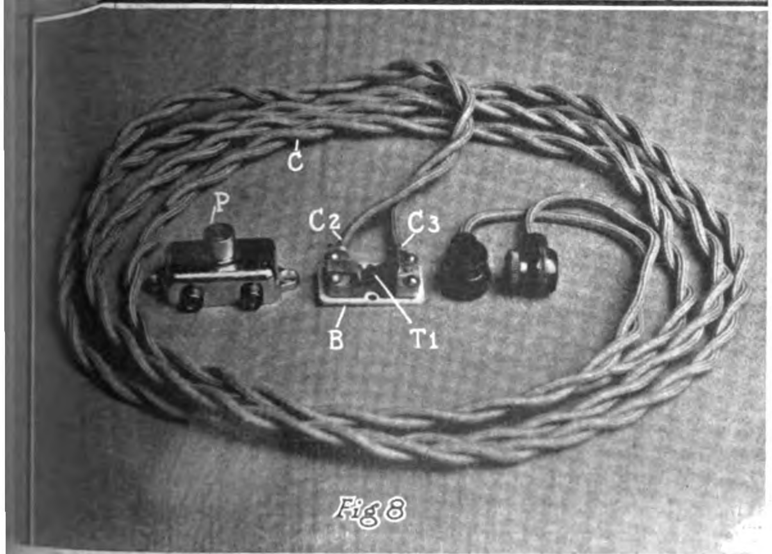
Fig. 4—Field windings in the four states of processing

Fig. 5—Diaphragm of vanadium steel with the button riveted in the center

Fig. 7—Armature shown during the various states leading up to the completed form







state at A, advanced an operation at A1, after it is turned down in the shell at B and before the turning operation at B1. The segments of the commutator are shown at C and the spool is presented at D. The washer of the beveled type is presented at E and the nut at F, while the mica insulation is shown at G. Experience has proven that the commutator of the little motor used in this work must be put together with the same care as that attending the building of commutators on the largest sizes of dynamos.

The field windings of this motor, of which there are two, look as shown in Fig. 4 during four states of construction, in which A shows the winding alone, B presents the same after it is taped, C shows it shaped up and D when the terminals are soldered on and the baking operation is done. It is the function of these field windings to magnetize the soft iron field, thereby contributing the magnetic quota, which, together with the electric current that flows in the windings of the armature, results in the torquing of the motor, ending in the desired amount of power at the proper speed, remembering, however, that the starting torque must be relatively great and this is assured by connecting the field windings in series with the windings of the armature so that the total current in passing into the armature also passes through the fields, and in view of the fact that the current in amperes increases as the speed decreases, owing to the falling off of the counter electromotive force, the very increase in current that would be fatal to a motor otherwise built saves the situation. Fig. 3 shows the field with the armature removed, presenting the brush holders B1 and B2, by means of which the current is transferred from the binding posts B3 and B4 to the commutator of the rotating member or armature. The field windings are housed in perfectly, thus protecting them from foreign matter and lubricating oil or other rotting substances. Fig. 5 is a near-size view of the diaphragm, which is made of a special grade of steel, showing the hardened button B riveted at the middle and six holding bolts, by means of which the diaphragm is clamped between the two housing members, it being flanked by two insulating pieces, the idea being to preserve the purity of tone of the diaphragm. Sound is produced by the vibrations set up in this diaphragm, as before stated, but despite the fact that it looks like a simple piece of Russia iron, blanked out in dies, the fact remains that it proved to be one of the most troublesome features in the building of this scientific sound producer. It is made of a special grade of steel, alloyed with vanadium, produced by special heats, for this specific work, and after it is blanked out in dies, heat-treated and the button is riveted in, it is then sent to a skilled workman, who lays it on a platen and by the deft use of a suitably contrived pien hammer the internal strains are relieved and it is flattened out so perfectly that the special means afforded for its keen inspection fails to disclose any defect which would interfere with its ability to measure out vibrations of the desired wave length and other characteristics, and it is interesting to observe that one of the requirements is to have the diaphragm absolutely flat, which, by the way, is a difficult accomplishment.

The electrical connections between the battery or other source of electrical energy and the horn, also the connections between the motor and the push button, must be electrically perfect and mechanically protected in order to assure continuity of performance of the instrument. Fig. 8 shows the duplex electric cable C1 that is provided with the instrument and the connections C2 and C3 to the terminals, which are screwed into the base B1, also the tongue T1, which is pressed into wiping contact with one of the terminals when the push P1 is pressed down; nor does it matter how much pressure is exerted, it will be impossible for the operator to disarrange the parts or destroy the wiping nature of the contact.

Fig. 3—Soft iron field—looking at the end with the spider off, showing the brush-holders in place

Fig. 6—Commutator and the parts of which it is built up

Fig. 8—Push-button, terminals and the duplex-flexible cable used in service

Among the Accessory Makers

SHAWMUT TIRE FOR WINTER WORK; BROWN'S COMPRESSOMETER; FLEXIBLE VALVE REMOVER AND GRINDING TOOL; GRAY & DAVIS LAMPS FOR CLOSED CARS

VALVE REMOVER AND GRINDING TOOLS

Two useful valve tools that have been placed on the market by The Flexible Valve Remover Co. of Providence, R. I., are shown in Figs. 1 and 2. The first is a combination screw driver and valve grinder 12 inches long. The knob at the top is on a swivel which lets the rod turn without moving the knob. The handle on the side moves up and down in a groove, thus enabling the operator to work with ease around piping and fittings, adjusting the handle where most convenient to use. The tool is bright nickel and the point is hardened. The price includes a spring for inserting under the valve mushroom.

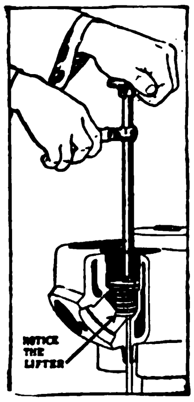


Fig. 1—Combination screw driver and valve grinder

The Flexible Valve Remover (Fig. 2) is made in two sizes, the large one being made extra heavy for big cars, and is 17 inches long. The lever has two slits, one on either side, into which the chain grips and the hooked top presses on the valve head, preventing it from rising when the spring is raised.

TIRE FOR NON-SKID WINTER WORK

The illustration here shown of the new block-tread non-skid tire as manufactured by the Shawmut Tire Co., of Boston, Mass. (Fig. 3) is intended to afford immunity from the customary troubles of Winter automobiling in addition to the service that is the normal expectation of a good pneumatic. The particular interest of the moment is centered in the efficiency of the block-tread, due to its good traction, and freedom from side slip. The tires are made in the several customary sizes, and it is the claim of the company that the fabric employed in the building up of the tire, together with the quality of the rubber and the details of workmanship, are such as to support the good work that the block-tread is responsible for, thus assuring a satisfactory mileage in addition to the other advantages.

Fig. 3—Non-skid tire for winter

REGISTERS CYLINDER COMPRESSION

The usual way to find out whether a certain cylinder has equal compression with its fellow-cylinders is to turn the motor over by the starting handle; but at best this is a poor way, although an experienced mechanic can more or less tell approximately which is the best and which the weakest. The compressometer (Fig. 4) is intended to indicate the exact amount of compression that each cylinder contains when the motor is revolved.

To use the meter unscrew a spark plug, screw the instrument in its place, and turn the motor over by hand. Under no consideration run the motor. The large hand will carry with it the small telltale hand and the latter will remain at the highest point when the meter is unscrewed. By this means each cylinder can be compared. Care should be taken to fit a washer under the meter in the same way as a spark plug; otherwise the reading will not be correct. The instrument is made by the H. W. Brown Co., of Syracuse, N. Y.

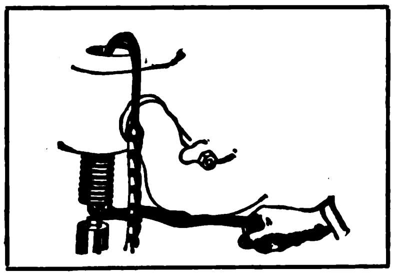


Fig. 2—Flexible valve remover

LAMP FOR CLOSED CARS

The lamp illustrated in Fig. 5 is known as a pillar lamp, and is designed for closed and limousine cars. Besides looking smart during the day, its object is to illuminate the step and door of the car, and being electrically lighted, the objections to oil lamps in this position are done away with. It can be furnished in all brass or brass with a black enamel top, and is equipped with six-volt, four-candlepower bulb and cut-out plug. It is made to take round holder or bracket. They are manufactured by Messrs. Gray & Davis, Amesbury, Mass.

TO FRUSTRATE THE MEDDLERS

Cars that are fitted with switches that one can lock in the "off" position are less likely to be tampered with than when the switch is one of the ordinary kind that anybody may turn on and perhaps start the engine. The New York Coil Co., 338 Pearl St., N. Y., has perfected such an anti-meddler switch with which genuine Yale locks are used, three keys being supplied. The switch must be turned in the off position before the key can be removed. The combination is for two sets of ignition, either two batteries or magneto and battery.

Fig. 4—The Brown compressometer

WATERPROOF AUTOMOBILE GARMENTS

A new waterproof material that has been creating quite a sensation on the European market is now being introduced into America, the sole manufacturers in this country being the Rubbinol Raincoat Company, 1777 Broadway, New York City. Besides raincoats, this concern makes capes, sleeve protectors, aprons, leg protectors, cap-hoods, gloves, etc. "Rubbinol" closely resembles rubber, but is much softer, lighter, non-crackable and better-looking. Besides being one of the lowest-priced materials on the market it is absolutely waterproof, oil-proof and gasoline-proof, the last-mentioned qualities making it more desirable than rubber. The color is black, with a dull finish.

Fig. 5—Pillar lamp for closed cars

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THE AUTOMOBILE

Making The Laboratory Pay

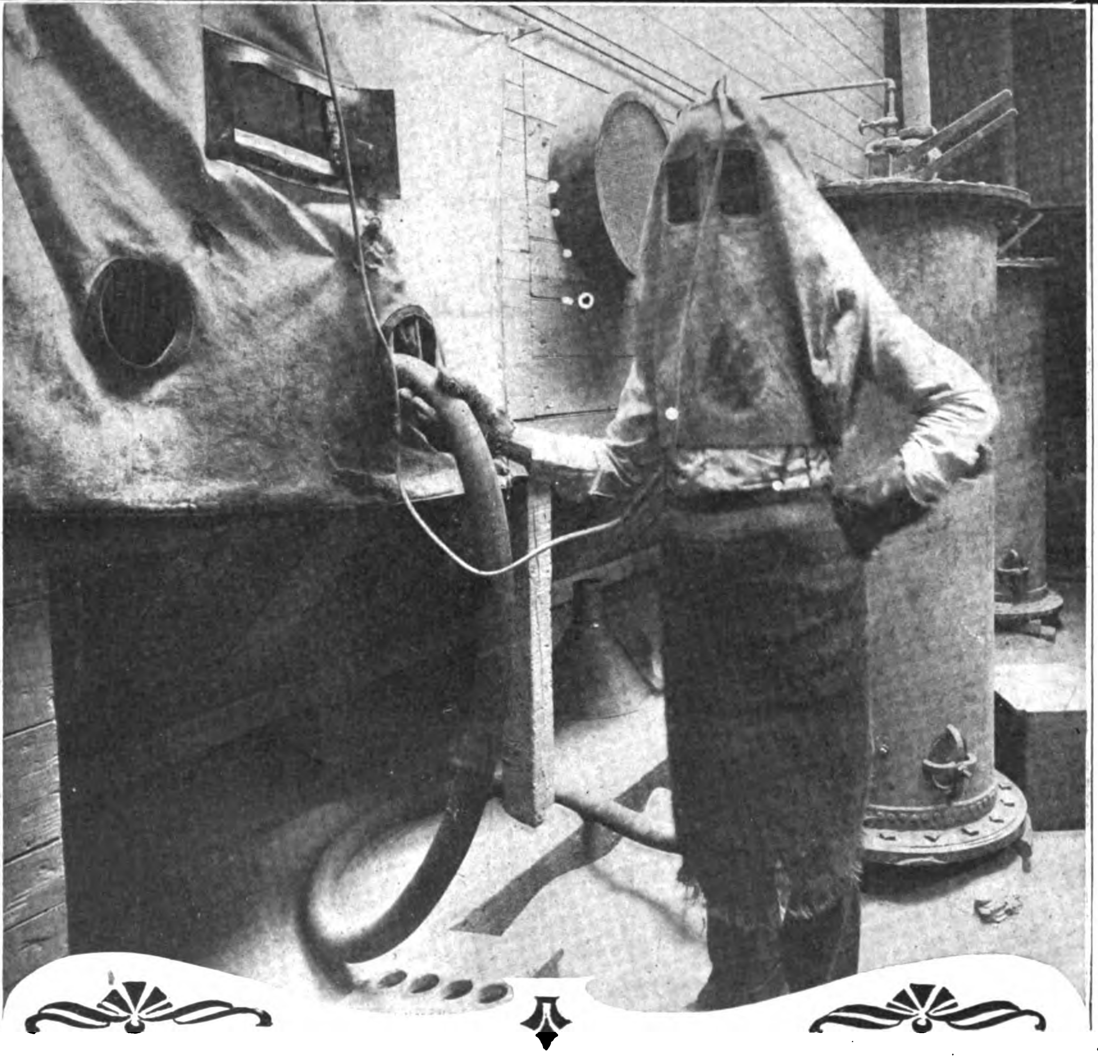


FIG. 1—SAND-BLAST EQUIPMENT VALUABLE FOR UNCOVERING DEFECTS IN FORGINGS AND OTHER PARTS, REMOVING THE SCALE, ALSO THE PRELIMINARY TO HIGHLY FINISHED WORK

HAVING decided, after long experience, that a certain type and design of automobile offers the greatest possible attraction to a given clientele, the E. R. Thomas Company, of Buffalo, N. Y., worked along the indicated lines, the result being the perfection of the six-cylinder long-stroke motor and the design of automobile that would best serve as a setting for this character of power plant. Looking at it from the laboratory standpoint, the first duty was to build the automobile as a whole, to do which required that the units composing the car be brought to a high state of perfection, inducing a condition of harmony and unity of the operating parts.

Last year, when this laboratory was pictured and reviewed in THE AUTOMOBILE, it was shown that the good work done had penetrated into the plant, and the automobiles that were manufactured under the reign of the laboratory were far more perfect than those of previous years, although the earlier products were shaped in the light of a growing laboratory experience.

But there were a large number of experiments still to be concluded, and the gist of this review will have for its basis the further elucidation of the laboratory plan, pointing out some of the things that were done and showing how they added to the quality of the automobiles made and how the cost will be lowered in future sufficiently to compensate for the large initial outlay, reducing future operations to a certainty having a marked bearing upon "overhead" charges.

The laboratory is located in a large, well-lighted wing of the concrete construction plant, comprising, in the main, the equipment as follows:

(a) Complete equipment for chemical research.

(b) A testing machine, rated at 100,000 pounds, fitted with every modern convenience.

(c) A motor-testing dynamometer fitted with a manograph, recording instruments, and checking mechanisms.

(d) Means for investigating steel and other materials for the purpose of determining dynamic qualities.

(e) Besides the strictly laboratory equipment there is a large and well-equipped test room for motors, testing mechanisms for springs, and dynamometers for proving transmission gears, live rear axles, and other component units of the automobiles.

It will be understood that the regular tests of materials went on in a routine way day after day, which character of work was inaugurated at an earlier period and was alluded to in last year's review of the undertaking. The special investigations, while there were too many of them to find space in this article, will be appreciated if some of the more important of them will be here discussed.

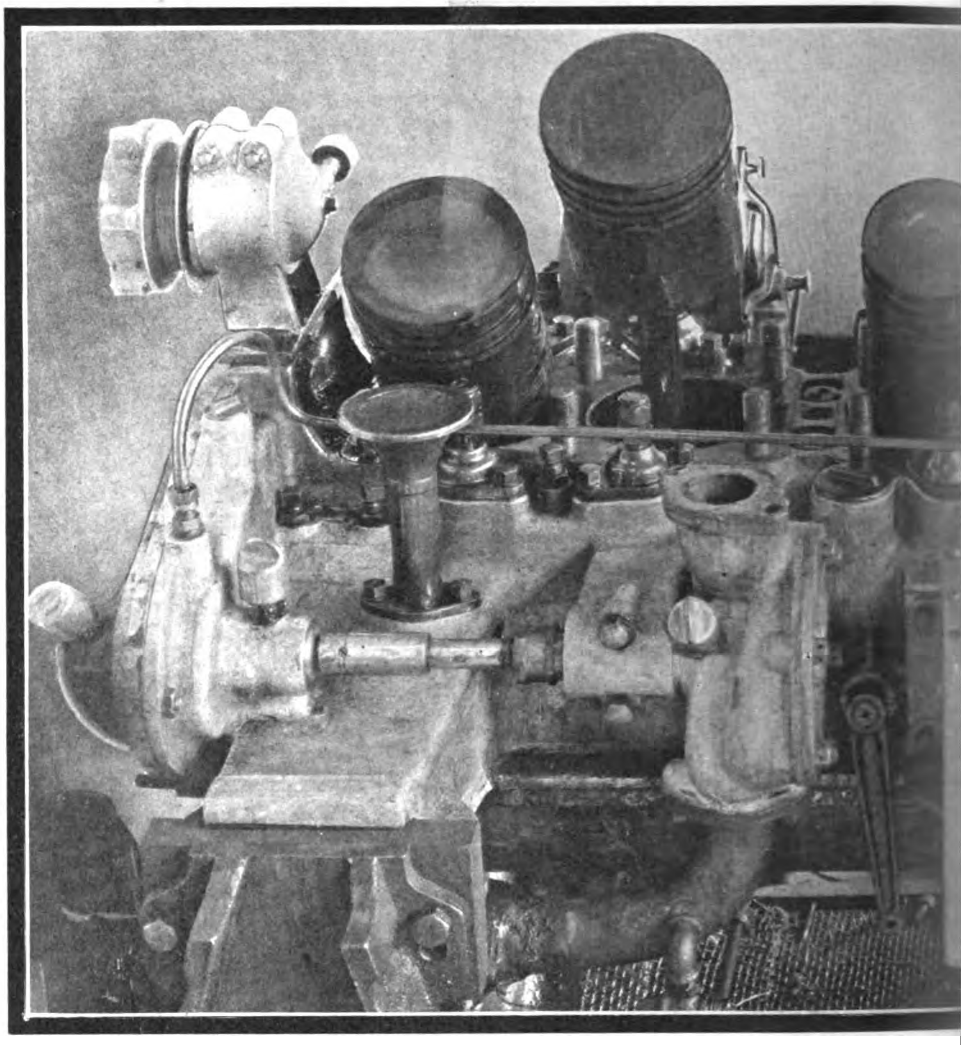


Fig. 2—Model M motor with the cylinders removed, showing the enti

The objects of the special investigations were (a) to reduce the cost of maintenance of the automobiles turned out, and (b) to lower the cost of manufacture, stopping up leaks and fixing a close limit upon so-called "dead labor." In attacking the problems of cost of maintenance the question of gasoline economy was taken up at great length from two points of view. It was recognized that the power of motors should be on the most flexible basis and it was found that carbon accumulations and other like troubles increased as the quality of automobile gasoline declined. In order to appreciate the progress that a year has brought in this important branch, reference may be had to Fig. 7 of a series of curves that are charted for the several carbureters, showing continual gains, not only in flexibility, but in total power of the motor as well. In the chart the speeds are set down in hundreds of revolutions per minute as ordinates, and the actual delivery of power is given as abscissa up to 65 horsepower. Each carbureter is given a curve and the lowest result was obtained in the curve F, showing that the power reached a maximum of 47 actual horsepower at 1,200 revolutions per minute. The curve E is quite different, both in characteristics and result. In this example the maximum power was realized at 1,600 revolutions per minute, but it may also be observed that there is little gain above 1,500 revolutions. This curve presents a gradual falling off of power with speed up to

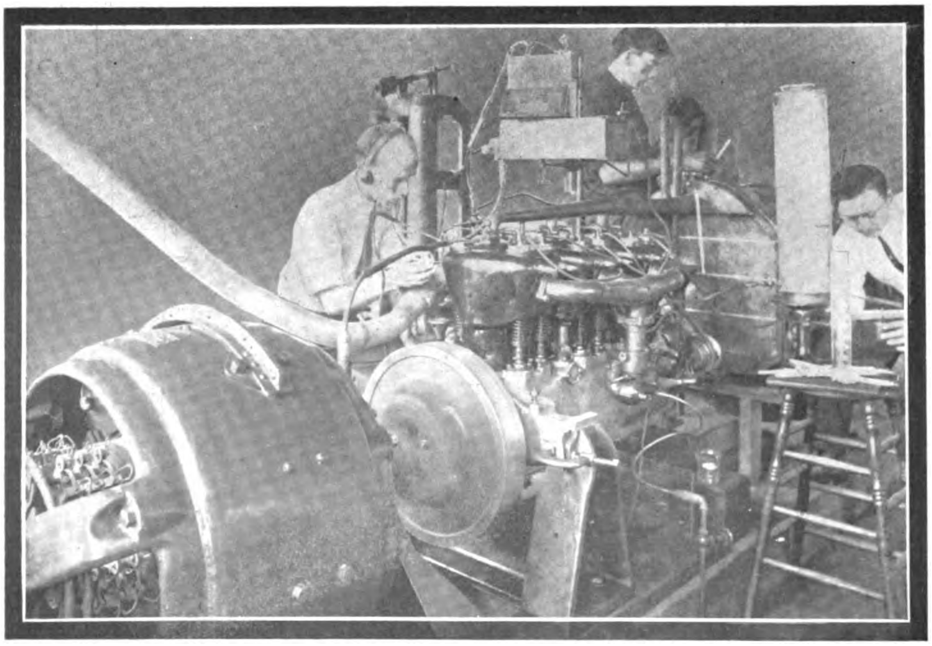
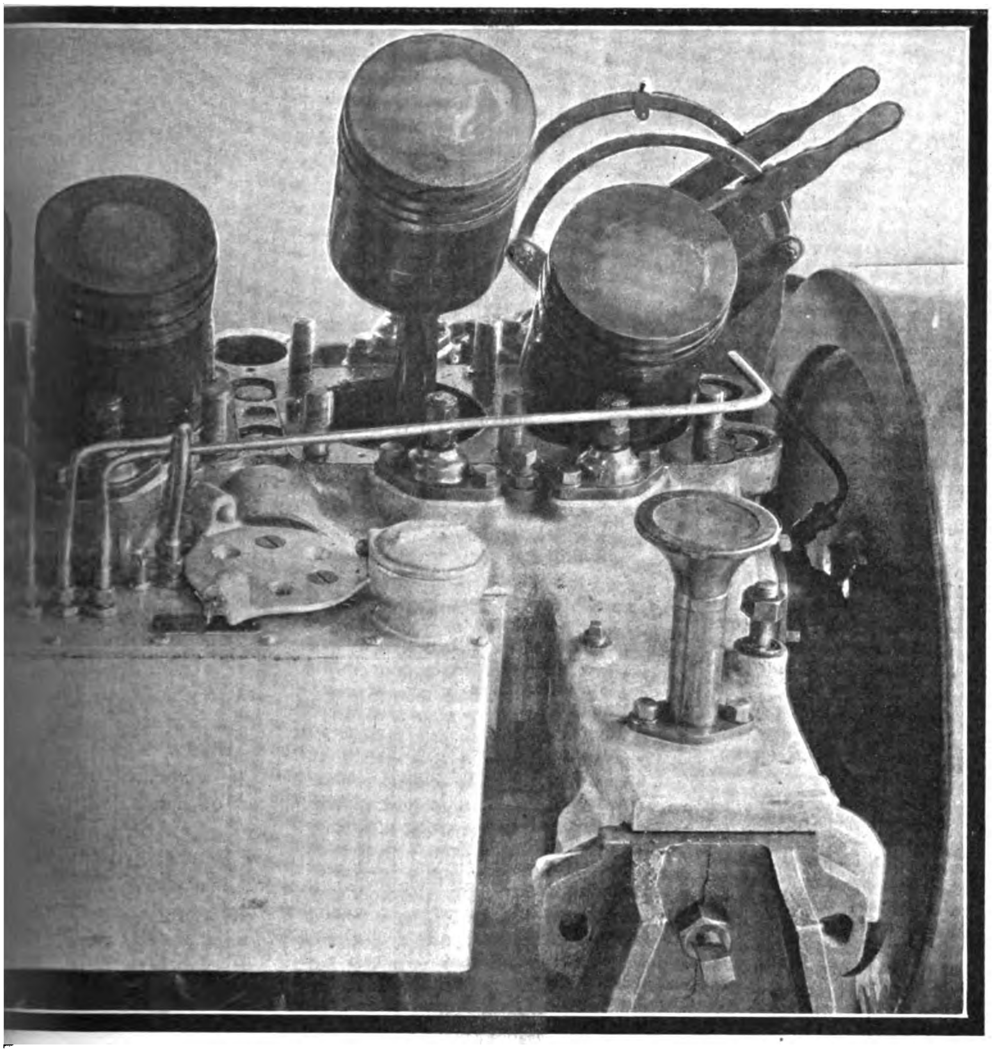


Fig. 3—Electro-dynamometer in conjunction with a manograph, fuel-weighing equipment and other facilities for use in determining the power, thermal efficiency and flexibility



absence of carbon or other imperfections after a run of 500 hours

1,200 revolutions as compared with the curve F. In the curve D this gradual lowering is corrected in a large measure, with the result that the actual power delivered is 58.5 at 1,500 revolutions per minute, but after events showed that even this result is below the best performance when the conditions are scientifically investigated. Curve C tells a better story; the performance was practically the same as that shown in curve D up to 1,100 revolutions per minute, with a delivery of 50 horsepower. Beyond this point the results shown in curve C are considerably better, resulting in a maximum delivery of 60 horsepower at 1,500 revolutions per minute. In the curve B a distinct betterment was made, due to the power increase at the higher speed; the droop was less precipitate at 1,500 revolutions and there was a gain of two horsepower besides. The best result of all is shown in curve A, delivering a maximum of 64 horsepower at 1,600 revolutions per minute; but, what is more to the point, the stability of the motor is considerably more pronounced at the higher speeds. The drooping of the curve is relatively slow; at 1,740 revolutions per minute the delivery is 60 horsepower, and following back on the speed range offers evidence of a much more substantial torquing moment. For illustration, at 1,000 revolutions per minute the readings are:

Curves A, 47.6; B, 45.6; C, 45.6; D, 45.6; E, 43; and F, 43 horsepower.

In order to obtain a better understanding of the results obtained in the test A, Fig. 7, the chart Fig. 8 is given.

Time Test to Prove Stability and Permanence of Adjustment

The difficulty experienced in the average laboratory lies in the falling off in practice, due to an artificial excellence that is induced on account of the better care and closer adherence to the requirements. One of the ideas in this effort was to make the laboratory test conform to the practical conditions, and in a 500-hour run, which is given in detail later, the motor was tested first to observe what it was capable of when new, and after the 500-hour run it was tested out in order to note the effect of such a long run upon the adjustments and the power delivery. The curves, Fig. 9, offer conclusive evidence of the result. In this chart the two curves are superimposed. The curve marked "before the run" shows maximum power at 1,600 revolutions per minute, and the curve marked "after the run" indicates an actual prolonging of the torque, resulting in maximum delivery at 1,700 revolutions per minute.

Both curves parallel each other for the whole distance, with a slight difference, up to about 1,400 revolutions, after which the curve marked "after the run" takes the mastery. The details of this 500-hour run will tell the rest of the story, but it is worthy of special note here that the motor actually improved in performance during the run, and from the point of view of the user it was a considerably better motor at the conclusion of the long and thorough test, under peculiarly severe conditions, than it was at the beginning of the run.

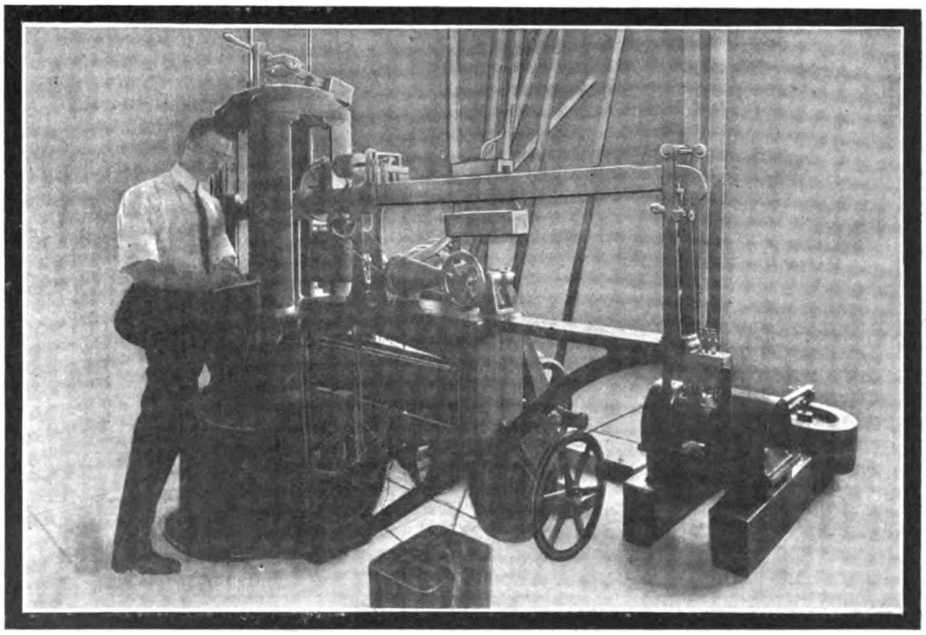


Fig. 4—Testing machine with a rated capacity of 100,000 pounds, fitted with an automatic recorder, and other means for determining the physical properties of the steel and other materials used in the automobiles

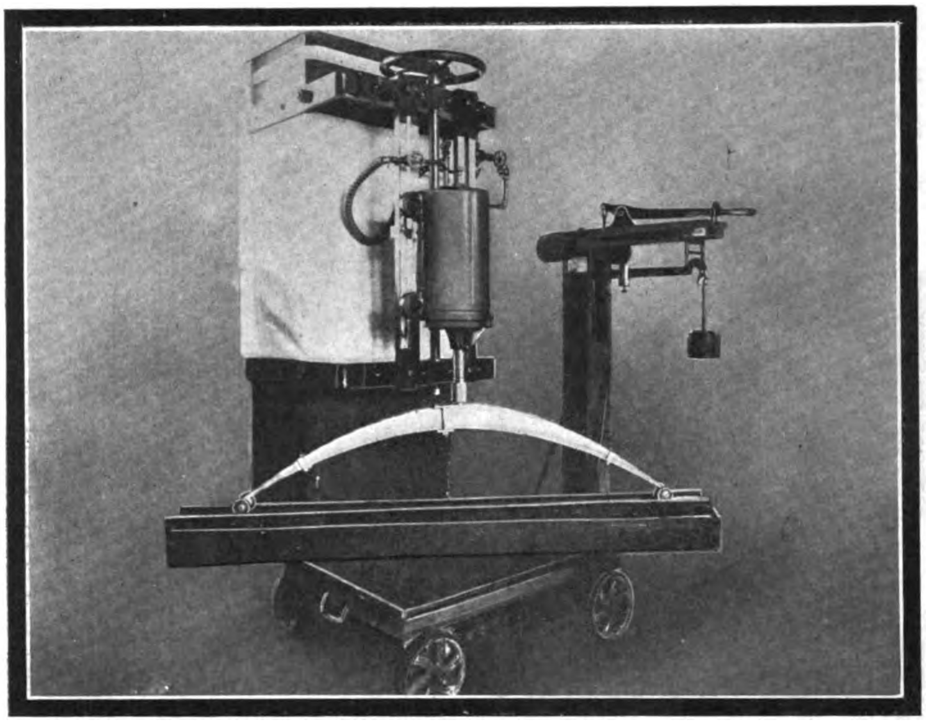


Fig. 5—Testing machine for investigating the quality and flexibility of the chassis springs, recording the deflections by means of a calibrated platform scales

The mere delivery of more power, or the better shape of the curve of power as it is shown in a chart, are relatively small matters as compared with the improving of the thermic results.

How the Thermic Conditions Were Bettered

Automobilists have had relatively little to complain of from the point of view of the general good performance of new motors, but the formation of carbon in the cylinders and the poor results obtained from the cooling systems, together with lubricating trouble, were all deferred for a time as a rule, falling like a wet blanket upon the men who were ill fitted to cope with such matters, and it was quite easy for experts to explain to them that they were careless, using too much lubricating oil or gasoline, and suffering from the practice of running upon a retarded spark.

All such explanations, although they failed in their purpose, were probably made in good faith by those who struggled without the advantages of a working laboratory, but investigation shows that the real trouble is due to the defects of design of the motor in nearly every instance, and Fig. 2 of the Model M, 6-cylinder motor, showing clean pistons after a 500-hour run, is evidence of what can be done if the problem is attacked in the laboratory and a fight is made with the stubborn facts rather than to be content with laying the trouble to operating causes.

Other Refinements Were Also Made

Passing over the timing of the motor for the moment, this being an important matter involving a study of the conditions, using the manograph and other suitable equipment, it remains to observe that the exhausting of the spent products of combustion, unless it takes place under well-defined conditions, is the source of not only a loss of power, but mal-thermic relations of a trouble-brewing nature. Unless the conditions are such that the fuel will burn to carbonic acid and water—nor can this be so if the back-pressure is excessive—the dreaded carbon formation will creep in and the power of the motor will diminish materially in service. But even this is relatively unimportant; the flexibility of performance, which is so much desired, will be gone.

What is this flexibility of performance and why is it desired? Were a motor so flexible that it would deliver power in adequate quantity at all speeds, there would be no occasion to employ a transmission gear system. Running on high-gear under all conditions of service was the dream of every automobilist not so long ago, and it was hoped that the coming of the 6-cylinder motor would deliver this benefit. Experience soon brought a realization of flexibility that thwarted this desirable end even in 6-cylinder motors, and it remained to study the problem and locate the interference with this good plan; the desired end was ultimately realized.

When the problems of carburation were investigated at some length, the plan was headed off by exhaust trouble, and it at once became necessary to look into this phase of the thermic relations and find a remedy for back-pressure and fouling of the combustion chamber space by the residuum of gas, which prevented the further complete burning of the fuel; piling up of partially burned mixture was, of course, a very serious matter.

It will be necessary to critically examine the chart Fig. 10 in order to appreciate just what this means. In this chart the speed of the automobile on the road is given in ordinates in miles per hour, and the back-pressure is plotted as abscissa in pounds per square inch above atmosphere. The back-pressure increases with the speed of the automobile on the road, also with the opening of the throttle. What does this mean? Does it not show that back-pressure interferes (a) with the speed of the automobile on a level hard road, and (b) with the hill-climbing ability at a given speed? Having investigated the relations, learning how the obstructions acted and what the consequences were, it was a mere matter of continuing the effort along intelligent and indicated lines for a time sufficiently long to bring about a remedial condition. After having reduced the back-pressure to the lowest possible point, using a silencing ejector type of muffler, it still remained to work out a form of

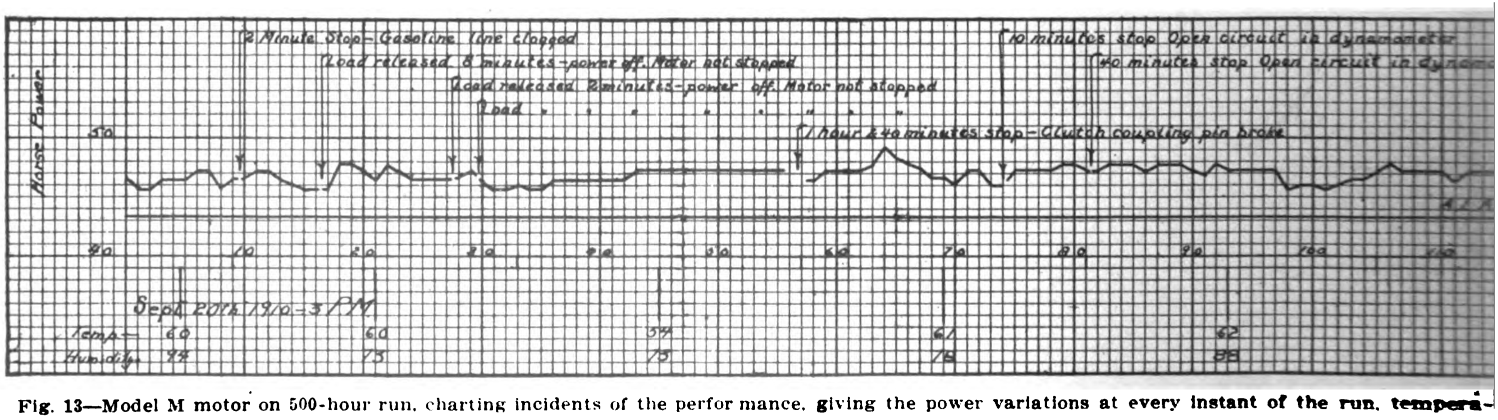


Fig. 13—Model M motor on 500-hour run, charting incidents of the performance, giving the power variations at every instant of the run, tempera-

exhaust relief valve that would really have the virtue that practice accords this form of device. The curve Fig. 11 shows the result of the latter effort, reducing the back-pressure down to a maximum of 1 1-2 pounds per square inch, and to less than half of this value under hill-climbing conditions.

Engineering Laboratory Report of 500-Hour Run

Model M engine, No. 1037, 4 1-4-inch bore, 5 1-2-inch stroke, was set up in laboratory and underwent a test run to determine if the motor could equal the record of the new Daimler or Silent Knight, as tested by the Royal Automobile Club, March 15 to 28, 1909, and recorded in their certificate of performance, No. 118.

The conditions of the Knight test were:

(1) That the engine should be tested upon the bench for 132 hours, continuous running.
(2) That the horsepower given off should at no time during the test fall below the R. A. C. rating, multiplied by 1.3, the piston speed to be 1,000 feet per minute. If a higher piston speed should be used the minimum horsepower should be increased proportionally.
(3) That the temperature of the inlet should be kept at 50 degrees centigrade during the test.
(4) That upon completion of the bench test the engine, without any of its vital parts being disturbed, should be installed in a standard touring car and run for a distance of 2,000 miles on Brooklands track, this distance to be completed in not more than 60 hours of running time.
(5) That upon completion of the track test the engine should be again placed on the bench and run for five hours under the same conditions as the previous bench test referred to in paragraphs (1), (2) and (3).
(6) The certificate should show *inter alia*—
    (1) A chart giving the horsepower readings to be taken not less than once every hour during the endurance test at the declared speed.
    (2) A record of repairs or adjustments, if any. The following, however, while they might be recorded on the certificate, would not debar the engine from continuing its test; the time for necessary repairs being noted and the motor being called upon to make good such time under general conditions governing the test: Defects in petrol supply, water circulation, ignition system, exhaust piping, brake system.
    (3) The fuel consumption per horsepower on the bench.
    (4) The degree of wear shown at finish on examination by the judges.

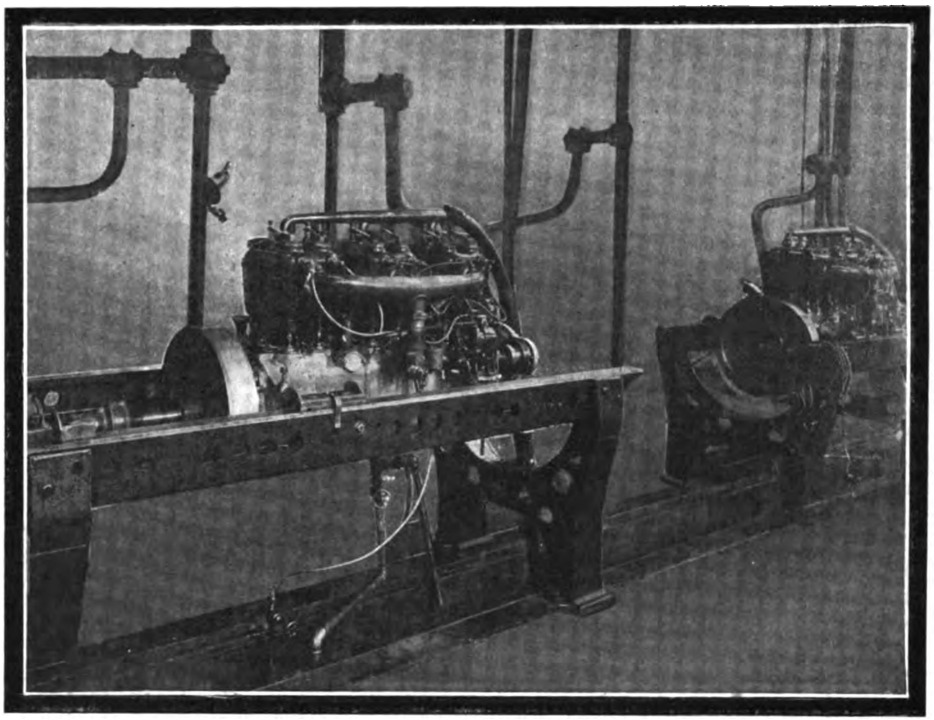


Fig. 6—Illustrating two units of the test stands which are available for testing all the motors produced for endurance, flexibility and power

The speed entered for the trial was 1,200 r.p.m., giving a limit of 50.8 horsepower, below which the horsepower was not to fall.

Engine readings, taken and recorded every half hour, are shown on the chart accompanying this report, (Fig. 13).

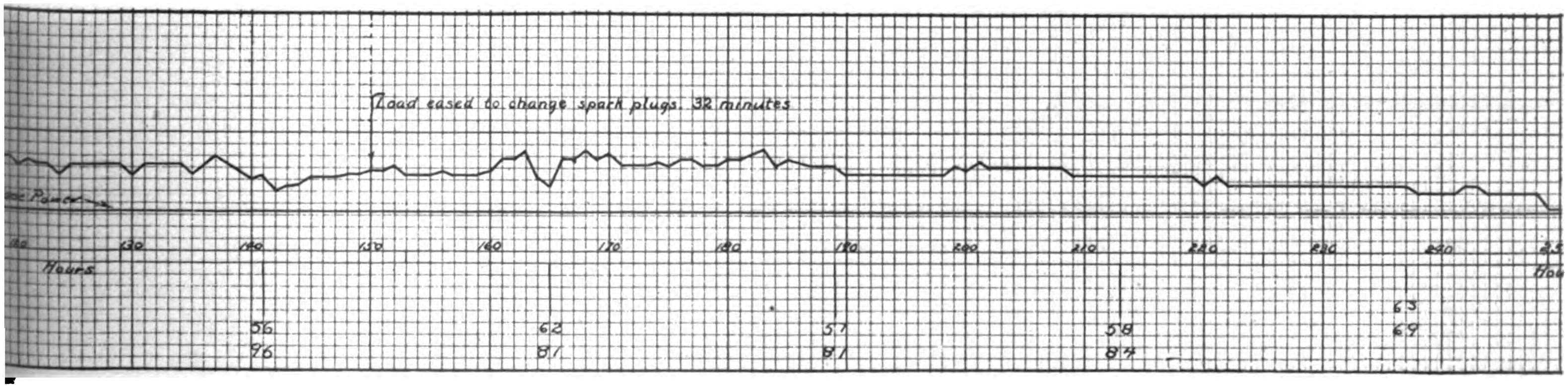
RESULTS OF 132-HOUR BENCH TEST

Total Time During which Load Was Eased	Duration of Tests	Stops Incurring Penalty	Stops not Incurring Penalty	Average H. P.	Gasoline Consumption	Consumption per H. P. Hour
Min.	d h m	No. Dur.	No. Dur.			Pint. Lbs.
19	5 14 15	0 0	5 116 min.	54.3	614.75	.679 .613

After this test the motor was installed in a car and run 2,159.5 miles, making about 20 miles to the gallon of gasoline. On completion of this run it was again placed on the block and run five hours under the same conditions as before.

RESULTS OF 5-HOUR TEST AFTER 2000 MILES ON ROAD

Duration of Test	Stops Incurring Penalty	Stops Not Incurring Penalty	Total Time During which Load was Eased	Average H. P.	Gasoline Consumption	Consumption per H. P. Hour
Hr. Min.	No. Dur.	No. Dur.				Pint Lbs.
5 15	0 0	0 0	15 min.	57.25	22.5	.599 .541



hanges during the performance, humidity of the surroundings, stating in detail the reasons for interruption, and other information of a pertinent

The engine was completely dismantled and no perceptible wear was noticeable on any of the fitted surfaces. The cylinders and pistons were found to be notably clean. The only noticeable wear in any part was caused by two point pins rubbing against adjacent parts. The ports of the valves showed no burning or wear.

The R. A. C. rating of the Thomas Model M is 43.89. The conditions of the Knight test required 43.89 horsepower × 1.3 = 57.05 at 1,000 feet per minute piston speed. As we used approximately 1,010 feet per minute piston speed, the horsepower of the motor should not fall below 58 horsepower during the test.

Owing to the small pipe supplying the laboratory with water and the varying pressure the lowest mean temperature we were able to keep the water at the inlet was 147.7 degrees Fahrenheit or 64.3 degrees centigrade as against 50 degrees centigrade required by the Knight conditions.

Motor No. 1037 was a regular stock motor taken from the assembly floor after it had completed its block test. After taking horsepower speed curve the motor was started at 3 o'clock p. m., September 20, and stopped at 3:14 o'clock p. m. on October 11, and another horsepower speed curve taken. Total actual running time of 500 hours. Outside of the above changes run was governed by the conditions of the Knight test.

The speed set for run was 1,100 r.p.m. The engine was observed throughout the trial and reading taken and recorded every hour. These records are submitted with this report.

TABULATION OF THE 500-HOUR TEST

Duration of Test	Stops Incurring Penalty	Stops Not Incurring Penalty	Total Time Load was Eased	Average H. P.	Gasoline Consumption	Consumption per H. P. Hour
d· h m		No. Dur.				Pint Lbs.
21 4 14	nil	7 197 min.	57 min	47.7	3,235.4 U. S. 2695 British	1.085 .814 U. S. .904 British

At end of run cylinders were removed and valves taken out. A close examination of cylinders showed that they were in good shape. The reader will be able to judge of the condition of the pistons as they were after the run by examining Fig. 2 of a photograph taken at the time. This is a remarkable showing, as an average showing of 47.7 horsepower for 500 hours at a motor speed of 1,100 r.p.m is equivalent to climbing 17,660 miles up an 8.8 per cent. grade at 35.4 miles per hour with a 4,600-pound car, equipped with a 3 3-7:1 gear ratio and 37-inch wheels (Model M stock equipment).

$$\frac{D \times N \times 60}{3\ 3\text{-}7 \times 5{,}280} = \text{Miles per hour of car.}$$

When D = Diameter of rear wheels in feet.
N = r.p.m. of motor.
3 3-7 to 1 is rear axle ratio on high gear.

Computing from foregoing, miles per hour of car = 35.32.
35.32 × 500 = 17,660 miles total.
Assuming 80 per cent. efficiency of transmission.
47.7 × .80 = 38.16 horsepower available at rear wheels.

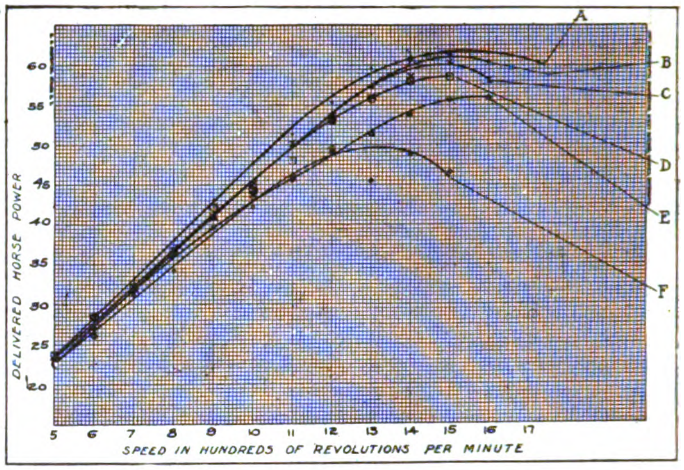


Fig. 7—Increase in power obtained by persistent investigation

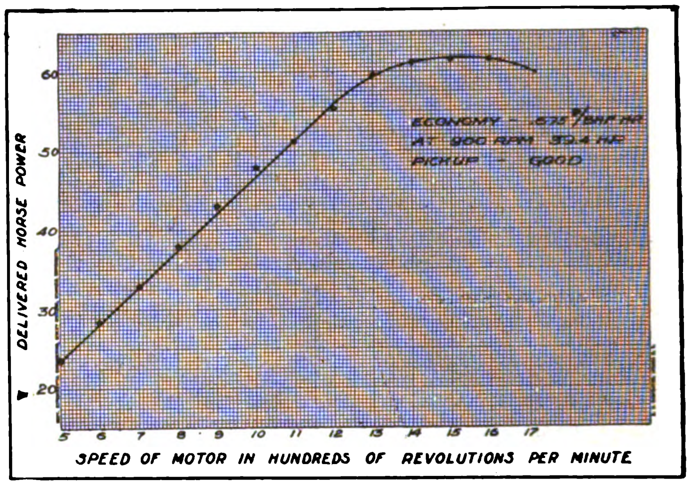


Fig. 8—Performance under conditions of perfected carburetion

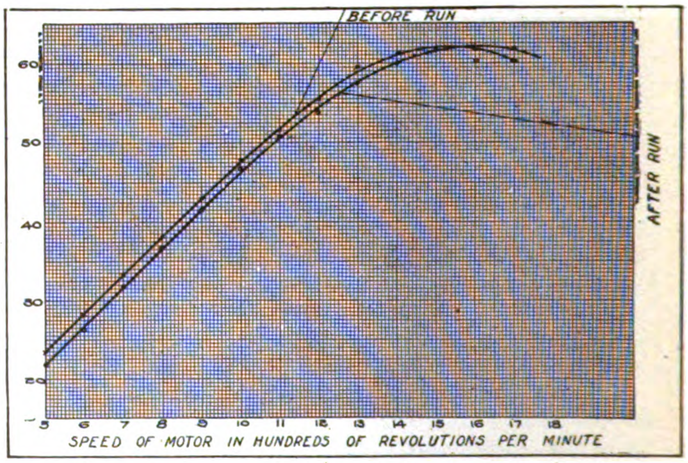
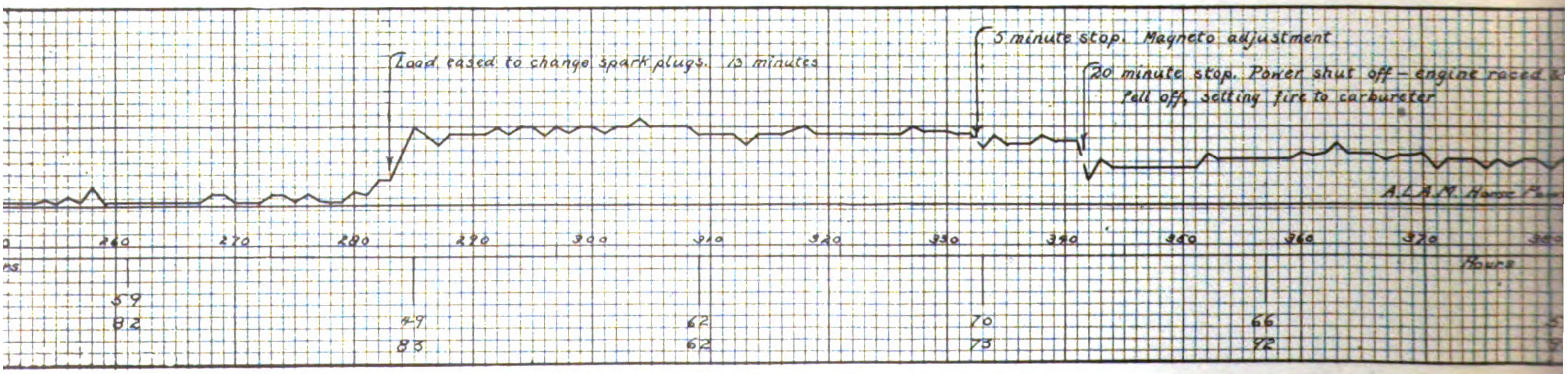


Fig. 9—Performance before and after the 500-hour test



character. This chart offers the advantage of showing the whole performance not unlike a bird's-eye view, marking off the variations of every charac

Now $\text{H.P.} = \frac{DNP}{33{,}000}$ when P = pounds pull at circumference rear wheels.

Therefore:

$$P = \frac{33{,}000 \times \text{H.P.}}{DN} = \frac{33{,}000 \times 38.16}{\times 3.083 \times 320} = 405.2 \text{ pounds.}$$

405.2 pounds may be taken as the tangential pull (see Fig. 12) on rear wheels tending to push the car up a hill.

The piston heads were noticeably clean, as can be seen by Fig. 2. The shop numbers can be easily read.

The greatest difficulty experienced in this test was to keep spark plugs in the motor. With this carbureter a mixture could be obtained giving the greatest power, but so lean that the plugs could not stand the heat. One make of plugs which were absolutely tight would get so hot that the center electrode would melt off and pre-ignition would occur, continually pulling down the horsepower. Upon enriching the mixture this would cease, but the power would fall off. All six of the plugs in the battery system melted in this way and had to be removed, being replaced by solid steel plugs. Another plug used, even when not leaking, would cause pre-ignition. Upon removal the center electrode would be white hot. Three plugs of another make were tried with no better results. The pointed plugs, called "Petticoat" and "Conical," would heat up in the center, and the "Enclosed" would get so hot that the end would scale. Three plugs with glass insulators solved the trouble in Nos. 4, 5 and 6 cylinders but the three different makes of plugs in the remaining cylinders still continued to bother until finally three new plugs of one make were put in and saved the run. With this change and the air valve open a little the power increased from 45 to 50 horsepower, and the gasoline consumption fell from .916 to .74 per horsepower hour. No further pre-ignition occurred throughout the run. Motor was not stopped to change plugs.

As noted on the chart, a stop of 2 minutes occurred between the ninth and tenth readings, caused by gasoline line plugging.

Between the sixteenth and seventeenth readings the factory power was cut off for eight minutes. As this is used to excite the fields of the dynamometer the load had to be released for that time, although the motor continued to run at 1,100 r.p.m.

There is one point which is well worth noting by those who are seriously interested in automobiles, and that is that the load under which the motor had to labor for this long period of continuous operation was a much heavier burden than motors have to carry in regular automobile service.

Explanation of Figure Twelve

Referring to Fig. 12, to which attention was pointed elsewhere:

P = tangential effort on rear wheels tending to push the car up hill.

W = weight of car.

when,

$$\text{Sin. } \Phi = \frac{P}{W} = \frac{405}{4{,}600} = .088$$

$\Phi = 5° 3'$, which is the equivalent of an 8.8 per cent. grade.

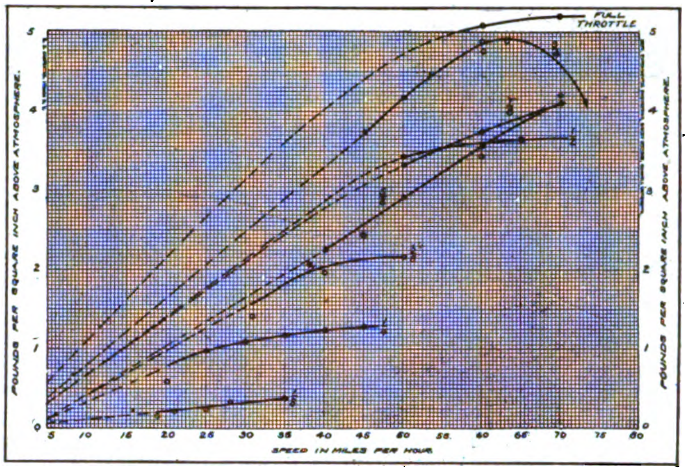


Fig. 10—Back-pressure investigations under various conditions

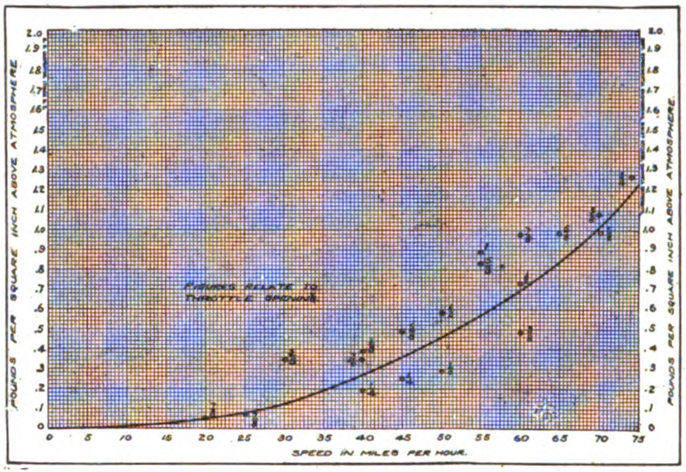


Fig. 11—Curve of back-pressure with various throttle openings

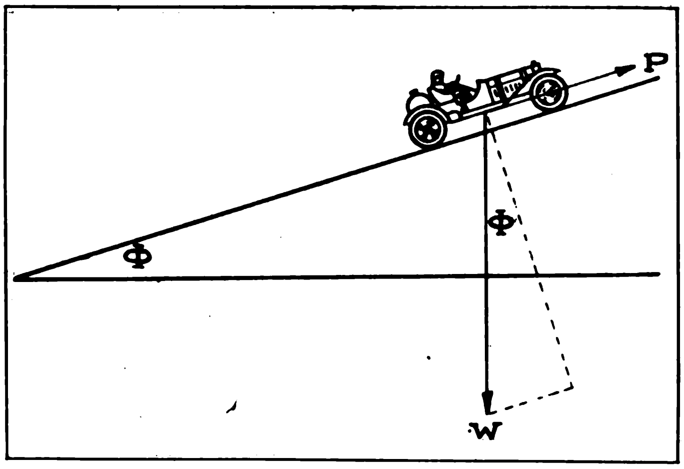
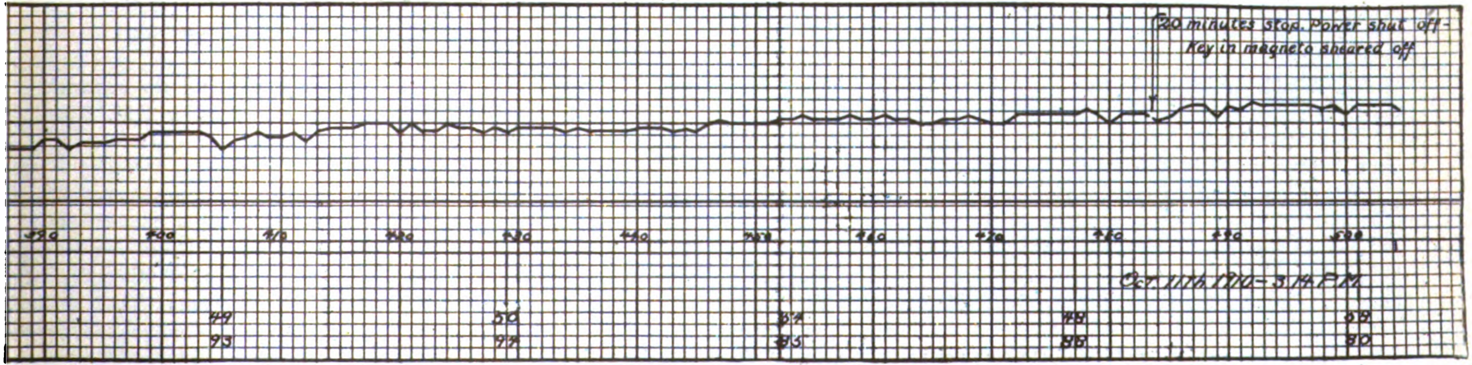


Fig. 12—Tangential effort on rear wheels to push car up hill



and denoting the periods of interruption in comparison with the lengths of runs, making, on the whole, an exact history of the event

Economy of Production

A PROMINENT AUTOMOBILE ENGINEER POINTS OUT HOW COST MAY BE REDUCED WITHOUT CUTTING INTO QUALITY OF THE AUTOMOBILES TURNED OUT

SURELY the reason for the existence of the engineer is not alone the designing or shaping of material; he must likewise provide for the economical use of material. Savages can bridge a stream by piling enough rocks across it; but when it comes to building a Brooklyn Bridge the engineer is the one who makes the accomplishment economically possible. The farther away we get from engineering practice the more often we find ten pounds of material used to do the work that might have been done with one.

In the automobile business, as in every other new industry, the first attempt was to make something that would work. A number of the very earliest cars, however, showed evidence of clever and good design. An economical use of material was made which permitted of the low price necessary to introduce a new type of vehicle. Then the automobile slowly became a thing of luxury. Comforts unthought of in the earlier days of vehicle design began to appear. Requirements became more and more exacting. On good roads the motor car was expected to carry a man with the speed of an express train and with all the comforts of a Pullman car. These requirements were met, but to meet them it was necessary to put more horsepower in fewer pounds of steel than had ever before been done in the history of the world. This was done by making one pound of steel do the work that had previously been done by two. The development of new kinds of steels became necessary, and to-day the entire steel industry has received an impetus toward quality. Where at one time the government alone demanded steels of superior grade, now the demands are from a thousand sources.

To-day the automobile business is passing into another stage of its development. Owing to increased competition and to an increase in the value that has been given the purchaser, it has become imperative that the manufacturer reduce the cost but not the quality of his product. This has opened a large field for the engineer who has commercial as well as creative instincts.

Many economical constructions have been noted on various cars, but it may be slightly surprising to see statements in dollars and cents of the savings effected thereby. Take the "hood form," which is the metal ledge attached to the dashboard on which the hood rests; by using pressed steel for this part instead of an aluminum casting, it was found that weight would not be increased, that greater strength could be secured, and that $157 could be saved on the first thousand cars and the dies and tools paid for as well, while on the second thousand cars the saving would be $507.

By a change in the construction of cam-shaft bearings, without affecting quality, life or performance in even the slightest degree, a saving of upward of $5,000 per thousand cars was found possible, and there yet remain possibilities of still further reducing cost while actually enhancing the quality. Another apparently inexpensive part used on the engine was found susceptible of redesigning and betterment that saved $3,000 per thousand cars, while another element used elsewhere will be made to leave $5,900 in the treasury. The simple expedient of changing the cover of the transmission case from aluminum to a steel stamping will yield a return of $466 for the first thousand and $716 for the second thousand automobiles.

All economies, however, are not so easy to discover as were the ones just quoted, nor as many of such large value, but all are of importance. To cite a little incident: from the earliest days it has been the custom to keep the hood from rattling by using a leather or "rawhide" strip for it to rest upon. Everyone knows that leather is injuriously affected by heat, and not one of the men who thoughtlessly called for its use would, for example, have left his shoes on a radiator for a few hours with the expectation of finding them in good condition on his return. Yet leather was specified on the radiator of an automobile. A little "shopping around" discovered a woven cotton material far better than leather for the purpose, the use of which saved 16 cents per car.

A dozen more cases might be mentioned where a positive betterment has actually resulted in money saving. This would seem to be real economy and in actual money saved, as well as in influence on every employee, is certainly far ahead of the petty and annoying "economies" sometimes attempted and considered good management.

Of course, as is natural to his kind, the non-constructive critic who is troubled with indigestion will say, "Why weren't these economies discovered in the first place?" Such a critic, of course, does not think enough to comprehend that human progress has been made by first doing a thing, and then by bettering it. We can assert, without posing as fortune-tellers, that railway travel ten years from now will be more comfortable and more secure than at present, for have we not to-day the pressed steel passenger car, and the "Twentieth Century Limited" that ten years ago were not thought of?

The whole subject of economy in automobile work is sure to receive an increasing amount of attention as the industry develops, and both the manufacturer and the public will share the benefit.

Another Washington Story Unearthed—The anecdotes about General Washington are almost without number. The following story is one of the most authentic, and it has the additional value of being new. When the American army was most pressed by the Hessians, aided by the English, Washington was constantly receiving intelligence of a nature which caused him to doubt the wakefulness of some of the sentries, especially those of a certain colored regiment. He determined to see for himself, and one dark night, when the password was "Chenango," Washington slipped out of his tent, dodged his faithful chauffeur, jumped into the headquarters automobile and made for the outposts. For a good three miles Washington went merrily along without seeing either hide or hair of a sentinel; but upon making a turn in the road the silhouette of a sentry loomed up ahead, making a bold outline against the ink of the sky, and Washington clapped on the brakes in order not to reduce the count of an already too meager army.

The harsh grating of the darky's melodious voice awakened the echoes of the long night:

"Who comes there?" said the vigilant infantryman.

"A friend," said Washington.

"Advance, friend, with the countersign," said the sentinel.

"Roxbury," said the General, advancing on low gear.

"No, sah," replied the soldier.

"Medford," roared Washington.

"No, sah," was the response.

"Charleston," pleaded the hero of fifty turning movements.

The darky lost patience and, said he: "Look yeh, Massa Washington, you all keeps sayin' 'Chug!' 'Chug!' 'Chug!' Dat's all I kin hea', Massa Gen'l, and if youall wants to git by hea' youall 'll have tu say 'Chenango.' Dar kyant no pusson go by hea' onless he says 'Chenango.'"

Operation and Care

COMFORT IN WINTER MOTORING; IDEAS IN PRACTICAL REPAIRING; CANTOR LECTURES; DON'TS; LETTERS; QUESTIONS; CARBURETER ACTION; LAYING UP CAR FOR WINTER

WINTER automobiling is quite out of the question, excepting as a matter of business, unless provision is made for the comfort of the driver in particular, and the disengaged occupants of the automobile in general. The average owner of the class who employs a chauffeur may think because he has all the money that he should draw 90 per cent. of the comfort. This point will not be contested, but an inquiring mind would be likely to ponder over the problem, arriving at the point, perhaps, where the question would be asked, How will the 90 per cent. owner take this comfort? If the chauffeur has his circulation stilled by the bitter cold, and his intellect benumbed in the bargain, or if his vision is dimmed by exposure and the bombarding effects of missiles from the sky, it is a fair inference that this is the type of owner who would describe the very acme of all that is comfortable, as fully represented in a sojourn for infinite time within the confines of a long-forgotten cemetery.

In advocating the comforts as suggested by humane considerations for the chauffeur, it is asking for no greater consideration than is accorded a plain ordinary work-horse. The owner's safety is at stake; then it is surely not too much to expect that the chauffeur will be accorded the meager consideration that is the natural due of an army mule.

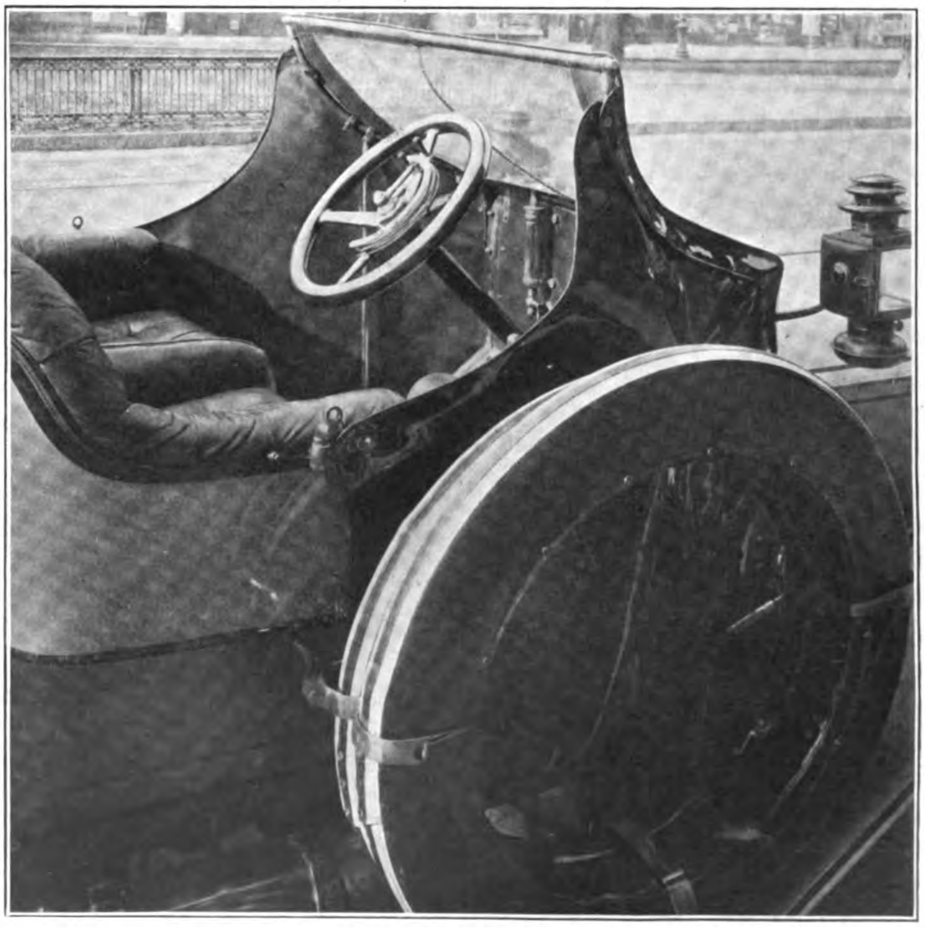
To enjoy automobiling, under conditions of inclement weather, particularly in the cold of Winter, protecting the chauffeur, or the owner, if he drives, are normal and healthy considerations. A mere windshield resides on the borderland of necessity; it is a whole lot better than nothing. The introduction of the fore-door type of body solved the problem in part, leaving the automobile with its standard body construction in the class with the old-fashioned street-car, without a vestibule. But there is no reason for struggling in the embrace of despair when a little ingenuity and a little work will bring every type of automobile up to a high standard of comfort.

Cold Weather Reminders

Some Pointers for the Autoist Whom Winter Cannot Feaze

IT often occurs that on a cold day a stop has to be made for such a length of time that the water in the cooling system becomes much too cold. If it is at all windy this operation will be effected quickly. The best way to overcome it is by following the methods in vogue at taxicab stations. The cabs have to be ready for a call at any moment, and if they are unable to start at once they lose their turn. Whenever they have to stop on the rank, off comes the driver's duster, which is placed over the radiator and hood. A car can be left in this manner for several hours in the open with the temperature below freezing point, but the heat under the hood and in the radiator is retained. Even if anti-freezing solutions are used, it is no reason for letting the engine become cold, as it takes some time to warm up again, and in the case of glycerine the liquid is turned into a semi-solidified state as the outside temperature becomes lower.

Before starting out in the morning it is a good practice to run the motor in the garage for several minutes in order to warm the engine and allow the carbureter to work under normal conditions, especially if it is not water or hot-air jacketed. It is not an uncommon sight in Winter to see the outside of the carbureter covered with a film of ice; also the induction pipe. This may stop the engine; should it do so, put a rag in boiling water, wring it out, apply it to the manifold and mixing chamber and close the air ports for starting so that the engine takes in a rich mixture; if these ports are not controlled by hand, cover them with a rag, or the naked hand will do equally as well. The practice of heating pipes by pouring gasoline on them and setting fire to it has been tried and found to answer, but is sometimes attended with unlooked-for results; the flame may become larger than intended, even going so far as to warp the whole car; a soldered union may be overheated, thus weakening the joint.



REGULAR TYPE OF AUTOMOBILE BODY EQUIPPED FOR WINTER USE

Practical Repairing

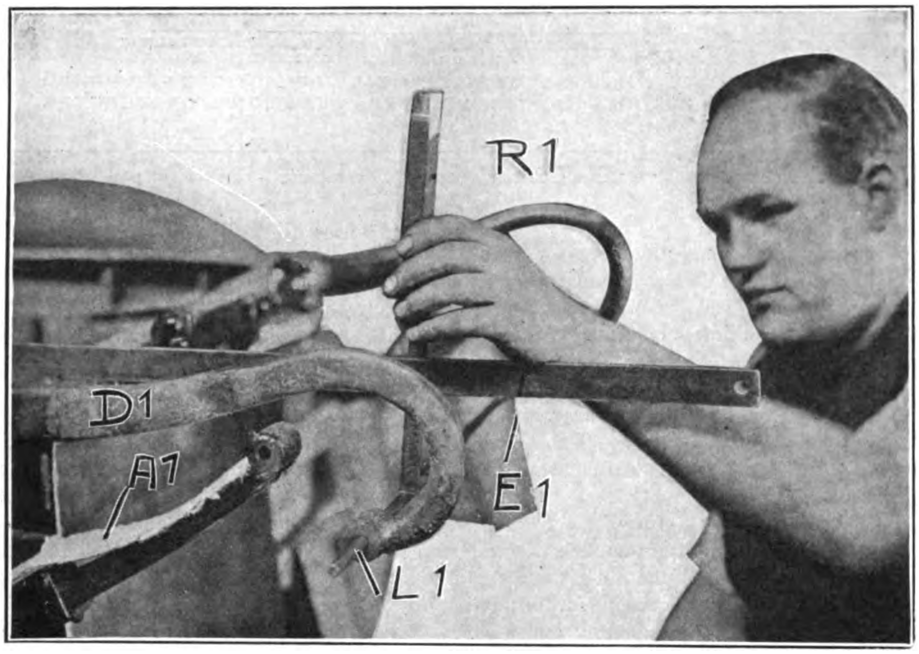


Fig. 1—Measuring height of dumb iron that has been bent and straightened by means of straight edge rule and lining rod

PRESSED steel frames have now become almost universal in automobile practice, and therefore it would serve little purpose to deal with other forms of frames that have been used from time to time, such as the armored wood and tubular varieties. Suffice it to say that in quite a number of cases the whole frame has to be taken apart to effect a repair on those two types or to reinstate the alignment.

The most common cases that the repairer is called upon to deal with are the direct cause of an end-on collision either front or rear, and these can be usually effected without the necessity of dismantling the chassis. The primary tools required are good blowers and the usual bending irons. The eventual cleanliness of the job depends upon the smith's skill and the facilities at his disposal to properly heat the bent part.

Fig. 2 shows the rear dumb iron or spring holder that has been bent down owing to a car running backward and striking a wall, the result being that the left-hand member was forced down about two inches. Restoring the frame to its original shape in this case is a very simple matter, and is effected in the following manner: The cross member of the frame is blocked up with a trestle and blocks of wood, and the spring bolt is withdrawn, allowing the left spring to drop and the weight of the rear axle to rest on the tire. Strips of asbestos that have been immersed in water are laid on the spring to protect the paint from the heat and the temper of the springs. Heat is applied to the dumb iron D1 at the point where the bend has taken place by means of the blowers F1 and F2, which are fed by gas through the pipe G1 and blast air through the pipe A1. The pressure in A1 is obtained from a compressor run off the machinery shafting by belt, and the amount of force of air and gas is regulated by two turn-cocks under the immediate control of the driver's right hand. One or two flames can be directed on the work while the smith grips the frame with lever L1 in such a manner that as soon as the heat has softened the steel it will give and bend upward, the operator having previously gauged just how much lifting is required.

The operation of finding the correct height can be seen by reference to Fig. 1. A straight edge E1 is laid on the side member of the chassis, protruding over the end of the dumb irons; a rod L1, called a lining-up rod, is passed through the spring bolt holes, and from this to the square edge the smith can see exactly by measuring with a rule R1 whether the height is correct or if it requires still more alteration. The springs in this case are attached to the frame by shackles that give as the torque is thrown on the axle. After the bending operations are completed the frame is filed up smooth and allowed to cool off, when it will be necessary to send it to the paint shop, as naturally all the paint will have been burnt off.

With the front end of the frame matters have not such plain sailing, owing to the different shapes that U section metal takes when bent; these are naturally governed by the force of the

Fig. 2—Straightening bent dumb iron of frame by blast heating and using bending iron

STRAIGHTENING FRAMES; PRECAUTIONS TO PREVENT THE EFFECT OF A BLOW; GENERAL BRAZING

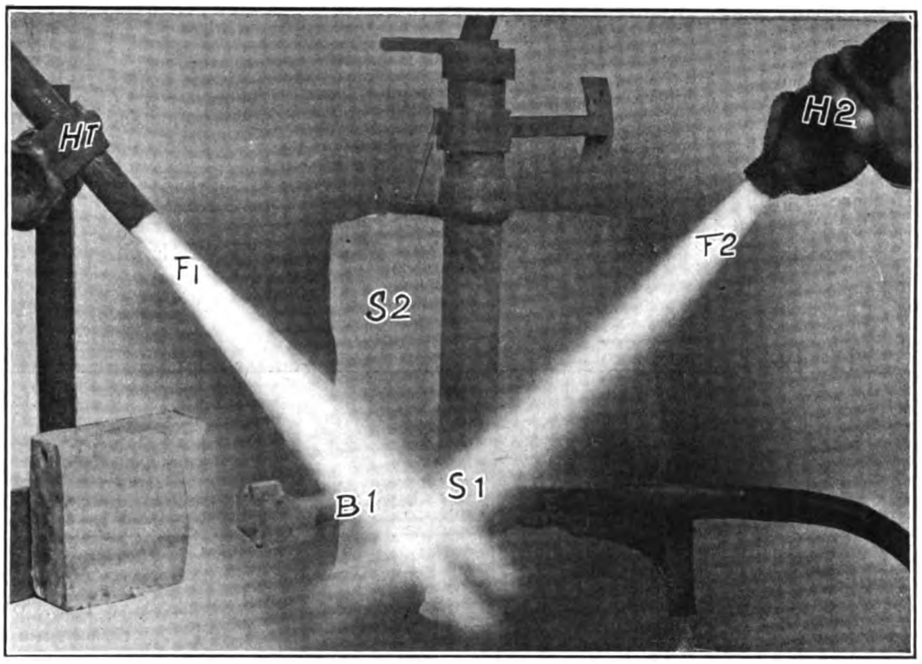


Fig. 3—Brazing new clutch pedal to transverse shaft after same has been pinned

blow and the direction from which it comes. It can be taken for granted that repairs are possible to the front end of the frame without having to fit a new side member, but this is a matter that requires more than passing thought, because it is often cheaper to have a new side member fitted if the frame is badly cracked than to have horn plates and new spring holders riveted and welded; besides, there is always the indelible mark of an accident to offend the eye and greatly depreciate the value of the car. Fig. 4 shows a frame F1 that was subjected to a violent impact with a telegraph pole, but most of the strain was taken in the cross member S1 that had been placed in front of the radiator as if by Providence. Such a cross bar would be a useful adjunct to any car, as besides strengthening the frame it protects the radiator in case of a vehicle backing. Much the same method is employed in straightening the front member as in the case of the rear, except that a certain amount of hammering is necessary to even up the U section at the point of bending. The radiator must first be removed and the engine casing protected by metal sheets and asbestos boards; there being so many parts to hold the frame rigid—as the engine arms A1 and A2, cross members and transmission arms—that it is usually only a matter of straightening the dumb irons, although the entire frame must be tested for lateral strains. It must be borne in mind that when the frame is released from the springs it has a tendency to curve inward, as it does in Fig. 4, but not to such a marked degree; consequently, when the frame is straightened allowance must be made for this. It is advisable in ordinary brazing jobs to have some means of holding the blow-pipes, and such can be seen in Fig. 3, H1 and H2. By this means the flame is directed on the part to be heated, whereas holding by hand the operator usually moves the flame, thinking thereby to hasten the heating. Such is not the case; a steady flame on one point will heat quicker than when it is moved about.

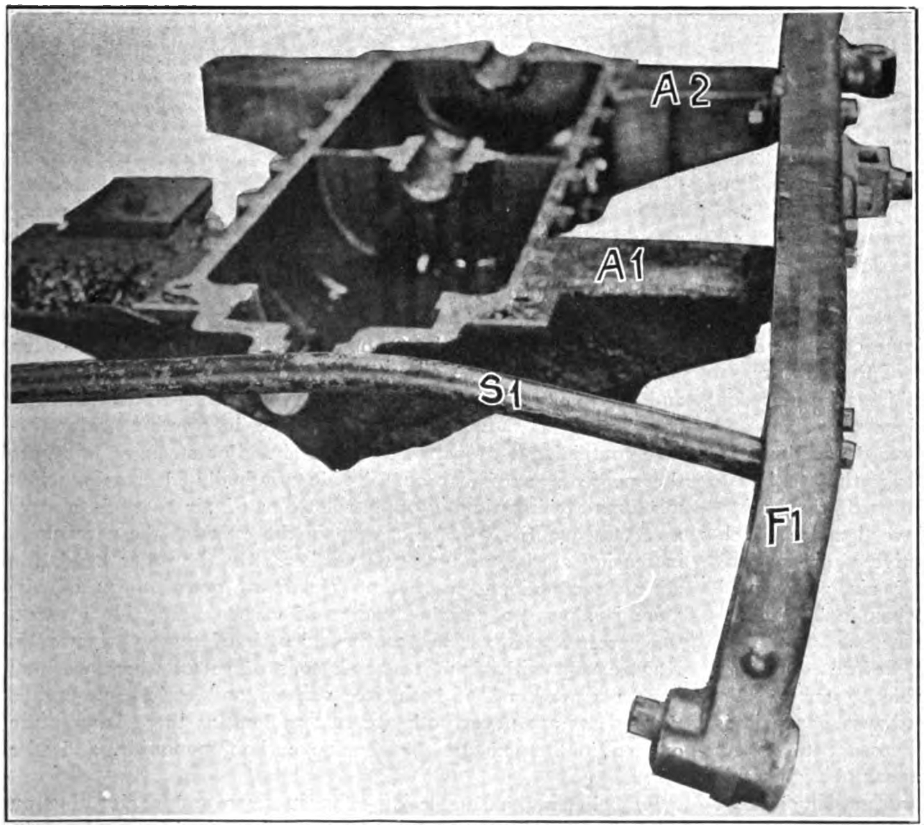


Fig. 4—Impact of a bad blow saved by the cross member fitted in front of the radiator

At the rear should be placed fire bricks or a sheet of metal, S2, and the job itself placed in such a manner that when the brazing rod or powder is applied the latter will run into the parts to be joined, S1. In this case it is a clutch shaft on to which a new pedal arm has to be fixed. The parts must first be cleaned with a file. The temperature of the flames F1 and F2 is greater in inverse proportion to their size, and the smaller a flame becomes the hotter it is and the more work it will do, provided the air is not supplied in excessive quantity. Parts such as these or the flanges on exhaust manifolds should be pinned before brazing, to overcome vibration and to hold the work together during the heating, as when the metal expands the parts may slip. Preventives against collision are so numerous that it is a matter for the autoist to choose the one that best suits his car or pocket; the point to be careful about in fitting one is to see that in case of an accident the tire cannot come into contact with the sharp ends and so cause perhaps twice the damage that would be entailed if the frame alone had to be straightened.

In Diagnosing Motor Trouble—

If the motor comes to a stop after a long run, look in the gasoline tank.

If the tank holds gasoline, see if the same reaches the carbureter.

If there is no trouble up to the carbureter, observe if gasoline passes out of the nozzle.

If there is plenty of gasoline available, it suggests the possibility that there may be too much.

If the gasoline flow is satisfactory, examine the air valve.

If the ratio of gasoline and air is right, look for water.

If there is no trouble up to this point, see if the intake manifold is tight.

If the mystery still persists, go over the ignition wiring connections and tighten them up.

If there is no relief, take out the spark plugs and test them.

If the spark is feeble in the open air, it will be worse under compression in the cylinder.

If there is a poor or no spark it is due to a weak battery or an open circuit.

Cantor Lectures on Motors

PROFESSOR W. WATSON, D.SC., F.R.S., DELIVERED A SERIES OF LECTURES ON THE GASOLINE MOTOR, OF WHICH THIS IS THE SIXTH INSTALLMENT—BY PERMISSION OF THE ROYAL SOCIETY OF ARTS

We now come to the consideration of the chemical nature of changes during combustion of petrol and air. The chief constituent of ordinary petrol is the hydrocarbon hexane (C_6H_{14}), mixed with a certain proportion of the other members of the paraffin series. When petrol is burnt in the presence of sufficient air or oxygen the carbon is almost entirely converted into carbon dioxide (CO_2) and the hydrogen into water. If, however, the supply of oxygen is deficient, then, in addition to carbon dioxide and water, there are also produced carbon monoxide (CO), hydrogen (H), and methane, or marsh gas (CH_4). Now these three gases (CO, H, and CH_4) are all combustible when mixed with oxygen, and hence it is obvious that the presence of such gases in the exhaust of an engine involves a waste, for we are discharging into the air part of our fuel, not, it is true, unaltered petrol, but since it is combustible it is fuel. The water produced by the combustion of petrol amounts to about one and a half times the weight of the petrol, and hence it is not surprising that when starting up an engine, so that the silencer is cold, a considerable quantity of water is often found to drip from the silencer or exhaust pipe.

If we take a certain volume of petrol vapor and air at, say, 110 deg. C., and, after firing the mixture, allow the products of combustion to cool down to the original temperature of 110 deg. C., it is found that if the pressure be adjusted to the original value, the volume of the products of combustion is greater than the original volume of air and petrol vapor. The amount of this increase in volume on combustion for different strengths of mixture is shown in Fig. 25. It will be noticed that for mixtures containing more than 14 parts of air to 1 of petrol, the increase of volume on combustion is very nearly constant. In in the case of richer mixtures, increase in volume on combustion increases rapidly with the increase in strength of the mixture.

Since the nature of the chemical changes which take place on combustion depends on the relative proportions of petrol and air present, we can, by a study of the products of combustion, *i.e.*, the exhaust gases of the engine, investigate the relative proportions of air and petrol taken in by the engine.

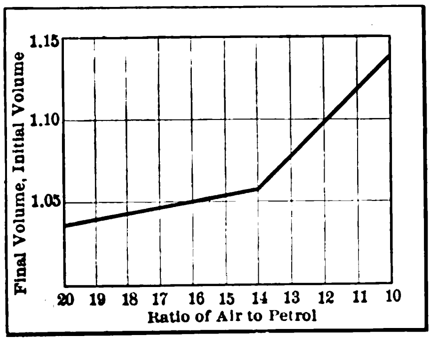


Fig. 25—Showing increase of combustion for different strengths of mixture

Before we are able to analyze the exhaust gases it is necessary to collect a sample, and this process, simple as it may seem, is one requiring considerable forethought. If a collecting vessel is simply connected, by means of a tube, to the exhaust pipe between the engine and the silencer, and the exhaust gases are allowed to blow through the vessel for some time, it by no means follows that the final contents of the vessel will be exhaust gases uncontaminated by air. The reason is that even with a four-cylinder engine, and much more in the case of a single or two-cylinder engine, the pressure in the exhaust pipe is often during a part of the stroke below the atmospheric pressure.

That this is the case is shown in Fig. 26, which gives for three different speeds the manner in which the pressure in the exhaust pipe of a four-cylinder engine varies during the stroke. It will be noticed that at all speeds the pressure sinks about 2 lbs. per square inch below atmospheric at some part of the stroke. Hence, if the collecting vessel is simply connected to the exhaust pipe by one tube, a second tube being provided to allow the escape of the air from the vessel, then while it is true exhaust gases blow through the vessel during the greater part of a stroke, yet during the remainder of the stroke, when the pressure is below atmospheric, air is sucked back into the sampling vessel. Hence, to obtain a true sample of the exhaust gases, some form of non-return valve must be fitted to the outlet from the vessel. There is no doubt that some of the very anomalous results which have been obtained, in particular the finding of oxygen in the exhaust when there is incomplete combustion of the petrol as shown by the presence of carbon monoxide, are due to faulty collecting of the samples.

The results of the analysis of a large number of exhaust gas samples, obtained when using different strengths of mixture, are shown in Fig. 27. In this figure the ordinates are the percentages of CO_2 O_2 and CO, obtained after the steam has been condensed. It will be seen that, starting with a weak mixture and increasing the strength of mixture, the percentage of carbon dioxide, as shown by the upper curve, increases up to a mixture containing 1 of petrol to 14 of air. For stronger mixtures the percentage of carbon dioxide gradually decreases. For mixtures weaker than 1 of petrol to 14 of air there is always a certain quantity of free oxygen in the exhaust, the percentage increasing as the mixture gets weaker. On the other hand, for mixtures containing more than 1 part of petrol to 14 of air, there is always a certain amount of carbon monoxide present, the percentage increasing as the strength of mixture increases. Now, except with about 14 of air to 1 of petrol where we may have 1-2 per cent. of both free oxygen and carbon monoxide. these gases are never both present; as long as there is any free oxygen in the exhaust there is no carbon monoxide, and *vice versa*.

By collecting a sample of exhaust gases and performing an analysis we can, by means of curves given in Fig. 27, immediately deduce what was the ratio of air to petrol taken by the engine at the time when the sample was collected. Hence, if samples are collected with the engine running at different speeds and with different throttle openings we are able to examine the working of the carbureter and, if necessary, adjust it, so that the strength of the mixture may remain, if not correct, at any rate within reasonable limits for all working conditions. As an example of such an investigation I may quote some results taken with my own car. After the car had been in the hands of the makers, and the carbureter had been adjusted by their tester, I took a series of samples of exhaust gases with the following results:

Speed of car	Throttle	Per cent. of CO in exhaust
18 m.p.h.	full open	9.6
23 "	½ open	2.2
Clutch out, engine turning slowly		0.4

Now, 9.6 per cent. of carbon monoxide in the exhaust represents a waste of about 36 per cent., due to incomplete combustion of the petrol, while even 2.2 per cent. of carbon monoxide represents a waste of 9 per cent. It was evident that the carbureter had been adjusted so that when the engine was running light, with the throttle almost closed, it would get a sufficiently strong mixture to work regularly, and that with this adjustment when the throttle was opened the mixture became much too rich. Further examination showed that when the engine was running light the petrol was not being properly vaporized, for a steady trickle of liquid was found to flow out of the bottom of the carbureter. By arranging a small cone of wire gauze below the jet, so that any petrol which flowed down the sides was spread out over the gauze, evaporation was so much improved that no liquid petrol escaped. The air now took up, even with the throttle almost closed, so much more petrol vapor that the supply of liquid could be very much reduced. This, together with a hand-operated extra air valve, caused the working of the carbureter to improve to such an extent that, in place of getting 28 miles to the gallon, 42 miles was obtained, while the following results for the exhaust gas analysis were obtained:

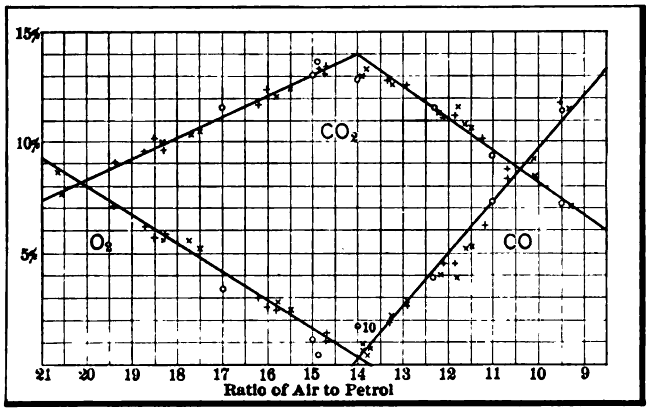


Fig. 27—Chart showing results of analysis of various exhaust gas samples, obtained from different strengths of mixture

Speed of car	Throttle	Per cent. of CO in exhaust
18 m.p.h.	full open	0.0
21 "	¾ open	0.4
21 "	¼ open	0.0
Clutch out, engine turning slowly		0.0

As another example of the utility of exhaust gas analysis when investigating the working of an engine, we may take some analyses made of the exhaust of the two-cycle engine from which the diagrams shown in Fig. 15 were obtained:

	Speed of engine (revolutions per minute) 640	1,500
	Per cent.	Per cent.
CO_2	6.8	10.0
O_2	7.6	1.6
CO	2.0	4.8
H_2	0.7	1.7
CH_4	0.2	0.2
N	82.7	81.3

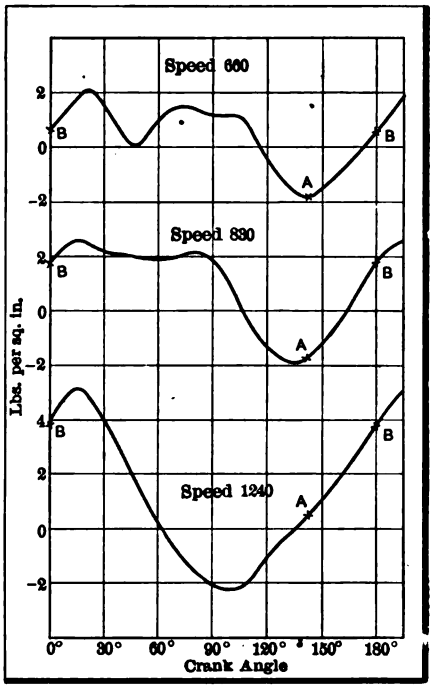


Fig. 26—Chart showing variation of pressure in exhaust pipe of four-cylinder engine

It will be observed that at both speeds we get free oxygen and carbon monoxide in the exhaust, while it will be remembered that in the case of a four-cycle engine these two gases are never found simultaneously. The reason for the difference is that while in the four-cycle engine, where the exhaust valve and the inlet valve are never open at the same time, it is impossible for the fresh charge which is entering to escape through the exhaust valve, in the case of the two-cycle engine it is quite otherwise. The exhaust port is open all the time during which the inlet port is open, and even after the inlet port is closed on the compression stroke, and although a baffle plate is fixed to the top of the piston so as to prevent the incoming charge from blowing straight across to the exhaust port, yet it is quite easy for some of the fresh charge to escape. Now, since there is some carbon monoxide in the exhaust, it follows that all the oxygen contained in that part of the fresh charge which is retained within the cylinder has been combined with the carbon and hydrogen of the petrol, and therefore all the free oxygen found in the exhaust must have blown straight through from the inlet to the exhaust port. From the percentage of nitrogen in the exhaust we can at once calculate the quantity of oxygen which accompanied this nitrogen in the air which was taken into the engine, since the proportion of nitrogen to oxygen in the air is always the same. Thus 82.7 volumes of nitrogen must have been accompanied by 82.7 x 0.266 or 22.0 volumes of oxygen. The analysis shows that 7.6 volumes of oxygen must have escaped through the exhaust port during the time the fresh charge was entering. Hence

$$\frac{\text{Oxygen which escapes}}{\text{Total oxygen taken}} = \frac{7.6}{22.0} = .345.$$

Now the oxygen which escapes bears the same ratio to the total oxygen which enters through the inlet ports, as does the charge which escapes to the total charge. Hence

$$\frac{\text{Charge which escapes}}{\text{Total charge}} = .345.$$

In other words, 34.5 per cent. of the charge, which enters the engine at a speed of 640 revolutions per minute, escapes through the exhaust port, and hence is, of course, entirely wasted.

A similar calculation made for the speed of 1,500 revolutions per minute shows that, at this speed, only 7.4 per cent. of the charge escapes. The reason for the much larger escape at the slow speed is at once evident from a study of the crankcase diagrams given in Fig. 15. The much larger charge per stroke taken into the crankcase at the slower speed, and hence the larger volume of fresh charge driven into the cylinder is responsible for the large loss of charge through the exhaust port.

If you see an automobile approaching at a brisk pace, give it sea room; it may cast a shoe just alongside of you.

If you hear a strange noise, make an investigation; it might be due to a hollow lubricating oil tank.

Don'ts for the Automobilist

FOR THE BENEFIT OF THOSE WHO NEED NUDGING; DEALING WITH PROBLEMS OF EVERY-DAY OCCURRENCE; APPLICABLE TO THE AUTOMOBILIST AND THE CITIZEN

Don't lay the blame on your collaborators if you fail in some undertaking. If you are a bungler there will be no concealing the defect in any case.

Don't imitate children; they blame others for what they do that is wrong.

Don't try to transfer the responsibility for an act that is yours if it fails to pay a dividend.

Don't attempt to assume the responsibility for an act that is not yours if it does threaten to pay a dividend; the elusive little fellow might escape after you acknowledge the child as yours.

Don't surrender your reputation for being honest by trying to escape the blame for a fault.

Don't forget that anyone would rather have an honest (though imperfect) man than a person who is smart and irresponsible.

Don't be grieved if you naturally would like to take credit for good deeds and escape responsibility for the other kind—so would all your acquaintances.

Don't shirk responsibility just because there is a good chance of failure—could your employer find a better risk than you, he would do so.

Don't expect to shine with an efficiency of 100 per cent. No man ever lived in such fierce light.

Don't be satisfied with an efficiency of less than 66 per cent. Your friends will be disappointed in you if you are.

Don't be a lone fisherman; find out what others expect of you; see if you cannot merit their approbation.

Don't try to reduce the number of your enemies; have you forgotten that it is they who urge you on?

Don't let your friends baby you too much; it is nice of them, but it spells inactivity, and, what is worse, the intellect is lulled into a dangerous sleep.

Don't forget that a good friend makes a vigorous enemy; try to draft your enemies from the outside world.

Don't invite your enemies to lash you into a fury; just arrange with them to give you a sting of the whip when you need it.

Don't be bashful; your enemies will accommodate you any time that you request them to act.

Don't be blind; masks are worn by those who need them; masked faces are not good to look upon.

Don't be suspicious; if you are in financial trouble, consult a lawyer; if you are ill, send for a doctor; but if you are suspicious of some one, consult a friend and rely upon his judgment.

Don't impose upon a democratic spirit; you might wear out your welcome.

Don't imagine that you are using influence when you are swinging a club.

Don't club intelligence; you will be annihilating your best asset.

Don't forget that intelligence would have to be clubbed to death before it would bow to such a crude device as a club.

Don't hide the real merit that resides in your effort, and then substitute brutality when you go in quest of recognition; let the good quality shine; it will bring a response.

Don't forget that brutality is the most objectionable when it is dressed for a saunter 'midst refined society.

Don't overstep the bounds of prudence; when a man gives you all that you go after, why come back?

Don't harangue a mob; tell your story to some one intelligent person; the mob will follow the intelligent man.

Don't tell a story that will not attract the notice of the intelligent, nor forget that the same story will be as Greek to the ears of the mob.

Don't overlook the pleasure that follows if the chauffeur belongs to the class who keep automobiles in good working order; the saving in dollars is but a small part of the advantage.

Don't assume that your automobile will keep well just because you run it into the garage and keep it there for the Winter; that persistent agent of destruction, rust, may be a very busy pest; it might be like planting the automobile in a grave.

Don't use your garage for a grave; a hole in the ground is cheaper; the garage might then be available as a chicken coop.

Don't put a car up for the Winter without first preparing it for its long hibernation.

Don't assume that it is a mere matter of running off the water and emptying out the gasoline tank.

Inferior Terminology

No Truth in the Claim That a Cooling System Is Thermosyphon in the Absence of Water Pump

PERHAPS it is too late to revise the most commonly used terms throughout the automobile industry, referring to those that do not adhere to accepted terminology. The word "Thermosyphon" as applied to cooling systems of the class which do not depend upon a water pump for the circulation of cooling fluid is misplaced. It is even a question of some doubt as to whether or not the compound term "heat circulation" would be descriptive of the process. The probabilities are that the circulation which takes place in a body of water, due to differences in temperature, would be far too feeble to accomplish the purpose. In some so-called thermosyphon systems steam forms over the surfaces of the combustion chamber of the cylinders of the motor, and this slug of steam rushes off through the constricted passageways of the piping toward the atmosphere entraining water, thus setting up circulation. The vigorousness of this form of circulation is equal to that of a designed water pump. It would be within the realm of reason to hold that these slugs of steam are to all intents and purposes the very equivalent of the piston in a water pump, and they do the same work. It is doubtless true that a process of molecular segregation goes on; the molecules of water that are most affected by heat expand, thus lowering the specific gravity as compared with the same property of the water in the colder strata, and a process of equalization goes on, due to the circulating influence of the shifting molecules within the body of the water. But this feeble force for circulating purposes is a bagatelle as compared with the projectile-like ravages of a slug of steam, holding in its makeup a large amount of energy, by means of which it is impelled like a meteor from the place of formation to the point of escape to a lower pressure. The lower pressure is, of course, the outside atmosphere, and the overflow of the radiator is the gate to which the steam is directed in its passageway, and it is the problem of the designer to take advantage of the force of the steam so formed, but to dissolve the same in the water ere it reaches the atmosphere outside.

It Stands to Reason

JUST A FEW OF THE POINTS THAT SHOULD BE SELF-EVIDENT TO THE THINKING AUTOMOBILIST; THAT SHOULD NOT BE UNKNOWN TO THE THINKING BUILDER

That tires will not last long if the inner tubes are not of the right size; this class of trouble lost a race for one of the contestants for the Grand Prize at Savannah.

That the inner tubes will give out if they are too small, for then the rubber structure will be stretched too much.

That the inner tube will be quickly destroyed if it is too large, for then it will lap over and crack at the seam.

That the inner tube will be destroyed if it sticks (adheres) to the shoe.

That the inner tube will adhere to the show if it is not lubricated.

That lubricant for rubber is not the same as the lubricant used in metal bearings; for rubber, use soapstone; for metal, use mineral oil.

That sprinkling soapstone into the outer shoe just before putting the inner tube in place is not lubricating the tube.

That the soapstone must be rubbed all over the surfaces of the inner tube before it is placed in the shoe; a heap of material in the shoe may be damaging.

That care must be taken not to allow dirt from the roadway to contact with the inner tube; a $2 duster, laid upon the ground every time, will save several $10 inner tubes, and, perhaps, an outer shoe as well.

That a power pump to inflate the tires is of no value unless the air valves of the inner tube are in good order.

That putting up with defective air valves is poor economy; they cost but a few cents each—keep a few in the kit.

That tire valves should be covered with dust caps.

That good tires and care in putting them on is like spilling water into the ocean if a good tire pump is not available to use in pumping them up.

That a good tire pump is of little value unless there is some means at hand to tell the pressure.

That guessing at the tire pressure is like dreaming about how much gold there is in the vaults of the Bank of England.

That pumping up to a given pressure for all the tires is not good practice, unless attention is given to the effect of the given pressure on each of the tires—some tires have to be pumped up a little higher than others.

That good ignition equipment must be used if the motor is to deliver its proper quota of power.

That temperature, as it obtains in Winter and Summer weather, is never so severe as to alter the magnetic qualities of the permanent magnets of the magneto.

That temperature does affect the carbureter because the viscosity of gasoline changes with the temperature.

That the ignition is more or less efficacious as the fuel is well or ill proportioned.

That Winter's service demands a larger opening of the nozzle orifice of the carbureter than will be required in the Summer time unless some scheme is employed to maintain the fuel at a constant temperature.

That the fuel must be held at a constant temperature as it spirts out of the nozzle of the carbureter to avail anything from the point of view of a constant flow.

That temperature affects the battery, when one is used for the source of electricity, reducing the voltage, or the output, as the temperature is lowered.

That lead-lead storage batteries should be kept at a constant temperature to obtain the best result.

That the highest efficiency of the battery is at about 90 degrees Fahrenheit.

That poor ignition service is to be expected unless all the joints of the electrical system are soldered.

That makers of automobiles should see to it that all the joints of the electrical system are soldered before the automobiles are delivered.

That an accumulation of stale lubricating oil may not spell trouble until the temperature falls low enough to make it into a rock.

That a clean automobile is the least likely to give trouble in cold weather.

That an automobile may be too dirty to run and still look as spick and span as a 4-year old.

That a dash of attar of roses will not serve as a counter-odor for an automobile; what it needs is cleaning; get rid of the old lubricant.

That wheezing is a sign of defectively packed joints; replace the packing.

That just a small leak in the intake manifold will throw the mixture out of balance and shut the motor down.

That a leak may be due to defectively packed joints.

That the intake manifold may have a flaw in it; the mixture will then be out of kilter; get it fixed.

That shellac will close up a porous intake manifold quite permanently; flow the shellac over the inner surfaces.

That the proper kind of lubricating oil for a clutch depends upon the design and construction.

Our Endless Production

The Horse Shows That No Dent Has Been Made In Natural Demand As Yet

The new census tells us that there are more horses and more horse value in the United States now than were found in the year 1900. With all allowance for the probability that values and chattels were skipped generously by the enumerators and concealed industriously by the proud but thrifty owners, the new finding still contains some valuable documentary evidence as between the bears and the bulls in automobile production. It has been almost forgotten that the automobile was to drive the horse out of work and into the zoos, as was so generally claimed before it could be proven. These days, when the steadily swelling number of satisfied owners of automobile trucks and delivery wagons has really proven that the horse eventually must give up its burdens, the lesson of the fact seems to be lost on those who view with alarm a production of 200,000 automobiles in one business year, and to be appreciated mainly by the men of large finance who are accustomed to build on the broad facts of national scope. The horses are still there. What more does the doubting banker of Thomastown want? He who has grown opulent not only through his ability and faith in his own community but mainly through the large and conspicuous fact, in which are enfolded thousands of grievous industrial and commercial sins as in a mantle of charitable generosity, to wit, that it is difficult for any sound industry to keep step, only, with the national expansion in a country whose demands for a useful or a pleasing article grows annually by a healthy birthrate increase of the population exceeding 2 1-2 per cent., and in addition by an equal increase from the influx of immigrants, from whose labor somebody derives a profit, so long as all are working. In this bountiful situation the question of production remains serenely, How rather than How Many?

Classifying Carelessness

Meager Statistics Used to Classify Causes of Tire Trouble

RULES for use in "bucking" the stock market do not always prevent the players from getting their fingers burned, but they have a certain value to the man of skill and discrimination, so that if he must "take a flyer" he at least displays the good sense of utilizing available information for what it is worth. The same idea should have some value from the point of view of the automobilist who finds himself struggling with a large tire bill. Crude statistics are responsible for the classification of these troubles, as follows:

CAUSES OF TIRE CASUALTIES GIVEN IN PER CENT.

Assignable Causes	Shoes	Tubes
Reasonable wear and tear	37.1	43.7
Insufficient inflation	17.3	6.8
Punctures	29.4	7.2
Bruising	4.9	9.5
Surface blemishes	4.3	5.8
Rusted rims	3.5	..
Creeping	1.5	..
Blow-outs	1.8	..
Decomposition	0.2	..
Nipping	..	13.0
Unassigned	..	14.0
Total	100	100

Limiting Tire Depreciation

All Other Conditions Remaining Equal, Speed Is Disastrous

HAVING purchased the best tires possible to obtain for a given automobile, making sure that the sizes are large enough to sustain under the load without flexure, observing that they are fully inflated, keeping them out of contact with lubricating oil and other rotting substances, maintaining the surfaces intact in order that water will not be the carrier of mildew into the fabric, there still remains a considerable opportunity to destroy the tires before they will have rendered sufficient service to pronounce them satisfactory.

The speed maniac may be equally described as a tire destroyer. It is speed that does it. A given set of tires on a given automobile will last four times as many miles at 20 miles per hour as they will at 40 miles per hour. Putting it another way, the mileage of a tire is approximately inversely proportional to the square of the speed of the car. In operating an automobile, the average speed of traveling, considering a distance of, say, 1,000 miles of the total effort, does not exceed 18 miles per hour; this is in the face of the fact that autoists drive at a much higher speed for a part of the time, but it is not believed that they fall below this level for an equal part of the time. What really happens, is, that for all the time gained at the higher speeds, there is an offsetting period of inactivity which does not help to sustain the average speed.

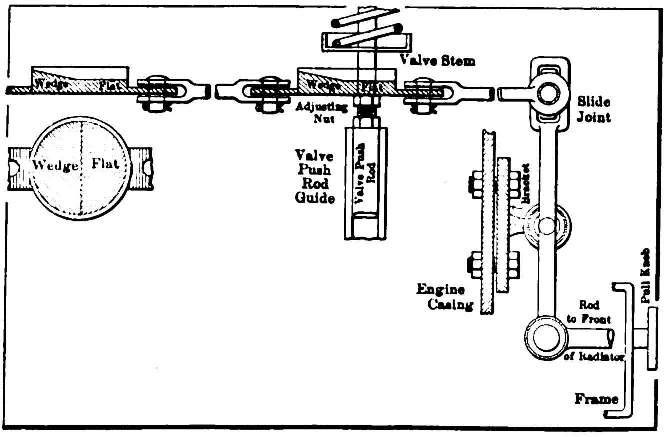


Fig. 1—Method of fitting compression release

Letters from Subscribers

High Compression Causes Difficult Starting

Editor THE AUTOMOBILE:

[2,434]—I have a car fitted with an engine with a five-inch bore and 5 1-2-inch stroke and find it very difficult to start, particularly in cold weather or when the engine has not been run for several hours, owing more to the fact that the compression is high and therefore difficult to swing. There is no compression release fitted, which makes matters worse. I have tried putting gasoline into the cylinders and after a few pulls it will start, but the difficulty is to crank sufficiently fast for the low-tension magneto. I find it more difficult to crank with the compression cocks open. What would you suggest to overcome the difficulty?

Buffalo, N. Y. F. C. RICE.

The difficulty with your car is that it should have been fitted with a compression release. To fit an internal release is a matter that we cannot suggest, as it involves a new camshaft and quite a lot of alterations. The simple compression release shown in Fig. 1 could be fitted to almost any motor. It consists of inserts placed under the valve stems in such a way that when the motor is running the flat surface only is in contact. The engine is started by pulling out a rod in front of the car near the starting crank; the wedge-shaped part of the insert raises the exhaust valves slightly, which will permit of giving the engine a good "swing." The insert should be hardened.

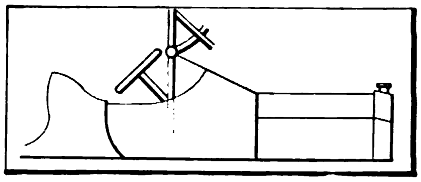


Fig. 2—Wind shield for small runabouts with scuttle dashes

Patches That Do Not Stick

Editor THE AUTOMOBILE:

[2,435]—I have just returned from a tour, and although somewhat inexperienced I had no trouble with any part of the car but the tires. The less I say about them the better, as I could fill your paper with my troubles. But they say that practice makes perfect, and I now see that a good deal of my trouble was of my own making. There is one thing, however, that I cannot manage, viz., putting patches on punctures and making them stick on. Everything seems good when I put the tube in the tire, but after a few miles the two part company. The trouble I have is to make the patch stay on the tube, as it always has a tendency to curl at the sides. I have greatly profited by your recent articles on tires and will be greatly obliged if you can help me. TIRED.

Savannah, Ga.

Your difficulty seems to lay in two things: First, you do not allow the solution to become tacky, and this takes from 10 minutes to a quarter of an hour by the watch, and not guesswork; secondly, you should have some means of keeping the tube and the patch pressed together, and such a tool as shown in Fig. 3 would answer. It consists of two pieces of hardwood and a clamp that can be purchased at any hardware store. Leave the tube in the press about ten minutes, first lightly powdering the boards to prevent the patch from sticking to them.

Heat inside the tire is generated by friction and to overcome this liberally cover the tube with French chalk before inserting it again and pumping it up to the proper pressure.

THIS DEPARTMENT IS DEVOTED TO THE ANSWERING OF LETTERS FROM SUBSCRIBERS ON ANY SUBJECT RELATED TO THE RUNNING OF AUTOMOBILES

Weight of Woods for Aeroplanes

Editor THE AUTOMOBILE:

[2,436]—Could you give me the weight in pounds per cubic foot of the following woods: Ash, beech, elm, oak, sycamore, willow, together with any remarks on them as to their properties?

Ash weighs 50 pounds per cubic foot and is very elastic and withstands weather conditions well. Beech weighs 42.12 pounds and the white variety admits of thin divisions. Wych elm weighs 35.62, and is suitable for steam bending. Rock elm weighs more than wych, viz., 41.93 pounds per foot cube, but is closer grained and better to work. Oak weighs 54.50 and is durable in exposure to weather; on account of the tannin in oak it must not be used in contact with iron. Sycamore weighs 38.90 pounds per foot cube and willow 30.37 pounds. The latter is often used for friction plates and brake blocks.

An Inexpensive Wind Shield

Editor THE AUTOMOBILE:

[2,437]—I have a racing runabout with a metal scuttle dash and I wish to fit a wind shield. I tried one fitted to the dash, and it was worse than useless, as to be of any service it had to be high, offering a large area for wind resistance. If it were possible I should like it so designed that I will be able to lift it and see underneath when it rains.

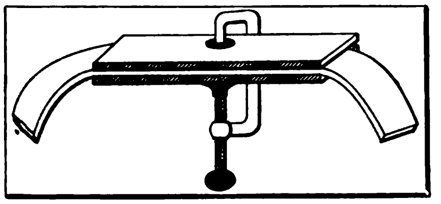


Fig. 3—A tool that every autoist should carry—two pieces of wood and a clamp

York, Pa. H. P. S.

Such a shield as you require we have sketched in Fig. 2. As you say the car is fitted with a scuttle we presume there are front doors and enclosed sides and to these the upright can be fitted. From the upright to the dash we suggest that you fit a piece of leather that can be removed and make the frame carrying the glass hinge at the top. The bottom of the frame should be fitted with bolts and thumb-nuts which will grip on the semi-circular guides. If you have a top fitted, raise this when you are measuring the height of the shield.

"Which Wire?"

Editor THE AUTOMOBILE:

[2,438]—I have a fleet of motor cabs running, and what I find gives the men more trouble than anything else is the ignition wiring. There are two separate sets of plugs connected to magneto and coil ignitions, and the men, when anything happens, often remain stranded owing to want of knowledge as to which wire to put to the proper terminal. Could you give me any suggestion as a remedy?

New York. A SUBSCRIBER.

The best method we can suggest is to mark the terminals with different colored paints, thereby making the matter of matching simplicity itself and doing away with any possibility of making mistakes. The valve caps into which the spark plugs are screwed should be painted as indicated in Fig. 4, and each wire so colored that it can be traced from spark plug to magneto or distributor with ease.

Slush in the Cooler

Water Has a Definite Freezing Temperature; Non-freezing Solutions Are Not So Definite

WATER freezes at 32 degrees Fahrenheit, under a pressure of one atmosphere, and as long as there is any water present the temperature will hold at the point of freezing, or melting, as the case may be. In dealing with water, this definiteness is advantageous. Upon adding ingredients which in themselves have a lower congealing point, they influence the freezing point of the whole, dragging it down to a lower level. It is also true of glycerine, alcohol, calcium-chloride, etc., that when added to water to make a non-freezing solution, they destroy the sharp line of freezing distinction, and instead of making a solid at some definite temperature, the product is more in the nature of "slush," a good example of which is to be found in the characteristics of ice cream. This slushing property may be taken into account advantageously. In making a non-freezing solution, the more of the foreign substance that is added, the lower will be the specific heat of the mixture as a whole, to which must be ascribed the reduced efficiency of the solution for cooling purposes. Under the circumstances, it is wise to add as little as possible of the glycerine, or alcohol, as the case may be, to attain the end, and the fact that slush forms, rather than a homogeneous body, makes it possible to limit the quantity of the foreign material to be added, knowing that while the lowest winter temperature may produce freezing, it is not likely to result in a homogeneous solid body.

Value of Graphite

Automobilists Will Profit by Its Use as Here Indicated

IT has been found that if finely powdered flake graphite is put into the crankcase in the proportions of a teaspoonful to a quart of lubricating oil the engine runs more smoothly, there is better regulation and compression is much improved. The following uses for flake graphite about the automobile are suggested:

Introduce flake graphite between the leaves of the springs. This may be done by jacking up the car so that the chassis hangs by the springs, then flake graphite and oil mixed to the consistency of a thick paste may be introduced between the leaves and the squeak will be cured for practically all time.

If the valve seats and stems are polished with flake graphite a free and easy movement is assured.

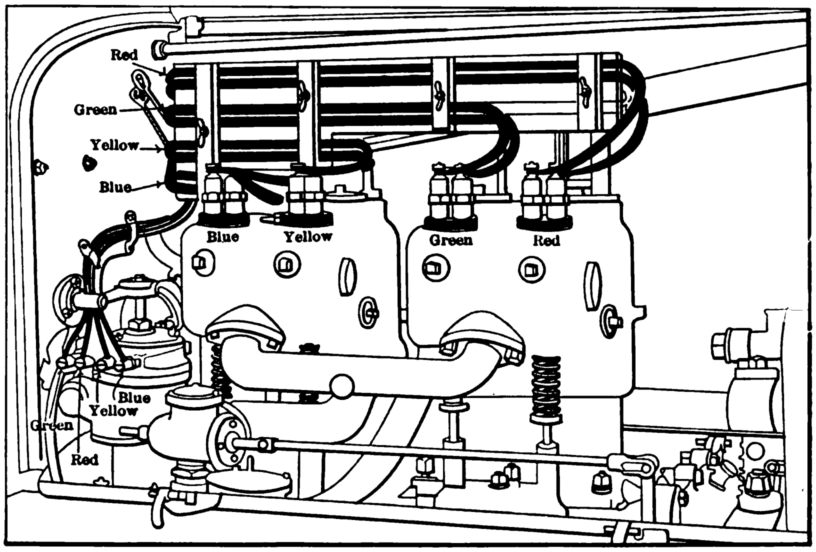


Fig. 4—Method of painting wires to facilitate finding the proper wire

As a General Rule—

If an inventor is awarded a patent, an infringer will be found for it.

If a patent is allowed, it is fairly well understood to be a license for a lawsuit.

If the inventor ever reaps a profit, he may consider himself fortunate.

If the invention is valueless it will not be copied.

If the invention proves to be an epoch making discovery there will an army of copyists.

If the inventor is wise he will exact cash from the purchaser.

If the inventor takes a note in payment it will be no good.

If the purchaser can negotiate a transfer for a note or a promise, he will do so.

If the inventor goes to law he will find it the shortest road to the poor house.

If the inventor has any other way of making a living, it will be worth his while to practice it.

If "Colonel Sellers" made all the money he hoped to, there would be no more left in the world.

Carbureter Action

BEING AN ABRIDGMENT OF A PAPER READ BEFORE THE BRITISH INCORPORATED INSTITUTION OF AUTOMOBILE ENGINEERS, BY W. MORGAN, B.SC., AND E. B. WOOD, M.A (CANTAB.) (SECOND INSTALLMENT)

VARIATION of cross-section of throat modifies the suction on the jet for equal deliveries of air and consequently modifies the carbureter characteristic. Bushes of the following diameters were used with the same jet: A, 1 1-4 inches; B, 1 inch; C, 3-4 inch, and D, 1-2 inch.

These varying velocities past the jet affect both the slope of the characteristic and the point of intersection on the air axis (see Fig. 6). The characteristics converge toward a point on the petrol axis behind the air axis.

The droop from the straight line appears to a greater or less extent on every curve taken. Fig. 7 gives the characteristics obtained with tubes A, B, C, at 500 revolutions per minute. It is seen that the maximum quantity of air per minute with A and B is the same, the curve of the droop in the case of B being slightly the flatter. In the case of C the droop is still less pronounced. Measured in percentage deviation from the straight line relationship the droops are: A, 23; B, 7, and C, 5.

The engine in cases A and B has nearly reached the maximum intake of air with half-open throttle, so that further throttle opening serves to enrich the fuel mixture without grealy increasing the quantity of air taken.

Strongly marked oscillations of pressure occur in the induction pipe of an engine due to resurgence on the opening of the inlet valves and to inertia effects generally. These same effects will occur in the partially throttled pipe, but the pressure variations will be damped by the high gas velocities at the partly closed throttle. On opening the throttle lower gas velocities are obtained with less and less damping action so that the surges of gas are more strongly felt at the jet. With open throttle this surging can be so strong as to carry petrol outward from the induction pipe. The result is that a unit volume of air in surging flow induces a larger quantity of petrol than the same volume in steady flow.

It has been suggested that the high gas velocities in a partly closed throttle serve to damp the surging. The same would be true of high velocities around the jet and this conclusion is borne out by the smaller droop observed with throat C. The authors made efforts to wipe out this droop by inserting silencers of various types between the engine and the jet with quite satisfactory results. Care was taken that a silencer was used which offered no serious resistance to the passage of air. Fig. 8 is the graph obtained with a silenced carbureter using high velocities round the jet.

Without this droop the characteristic of a plain-tube carbureter for all speeds and throttle positions would be a straight line graph. The droop for wide-open throttle positions causes the graphs for successive speed to cover a wedge-shaped area, so that with the same delivery of air various quantities of petrol may be obtained. It should be noticed that this variation is more apparent than real, for in the examples shown, up to 0.8 of the maximum air delivery possible at any speed the characteristic lies on the straight line.

The cause of the droop in the carbureter curve has been stated to be resurgence in the induction pipe which makes itself seriously felt when the throttle is wide open. It may be urged that the droop may be caused by a change in the type of air flow set up at certain conditions of velocity and throat area. If this were so it would be expected that the characteristics obtained at different speeds with the same bush would all show the graph falling from the straight line at the same point. Reference to the superimposed curves obtained with the same bush at speeds of 300, 500 and 900 revolutions per minute (Fig. 3) shows that the droop begins to be apparent at points indicating different velocities with different speeds.

Variation in back pressure may be expected to affect the characteristic, for, in general, the pressure in the cylinder, on the opening of the inlet valve is greater than that in the induction pipe, so that a rush out of the cylinder takes place, setting up surging (see Fig. 1). This effect will be the greater, the greater the back pressure, and as a consequence it may be expected that

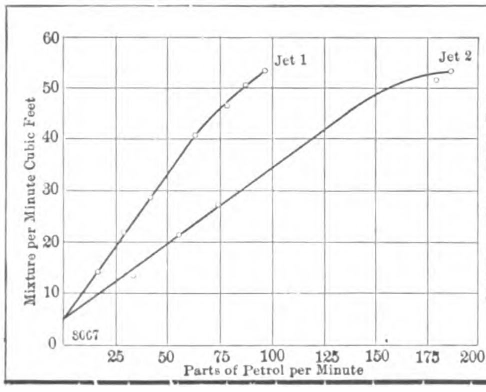


Fig. 5—Curves plotted from tests on jets of different sizes

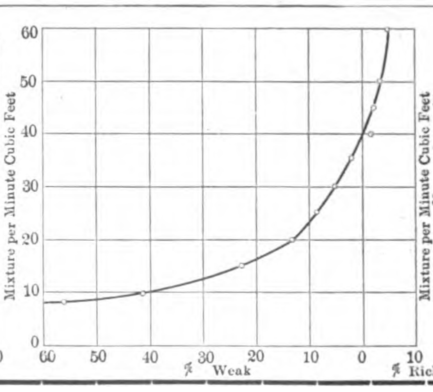


Fig. 4—Percentage variation of mixture strength

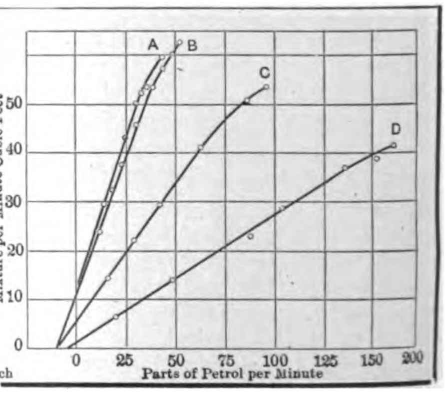


Fig. 6—Effect of varying sizes of choke tubes

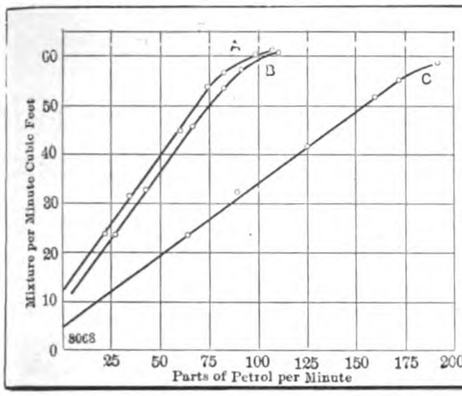


Fig. 7—Obtained with three sizes of choke tube at 500 r.p.m.

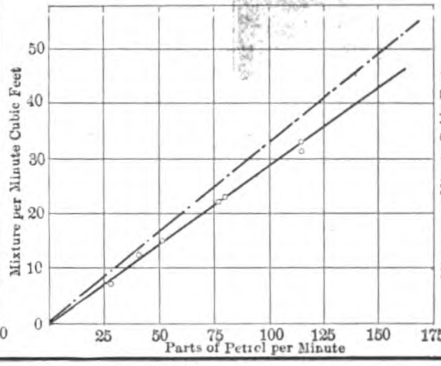


Fig. 8—This graph was obtained with a "silenced" carbureter

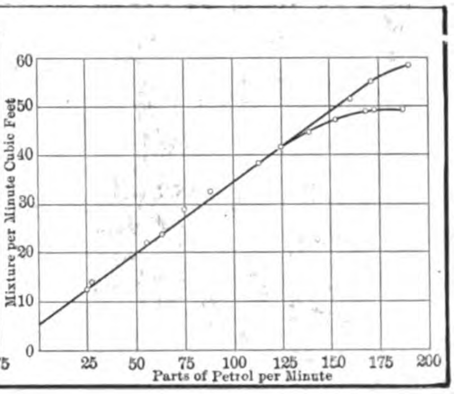


Fig. 9—The results of back pressure are plotted here

other things being equal a high back pressure will give a carbureter characteristic with a greater droop than that obtained with a low back pressure. This is brought out in Fig. 9, which shows characteristics obtained with normal back pressure and with a pressure of 5 pounds per square inch.

The adjustable tappets on the valve lifters of the engine were removed first from the two back cylinders, leaving the two front ones in action. Afterward the third cylinder tappets were removed. In this way characteristics were obtained with two cylinders and with one cylinder in action. The type of characteristic remains unchanged.

The characteristic of a plain-tube carbureter for all speeds has been shown to be a straight line (neglecting droop). The slope of this graph may be varied to any degree by selecting a suitable jet. Let the jet be adjusted so that in a given plain-tube carbureter the characteristic lies parallel with the ideal line. The mixture delivered is now weak all along the line, very weak at first, and becoming very nearly correct for large consumptions of air. Another way of stating this is to say that in such a plain-tube carbureter there is a constant shortage of the delivery of the liquid. This being so, the designing of a constant mixture carbureter is possible; allow the constant shortage to dribble into the induction pipe and the problem is solved, except for questions of convenience. The droop on the characteristic for any given speed does not necessarily lead to waste of petrol, for the graph may be set so that the terminal points of the characteristics are parallel to the ideal line; a suitable constant supply then enables the ideal mixture to be obtained at all open throttle positions. At intermediate throttle positions the mixture would be weak, but if the statement be accepted that such weak mixtures are economical this would be a desirable feature. In any event when maximum torque was required at any speed the required mixture could be obtained by fully opening the throttle; with throttled positions maximum torque is obviously not required and some weakness of mixture would not be felt.

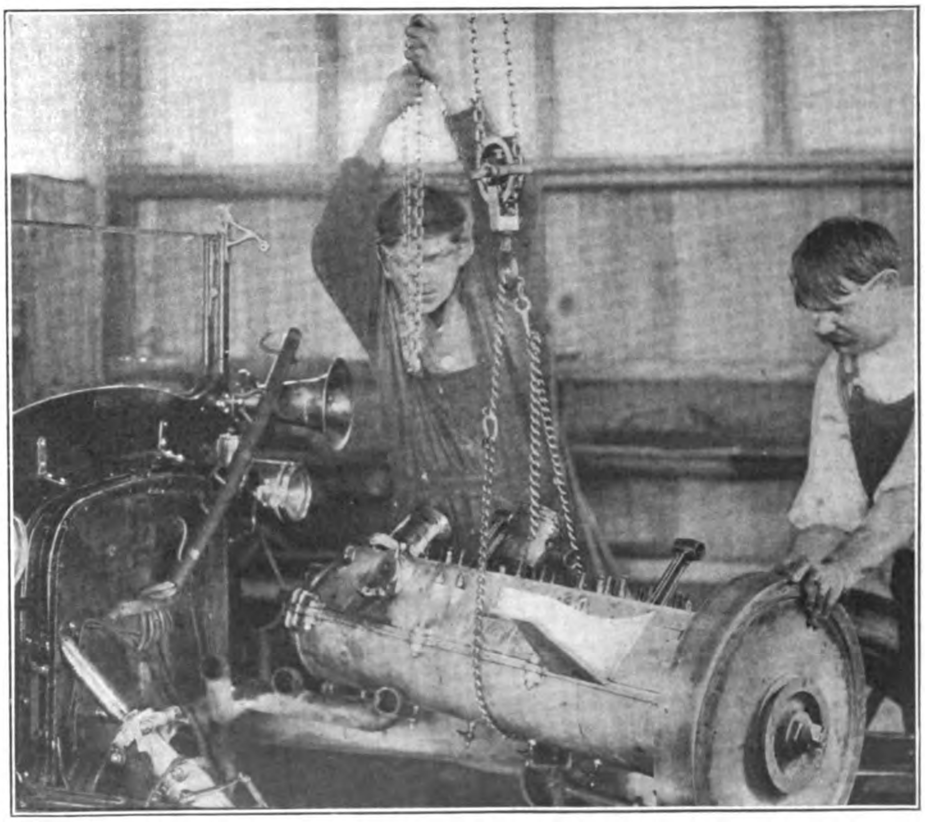
To sum up, there appears to be no necessity in any carbureter for extra air devices or the multitudinous contraptions employed other than a neat form of apparatus for supplying this constant extra supply of petrol.

It may be objected that the foregoing results have been obtained under conditions which do not occur in practice. This is true, and to estimate the effect of actual running conditions in modifying the characteristics obtained by driving the engine by an electric motor, measurements of air and petrol consumption have been taken with the engine running under its own power. The apparatus employed was the same, except that the electric motor was cut out and replaced by a rope brake. The engine speed was held constant for various throttle openings by varying the load on the brake. The results obtained bore out those obtained by driving the engine by an electric motor.

Lifting Out the Motor

Illustrating the Use of a Chain Hoist in the Repair Shop

NEXT to a file or a hack-saw the chain hoist ranks in importance in the repair shop; it comes in when units are to be lifted out of the chassis, as shown in the illustration, and, in many tight corners, it is worth more than a half dozen men. All that is required is the hoist, capable of lifting anything up to two tons, and a sling, so that while one man puts his weight on the whip end of the chain hoist, the other man steadies the work.



Illustrating the use of a chain hoist, showing how the motor base, in this example, is slung, permitting one man to lift the weight while the other steadies it

Laying Car Up for Winter

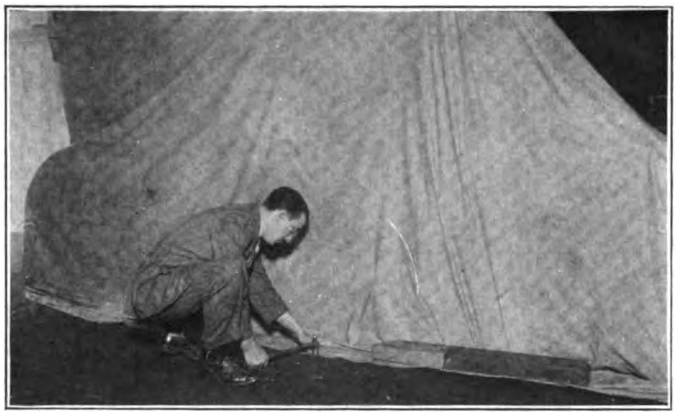


Fig. 1—Care should be taken to see that the cover is either held to the ground or tacked thereto

IT is not always because the owner does not care for driving in inclement and cold weather that the car is laid up for the Winter. Health, business and the putting of a closed car into use necessitate the open car being stored, and the owner will do well to remember that a great deal of trouble can be saved at any future time that the open car is put in service if the autoist will see that the following instructions are properly carried out. There is nothing that will depreciate the quality of a car sooner than allowing it to lay idle and unprotected for any length of time, except, perhaps, abuse; and it is for this reason that a doctor's car runs better than most cars of the same make, as he, above everybody, has to keep his car in running order, and consistent running without rough usage keeps everything in trim.

Appearance has a lot to do with it, for when appearance has to be studied the car is sure to be properly looked after, preventing filthy accumulations of oil, grease and mud.

Tires.—Place the car where it can remain without having to be moved and with some suitable means jack the wheels up and remove all the tires. Fig. 4 shows how the front wheels can be lifted by placing the jack under the center of the axle and inserting blocks of wood B1 and B2 under the spring clips. The wheels U1 and U2 may have to be turned to allow the block B1 clearing the steering arm. The rims should be looked over to see if any dents are present and these should be remedied; clean off with emery paper any rust that may be on them, and then paint the insides with aluminum or any other suitable paint to prevent them rusting while being stored. The tires should be thoroughly overhauled and all small holes cleaned out with gasoline and a pointed instrument to remove dirt and small stones, and if there are any large cuts and the autoist is not in a position to do vulcanizing himself the tires should be sent to some tire shop to have such repairs made. The tubes should be wiped over with gasoline (using only a very small quantity) and slightly inflated, well-covered with French chalk inserted in the tires, of course after all vulcanizing that is necessary has been effected. Wrap them up in cloths and store in a dark damp place. Hang up on stout wooden pegs or lay them flat on shelves; never hang tires on nails.

Body.—This should be lifted about 2 inches for the better access to the chassis. It is usually accomplished by loosening six bolts that attach it to the side members of the frame. All dirt and oil should be removed by scraping and washing. If pleated leather upholstery is fitted, introduce a wet leather between the folds to extricate dust and afterward dry off with a clean, soft rag. The white of an egg painted on with a brush will give the leather a renewed luster; this can be done when putting the car into commission again. If the cushions show signs of sagging they should be taken apart and the springs looked over and the hair restuffed. The paint work should be gone over with a renovator such as can be obtained at any coach-builder's store.

Chassis.—As above stated, to thoroughly overhaul the chassis the body must be lifted. The amount of dirt and oil that cakes everywhere in the parts covered by the body is surprising. Clean all foreign matter off with kerosene and a stiff brush, and rub with fine emery paper moistened with kerosene any metal parts that have become rusty. The latter facilitates the work and gives a smooth finish, and to prevent a reoccurrence the parts could be treated with paint; or if they are to remain bright, cover them with some thick oil, such as is used for rear axles; it is better than grease and easier to remove. Go over all nuts to see that they are tight, and if there are any missing replace them and renew any bolts that are worn.

Wheels.—Remove these; clean journals and ball races with kerosene and repack with grease or thick oil; if there is any play, which can be ascertained by shaking the wheels sideways, this should be taken up before the wheels are replaced.

Springs.—It would be as well to take the springs off, if the car has been in use for any length of time, in order to scrape the rust from between the leaves; otherwise jack the frame up, as shown in Fig. 2, when the weight of the axles and wheels will cause the leaves P1, P2, P3, P4 to separate and grease can be introduced with a flat knife, T1. If the leaves do not come apart easily prize open with a screw driver. Spring bolts and shackles wear if not made from the proper material, and these should be taken out, cleaned with emery paper and kerosene, oiled and replaced. If there are any grease holes drilled for grease cups, clean these out with some wire, so that when grease is again put through them there will be no impediment.

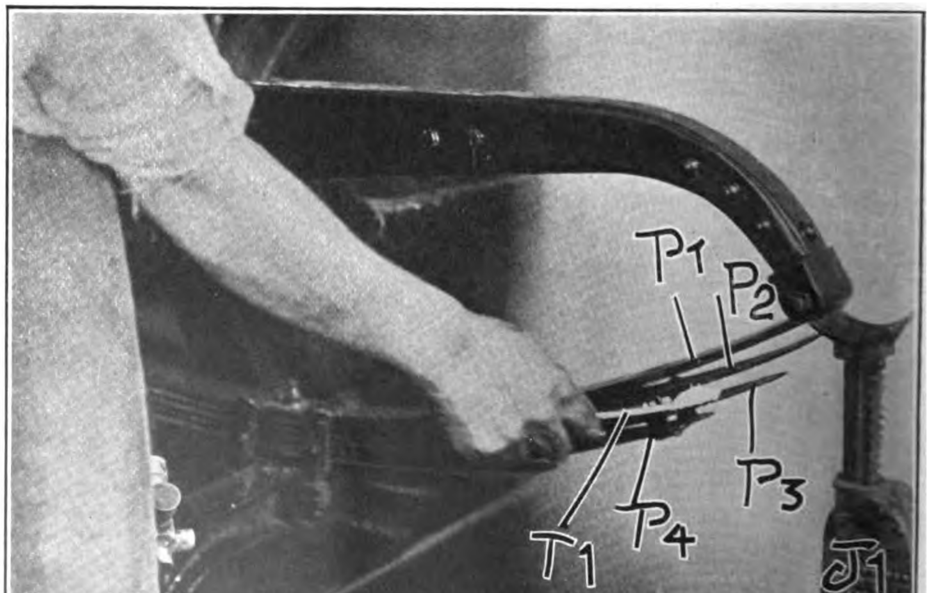


Fig. 2—Method of greasing springs that have been freed by the jack under the frame

PARTS OF THE AUTOMOBILE TAKEN SERIATIM; HOW EACH PART SHOULD BE TREATED TO PUT THE CAR OUT OF COMMISSION

Bolts.—There are different parts of the car where the threads of the bolts become rusted. They should be cleaned with a file cleaner brush, using a little kerosene and then oiled.

Lubricators and Pipes.—Wash all oil pipes with kerosene or gasoline; all grease cups should be cleaned out and refilled with fresh grease. Oil-containing tanks, lubricators and filters must be cleaned and gaskets put back, and if worn, replaced. Hammered lead makes a good joint and one that will not wear out.

Storage Batteries.—If the car is not to be used for more than two months, empty the acid, wash out with distilled water and fill with distilled water so that the plates are covered. Clean terminals from all sulphation and store in a dry place.

Magneto.—If the magneto is easily detached, remove, clean and store in a dry place.

Coil.—If the place where the car is to be stored is not perfectly dry, some rags wrapped round the box should keep this from damp.

Motor.—Grind in all valves; clean out all carbon; empty oil and flush with kerosene; clean distributor; clean off all dirt and oil with gasoline and kerosene and cover lightly with vaseline all bright parts. Better have all adjustments, repairs and overhauling to the motor done when the car is put away rather than wait for the Spring, when the repairers are busy.

Radiator and Water-Cooling System.—Empty all water; disconnect pump and engine and connect hose pipe to same, allowing a good stream of running water to pass through and clean out all impurities. Connect hose to outlet of water from radiator and run water so that it comes out of the filler. If the radiator is clogged with grease, steam will remove it.

Clutch.—If of the leather type, withdraw it and paint on some castor oil, first cleaning off with a little kerosene. Metal clutches should be washed out with kerosene and refilled with ordinary engine oil, allowing it to find its way between the plates by running the engine with the clutch out for a minute.

Gear and Transmission.—Thoroughly wash out with kerosene, using a syringe, refill with the lubricant usually employed. Pass the hands through the lubricant that comes from the gear box to discover any bits of metal that may have come from the bearings or gearwheels. If any are found, don't be satisfied till you know whence they come and have the worn parts seen to.

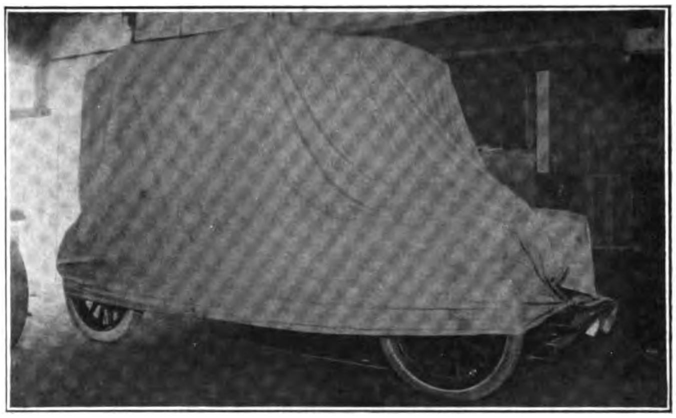


Fig. 3—How a car should not be laid up. Dust will creep in under the cover and front tires will be useless in three months

Rear Axle.—If there is a cover or filler at the top and a drain plug at the bottom, flush out with kerosene and refill with heavy oil, looking also for metal parts.

All bright parts should be thoroughly polished and covered with thick oil or vaseline, the car jacked off the ground and covered completely with sheets so that dust is entirely excluded. This can be done by tacking the sheets to the floor if it is of wood or by placing strips of wood on concrete floors and tacking the sheets to them.

Empty all gasoline and see that the float is not punctured and the float chamber is free from dirt.

If a strainer is fitted, clean it out.

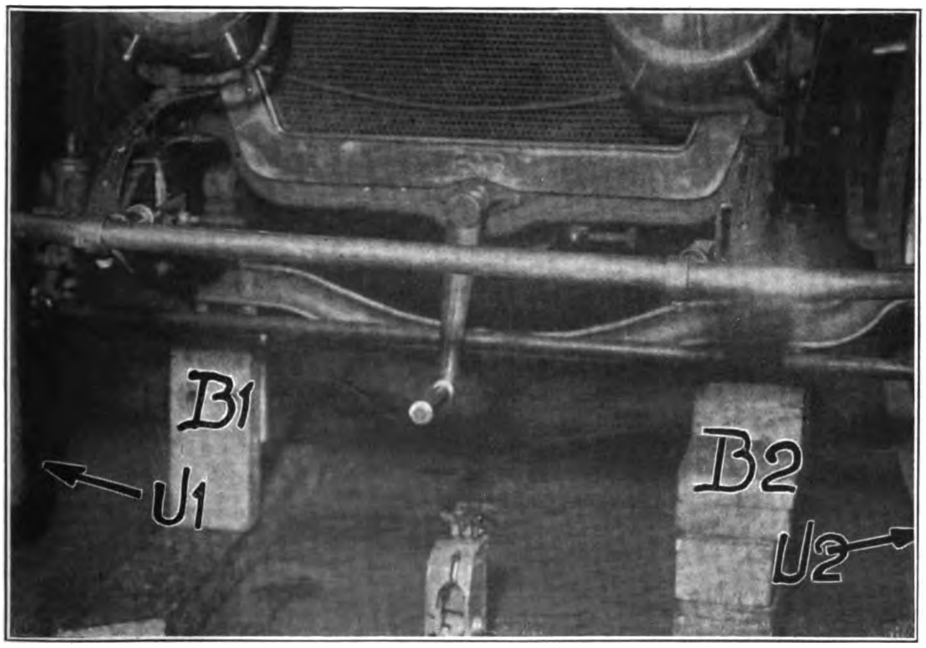


Fig. 4—Method of blocking up front axle to take the weight off the tires

Heating the Garage

A Naked Flame in a Cooped-Up Garage is a Short-Cut to a Fire

GENIUS, with all its versatility, has never succeeded in solving to the satisfaction of the prudent owner the heating problem in the small private garage. To the man who constructs a one-car garage in his back yard, there is offered the opportunity of trying to keep his automobile in commission in the Winter time, in the face of great difficulty. Insurance regulations require that the garage be located at a considerable distance from the residence, so that running a steam line from the furnace in the basement of the residence offers few attractions. Putting a stove in the garage is out of the question; even were it not in the nature of a fire hazard to do so, it would still remain for the owner to go to the garage at fixed and frequent intervals for the purpose of firing up. It has been suggested that gas be used for heating, placing a more or less automatic system in a small fire-proof "lean-to" adjacent to the garage, but separated by an impervious wall, so that inflammable mixture, should it break loose within the garage, would not be communicated to the naked flame of the heating apparatus. Even this solution is not available in half the private garages in the country because of the absence of illuminating gas. Electric lighting and heating is the obvious answer.

Questions That Arise

SOME OF THOSE THAT COME UP IN EVERY-DAY AUTOMOBILING ARE ANSWERED BY THE MATTER WHICH IS BEING PREPARED BY FOREST R. JONES IN THE NEW EDITION OF THE "AUTOMOBILE CATECHISM" THAT WILL SOON GO TO PRESS

[284]—How is vulcanizing done when repairing a tire?

After the patch is put on, it is heated to a temperature of about 250 degrees Fahrenheit or slightly hotter, for a length of time which depends on the amount of rubber that has to be heated. More volume of rubber must be heated when vulcanizing the patch on a tire-shoe than on the inner tube. It is not generally necessary to apply full temperature more than fifteen minutes.

Specially prepared sheet rubber and rubber cement in paste form are generally used for vulcanized tire repairs. A patch is put on in practically the same manner as in the preceding question, and then vulcanized.

Numerous forms of vulcanizers for repair purposes are on the market. The means of heating them is generally electricity, steam, gas or gasoline. A thermometer or a steam gauge often forms part of the vulcanizer. The steam pressure in the vulcanizer corresponds to a known temperature; thus, a steam pressure of thirty pounds per square inch by gauge corresponds to 250° Fahrenheit, and 45 pounds per square inch by gauge corresponds to about 275° Fahrenheit. The latter temperature is used on heavy tire-shoes.

The rubber is easily injured by overheating. Care must be exercised to prevent the vulcanizer from becoming too hot. Some electric vulcanizers are provided with automatic cut-outs, which turn off the current at the temperature to which they are adjusted.

It is advisable to experiment on some rubber which is not valuable before attempting to repair a tire.

[285]—Before putting a tire shoe on a rim, what should be done?

Clean the rim thoroughly where the tire touches it. Scrape and file off all rust and dirt. The edges of the clinch should be carefully smoothed with a file to remove roughness. The file should be fine cut so as not to leave ridges and points; clean well under the clinch.

[286]—What injury is almost certain to result by running with a tire too soft (insufficiently inflated)?

Rimcutting of the tire where the clinch of the rim bears against it. The rimcutting occurs in the groove between the bead and body of the tire.

[287]—If a tire is run completely deflated, what injury is apt to occur?

If there are tire lugs they are liable to tear the shoe and cut the tube.

When there are no tire lugs the shoe may creep around and cause the tube to pull so hard on its valve as to tear the tube at the valve.

Rimcutting is almost certain to occur in either case.

[288]—A tire that is badly worn on the tread can be repaired in what manner?

By retreading. The tire should be carefully examined, especially for rimcutting, to determine whether it is worth retreading.

[289]—How can a tire shoe that has a rather large hole through it be run?

By putting a protective lining canvas plaster inside of it and a protector outside. The latter is generally laced on; it is usually made of rubber-covered fabric or of leather, as found on the market. The patch, or lining, for the inside of the shoe is usually made of rubber-covered fabric. It is covered with adhesive rubber on the side intended to go against the inside of the shoe. Some internal patches are made to extend under the clinch of the rim.

When putting a protector over a tire shoe, the tire should be first partly inflated, say to almost 15 pounds per square inch, and the protector then laced on. Then, when the tire is fully inflated, the protector will be tight in place.

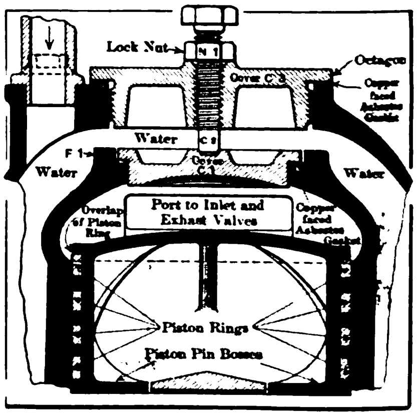
[290]—In case of a large hole, such as a blow-out, in a tire shoe, how can it be repaired?

By separating the layers of the fabric and inserting other fabric between them. The tire must be afterward covered with plastic rubber compound at the patch, and vulcanized. It is work for an expert.

Cylinder Refinements

Showing How the Questions of Expansion Are Cared For, and Other Details

NOTHING can be of greater importance than the details of design of the cylinders of a motor, nor is it possible to conclude from the evidence at hand that these matters are receiving all the attention that they deserve. The illustration here given of the upper end of a cylinder will be used to show how the inner cover may be held in place in such a way as to allow for a certain amount of expansion, it being true that the differences in temperature between cycles are so great that it is necessary to make some provision in order to abort leakage. In this example the dome of the combustion chamber is "cored" for a liberally sized opening and strength is obtained around the cored hole by means of the upward turned flanging F1, with a depression for the cover C1 to fit into, allowing for the copper faced gasket in the manner as shown. The cover C1 is held firmly in place by means of the capscrew C2, the latter being threaded through the cover C3, with a lock nut N1, which, when screwed down, prevents the cap screw from backing off. The cover C3, in turn, is screwed into the water jacket hole, which is also cored in the casting, leaving a large opening for the gases to escape during the casting process, thus assuring that the castings will be sound if the metal is of a good quality and the foundry work is well executed. Within the combustion chamber the surface is as nearly spherical as it is possible to make it, all things considered, and this conformation has the advantage of limiting the inner surface to the minimum, reducing the quantity of heat which will be permitted to pass through into the water that circulates in the jacket. The bore of the cylinder is countersunk at a point so located that the top piston ring will overlap as shown, the idea being to abort burrowing of the piston ring at the point of "dwell" of the piston at the top of the stroke. For the rest, let it be observed that the cylinder walls are of uniform thickness, the idea being to prevent the metal from cooling faster at one point than at another, and the piston is also of uniform thickness for the same purpose.



Section of a cylinder showing the covers are fastened to prevent heating trouble

Digest

EXTRACTS FROM CONTINENTAL PERIODICALS DEALING WITH SUBJECTS ALLIED TO AUTOMOBILE ENGINEERING—COST DATA ON SALT BATHS—SEPARATION OF SHAVINGS—ALTITUDE RECORDS, ETC.

Metallic and Salt Baths for Uniform Heating in the Hardening of Steel Parts—For temperatures from 650° to 700° C lead may be used. Beween 700° and 900° chloride of sodium (common salt) is available, but a mixture of chloride of potash and chloride of barium is the best medium so far found. This mixture has the advantage over common salt that it evaporates much less and does not spatter during the melting. The work and tools take a thin coating from the bath which obviates oxidation in the air, and in the water this coating cracks off, leaving the parts clean and white as silver. At the Deutz gas motor factory the bath is heated in steel crucibles, which have proven more lasting than clay or graphite pots. The bath may be heated by water gas, illuminating gas, producer gas, oil or electric furnace. For normal hardening, taking place at about 800°, producer gas gives the most economical results, especially where a number of hardening ovens are run at the same time or where the producer gas is also used for power purposes. For temperatures above 1,000°, as for high-speed steel, the gas flame oven with boxed inserts is most suitable. The cost of the different methods applied to identical work compares as follows: An electric hardening oven, 300 by 300 by 370 millimeters inside measure, uses at 800° C. at least 18 kilowatts of energy per hour, which at 20 pfennig per kilowatt brings the hour cost to 3.66 mark. A gas oven of 300 millimeters inside diameter and 450 millimeters deep uses per hour 9 cubic meters of illuminating gas, which at 12 pfennig per cubic meter brings the cost to 1.08 mark. The hourly consumption of producer gas amounts to about 50 cubic meters at 0.8 pfennig per cubic meter and this reduces the total cost to 0.40 mark, including fuel, work, amortization of investment and interest. Oil of 1,000 heat units (1 B.T.U. equals 0.252 German heat units), and costing 10 mark per 100 kilograms, brings the cost for fuel under the same circumstances to 0.55 mark.—Communication from Deutz Gasmotoren to *Werkstatts-Technik.*

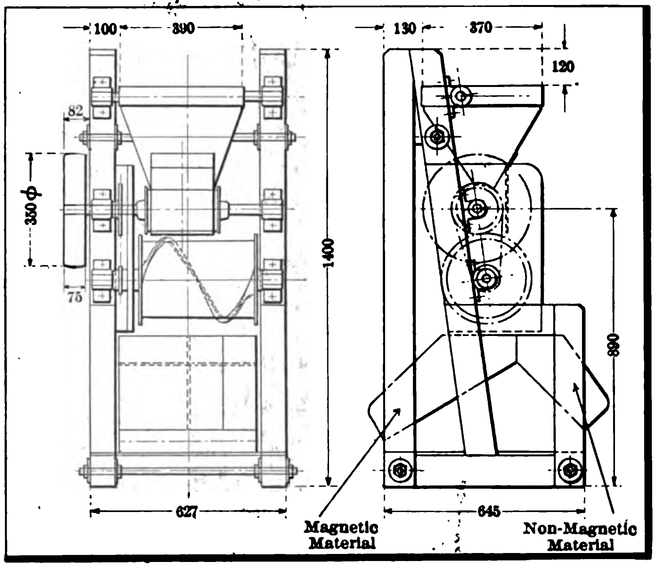
To utilize commercially the brass, bronze, iron and steel shravings which result from mechanical operations in factories where both classes of metals are worked it is necessary that there should be no admixture of iron or steel in the more valuable metals, but only in factories of the largest size is it practicable to work the different metals with different machine tools and in different locations. Hence it has become an economical necessity to perfect apparatus for separating the shavings and the electromagnet has naturally become the means for so doing. In *Werkstatts-Technik* for September several suitable machines intended for this work under different conditions, as these arise in different industries, are described and illustrated. At the same time the Siemens-Schuckert Werke of Berlin offers in the open market the separator shown in the accompanying illustration and two other types, one smaller and one considerably larger capable of separating about 800 kilograms per hour. These are operated with direct current of 140 to 500 volts and the magnets are arranged for tensions of 75 volts for each spool.

The material is placed in the hopper, made of sheet zinc and passes from the bronze feed roller in small quantities to the separator drum which is driven from a transmission mechanism or from a separate motor with clutch. The power required for a machine of the dimensions illustrated is 1-2 horsepower. For the larger machine 3-4 horsepower is needed. The brazen separator drum contains in its interior the stationary electromagnet of the usual shape, which holds all iron parts coming from the feed roller. By means of the spiral rib on the rotating drum the material which is attracted by the magnet is shoved to the end of the drum, where it is no longer under the magnetic influence and drops into the receiver for ferrous material. The drum makes 30 to 40 revolutions per minute, according to the kind of material to be sorted. The frame of the apparatus is made of wood to avoid magnetization. In the dimensions illustrated—the numerals denoting millimeters—the capacity is about 400 kilograms per hour provided the brass shavings contain about 5 per cent. of iron parts. With higher iron content the capacity is reduced, as in that case it is necessary to let the material pass more than once through the machine. The efficiency is also determined by the amount of moisture in the shavings and the amount of rust which has been formed, as when the shavings are allowed to accumulate under the machine tools subject to constant wetting from the soap water. Best results are obtained by sorting only dry material, but a special type of machine is constructed for handling grainy or pulpy masses and for separating iron pieces from molding sand or slag.

Methods for determining altitude by barometer and instrumental observation are described by Commandant Paul Renard. The accuracy of the barometric record depends very largely on comparison of the barograph reading with that of an ordinary scientific barometer before the barograph is sent up so that the daily and local variations in barometric pressure may be taken into account. True accuracy requires rather elaborate calculations which in the case of aeronautic exploits agree badly with the public's demands for immediate statements.—*Revue Scientifique,* September 17.

Just What Automobiles Do to Roads—In order to settle the vexing question as to the injury done to macadamized roads by the action of rapidly revolving automobile wheels, the War Department of France has set aside the road from Champigny to Quene-en-Brie for a series of practical tests to be begun at once.—*Bulletin Officiel,* September.

An Improvised Vise—When there is need of a vise at the roadside and none is available, it is usually possible to improvise one by placing the jack under one of the frame reaches and screwing it up until it holds the work tightly against the latter. To avoid scratching the frame reach, a piece of soft metal should preferably be put between.—*La Pratique,* October 10.



Scale sketch of German machine for separating steel from metal shavings—Figures denote millimeters

Care and Repair of Tires

TIRE LIFE DEPENDS UPON THE WAY A CAR IS DRIVEN, BUT ITS ULTIMATE LONGEVITY DEPENDS UPON PROPER INFLATION

TIRE experts, tire manufacturers, and any one with the slightest experience with tires, will agree that the pressure in tires must be sufficient to prevent flexure. Also, that a tire intended for a certain weight cannot under any circumstances be used on a car heavier than the weight for which it was intended without giving unnecessary trouble and being a source of expense to the owner. The matter is up to the manufacturer of the car, most people say, but the question of economy play's a great hand in the initial equipment. An inch in diameter or half an inch in width means the saving of thousands of dollars to a manufacturer of a quantity of cars, which means so much more profit. The blame after the car leaves his hands is not laid at his door, but at that of the tire maker. It rests with the buyers of cars to be more particular in seeing that the car has tires a half inch larger, rather than that there should be one-half inch more stroke to the engine, because, after all, what do the dimensions of an engine matter provided the result is there? The only way to obtain the result is to have tires of the proper dimensions and see that they are correctly inflated. This sounds very simple and the easiest thing on earth; and so it is, under certain circumstances. Water pressure affords a good illustration of the difference between hand-pumped tires and those inflated by mechanical means. As previously stated, CO_2 does not affect the life of a tire in a detrimental manner (this being the opinion of tire makers and those who have used this method of inflation for some time), consequently arguments against its use need to be backed with practical proof and not with hypothetical deductions. When water is wanted in a city all that is necessary is to turn on the tap and pay a small amount for water rate, which is equivalent to having a compressed air tank or other mechanical device. There are several good ones on the market. But suppose you live in the country and have to pump every drop of water several hundred feet up into a tank by hand, how often does it happen that the tank is dry just at the time you want water? What would you think of a man who had the water main passing in front of his door and could have it connected to his house at a small cost, but who persisted in using an old hand pump, unless it be that he preferred to do so for exercise sake or that the water of the well from which he derived his source of supply had particular advantages? Air is air, after all, and the only way to inflate a tire properly is by mechanical means if the pressure is to be maintained during its life. Autoists are divided into two classes—those who drive and look after the car themselves and those who employ a man—and where is the man yet born that will pump a tire to 100 pounds' pressure per square inch who can get along just as well with 80 pounds, provided it does not cost him anything by so doing? It is a well-known fact that some chauffeurs obtain a commission on tires, and it is to these gentlemen's benefit to underinflate rather than overinflate the tires. Try as hard as they can, they cannot do the latter with an ordinary hand pump, and the owner is surprised at the persistently large tire bill. The solution is to give the man the tools and see that he does his work. Cast a glance at the two methods of inflation, and say which is likely to prove the better. After pumping by hand for some time the barrel of the pump becomes hot and allows a great deal of air to pass the plunger instead of going in the tire, owing to the expansion of the metal from which the barrel is made and the wear on the leather plunger. While on the subject of heat it would be well to remember that through the heating action occasioned by friction the air in the tire is slightly heated by means of the hand pump, and consequently when it cools a contraction takes place, reducing the pressure; but the opposite is the case with carbonic acid gas, for with the heat generated by the tire while running the gas expands, giving more pressure under running conditions and in warm weather than when standing on the cold garage floor. Everything is against the unfortunate portrayed in Fig. 1, while the operator in Fig. 2 looks happy enough. The man who drives and looks after the car himself has only himself to please; so his troubles are on his own head, and there is no question of commissions to worry him. Being his own master, and having to pay his own bills, it only remains to point out that he will probably get better service from his tires if he resorts to mechanical pumping and save the cost of the instrument, whatever it is, several times over by reducing his repair bills.

Fig. 1—Inflating big tires with a small hand pump—no chance of the pressure being enough to prevent flexure—the unfortunate pumper is really working hard to increase tire depreciation whether or not it is agreeable to him.

If a tire should happen to puncture or blow out on the road late at night, or in a crowded street, don't say to yourself, "I have only a few miles to go," or "The garage is only a dozen blocks away." Procrastination in this case is directly putting his hand in the owner's pocket and taking out the equivalent of money. It is just in these few blocks that the damage is done that will cost the autoist money for repairs that would be otherwise unneecessary. One does not mind changing a tire in the presence of an interested audience, but when the cry is "All hands to the pumps!" and the small boys start snickering, "Aye, there's the rub!"

If a hand pump is used, a few drops of oil in the barrel occasionally will greatly help the leather to retain a good bearing on the barrel and will prevent it heating and drying up. Such small things as these appeal to everyone, and it is a matter that everyone knows; but how few do it? The methods employed by some drivers in pumping a tire make the work doubly hard, and the amount of air that finds its way into the tube is generally gaged by their physical endurance rather than by other factors, so that if the pumping is not carried out properly the tire suffers. The plunger must be pushed home to the bottom of the stroke, otherwise only a small quantity of the air will go into the tire, as the pump acts in the same manner as the engine on its compression stroke. The air becomes compressed in the bottom of the barrel and this compression must be higher than that in the tire to overcome the valve; otherwise it is useless to go on pumping to the distraction of nerves.

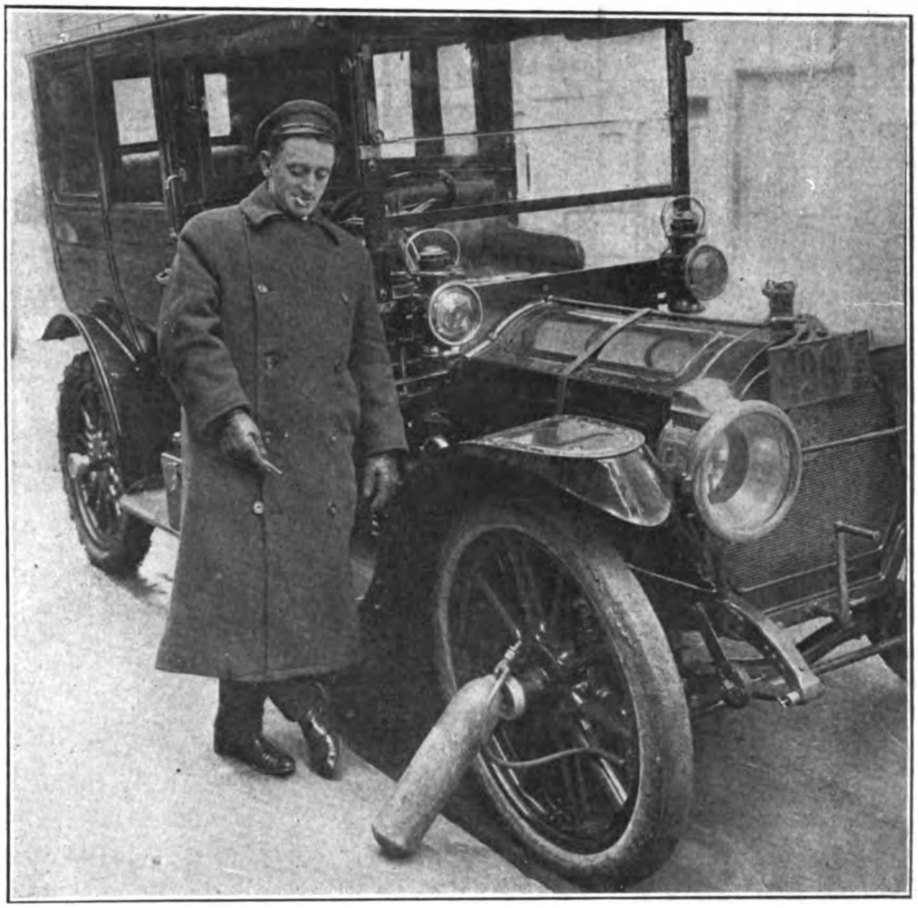


Fig. 2—A more prosperous condition—the chauffeur enjoys a happy situation—the tire is pumped up to the proper level, inducing long life, and cost is minimized

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Aviation Opens a Promising Field to Aluminum.—Aeronautical enterprises are becoming so numerous and the machines already promise so much that prognosticators seem free to predict that the aeroplane has a useful work, representing a new art, that it will outstrip the automobile in point of numbers and importance, taking less than ten years in the accomplishment of the task. Structural materials for aeroplanes are not on a well-defined basis, but it is believed that aluminum will claim its own in this field. In some of the earlier attempts to render aluminum strong, it was also increased in specific weight sufficiently to kill the advantage derived by adding strength, but the latest effort in this field goes to show that it is possible to make structural shapes that approximate the strength of steel, without increasing the weight of the aluminum alloy over that of aluminum itself.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, RACES, HILL-CLIMBS, ETC.

Dec. 1...........Chicago, Ill., First Annual Aeronautical Exhibition in the Coliseum.
Dec. 31-Jan. 7, '11.New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14.........New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 11-12........New York, Annual Meeting, Society of Automobile Engineers.
Jan. 14-28........Philadelphia, Annual Show, Philadelphia Licensed Automobile Dealers' Association, Third Regiment Armory.
Jan. 15-21........Detroit, Wayne Gardens, Detroit Automobile Dealers' Association.
Jan. 16-21........New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A.L.A.M.
Jan. 16-21........Detroit, Mich., Tenth Annual Show, Detroit Automobile Dealers' Association, Wayne Pavilion.
Jan. 28-Feb. 4....Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-Feb. 11....Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Feb. 18-25........Minneapolis, Minn., Annual Show, Minneapolis Automobile Show Association, National Guard Armory.
Feb. 18-25........Binghamton, N. Y., Second Annual Show, Binghamton Automobile Club and Chamber of Commerce, State Armory.
Feb. 18-25........Newark, N. J., Annual Show, New Jersey Automobile Exhibition Co.
Feb. 24-27........New Orleans, La., Annual Show, New Orleans Automobile Club.
Feb. 25-Mar. 4...Toronto, Ont., Automobile Show, Ontario Motor League.
Feb. 27-Mar. 4...Kansas City, Mo., Fifth Annual Show, Kansas City Automobile Dealers' Association, Convention Hall.
Mar. 4-11.........Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.
Mar. 18-25........Pittsburg, Annual Show, Pittsburg Auto Show Association (Inc.), Exposition Hall.
Mar. 25-April 1..Buffalo, N. Y., Fourth Power Boat and Sportsmen's Show, Sixty-fifth Regiment Arsenal, Buffalo Launch Club.
Mar. 25-Apr. 8...Pittsburg, Annual Show, First week, pleasure cars; second week, commercial trucks. Automobile Dealers' Association of Pittsburg, Inc.
April 1-8.........Montreal, Can., Automobile and Motor Boat Show, Automobile and Aero Club of Canada.

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COST, as it must be counted by the man who owns and operates an automobile, will be more or less depending upon (a) the quality of the car, and (b) the skill displayed in the operation thereof. The first consideration must be uppermost in the mind's eye of the automobilist when he goes into the salesroom and makes his selection. Having picked out the character of automobile that will do the kind of work of which the purchaser has a sufficient quantity, it remains to be intelligent and deliberate, if the cost of service is to be minimized. The best statistics that are available at the present time seem to indicate that tires are only serving to the extent of 37 per cent. of the reasonable expectation, which is another way for saying that the tire depreciation, due to carelessness and abuse, represents a cruel total of 63 per cent.

* * *

TIRE misuse, while it may be classified, is mostly due to lack of proper inflation, resulting in punctures, bruises, creeping trouble, blow-outs, rim cuts, overheating, disintegration, and last, but not least, the products of flexure. It is a great misfortune that owners of automobiles cannot be brought to a realization of the fact that they do not properly inflate the tires on their automobiles; they think they do. Indeed, they are in the same fix as a well-known automobilist to whom the Editor of THE AUTOMOBILE addressed the following letter: "In our campaign of education which has for its purpose the reduction of tire cost, we are taking pressures of tires as we find them on automobiles in the street, and you might be interested to know that the pressure in your own automobile tires was found to be as follows: Left rear tire 35 pounds per square inch; right front tire 42 pounds per square inch. These tires looked all right, but the pressure as found by the gauge goes to prove that they will wear out in a very short time."

* * *

CONSIDERING the fact that automobilists fail to look after the inflation of their tires, despite the many reasons given from time to time in the columns of THE AUTOMOBILE, it is feared that they are getting used to the cry of "wolf." It is too bad that it is necessary to examine all the automobiles that are in actual service only to find that the tires are not properly inflated, and to have to write a personal letter to each owner and warn him of the impending attack on his pocket-book. It will doubtless be an enormous undertaking to thus proceed, but unless each owner of an automobile who reads the stories that are being printed as the result of actual practical experience will have the goodness to appreciate that the tire inflation problem conceals a real wolf, some strenuous method will have to be contrived such as will bring him to a fuller realization of the fact that his tires will last at least three times as long as they do if he will pump them up.

* * *

RULE-OF-THUMB methods are at the bottom of a great many failures. It is this very way of doing things that results in the under-inflation of tires. In the average garage, an air-tank, under perhaps 90 pounds per square inch, is connected up with the tires to be inflated, and the artisans reach the vain conclusion that the pressure in the tires will also reach 90 pounds per square inch. Perhaps it will in not a few instances, but it has been found in actual practice that this pressure wire-draws down to as low as 60 pounds per square inch, thus showing that the tire valve is a most wasteful little beggar, and that while it serves extremely well in the process of keeping air in the tires, it is also a most unwilling servant when it comes to letting the air get in. Some valves are greater offenders than others; it therefore devolves upon each automobilist to apply a gauge to his tires after they are inflated and find out whether or not the air pressure in the inflated tank is free to transfer to the inflated tires. If, for any reason, there is a difference in pressure, it remains to supply the loss by increasing the tank-pressure, so that the tires will be inflated up to a safe point.

* * *

SPARK plug trouble seems to creep in when motors are run for a considerable period of time continuously, resulting in the melting out of the central electrode, and in order to avoid this trouble in some of the spark plugs tried out, the E. R. Thomas Motor Company, in its 500-hour run, as related in THE AUTOMOBILE, found it necessary to adjust the mixture for a somewhat lower power in order to obtain a cooler performance, until by a considerable amount of laboratory investigation the fault in the spark plug situation was remedied, after which it was found feasible to operate on a higher power level.

News Section

HAPPENINGS OF THE WEEK IN VARIOUS SECTIONS OF THE COUNTRY AS GATHERED BY THE 84 SPECIAL WRITERS AND CORRESPONDENTS OF "THE AUTOMOBILE"

A. A. A. in Annual Meeting—Selden Suit versus Ford and Others Closed—News of the Automobile Shows—Late Autumn Run of New York Automobile Trade Association—Lozier Wins Double Event at Los Angeles—Thanksgiving Day Race Meets—Briscoe Compares American and Foreign Cars—Peeps Through Auto Goggles at Distant Lands—Floods Threaten French Motor Manufacturing Plants; French Auto Club to Re-enter Racing in 1911—Other items of interest in a personal and business way to motordom gathered from all sides.

A. A. A. Decides to Enlarge Its Boards

REPRESENTING its membership in 39 States, the A. A. A. met in ninth annual session at the Belmont yesterday morning. The day was spent in listening to reports of officers and committees and in discussing the various matters brought out in them. L. R. Speare, president, announced that he was not a candidate for re-election. In delivering his valedictory Mr. Speare submitted a number of suggestions aimed to increase the representative character of the organization. These, in a general way, provided for an enlargement of the four chief boards of the association, namely, touring, good roads, legislative and contest, by automatically providing for membership in them of the chairmen of corresponding committees in all A. A. A. clubs. This was enacted with the proviso that an executive committee should be selected to carry on the work of the boards in the discretion of the chairmen.

The other reports showed that the association now has 34,946 members, more than doubling in the past two years. There was $9,423 in the treasury when H. A. Bonnell formulated his report.

The most important work of the session was the selection of a nominating committee, as follows, which will report at 10 o'clock this morning: C. H. Gillette, chairman; F. E. Edwards, George C. Diehl, H. L. Vail, J. N. Edwards, Paul C. Wolff and L. R. Speare.

Selden Suit versus Ford Is Closed

When attorneys for both sides of the Selden litigation concluded their presentation of the facts and law involved in the suit on Friday last and bowed to the bench, upon which were seated Judges Lacomb, Ward and Noyes, the most momentous legal incident in the history of motordom was finished as far as the litigants were concerned.

Both sides had been given the utmost latitude in construing the case, and when the court took it the judges had been informed most thoroughly as to the divergent merits. The facts as they were presented were the same as in foregoing steps in this litigation, but the attorneys took some unusual tacks in arguing from them. The contention of the A. L. A. M. was narrowed to a specific base of priority of patent, and the heaviest guns of the appellants were directed toward this same point.

The merits of the patent were carefully discussed, but the case as presented will probably turn upon the question of priority.

Among other interesting happenings in the legal sphere was the filing of the answer of the Delahaye Import Company to the action of the A. L. A. M., which had alleged infringement of the Selden patents and had applied for an injunction. The answer formally denies the material charges of the complainant, and in reply states that Selden committed laches in delaying to perfect and enforce his patent and that such delay constituted abandonment within the purview of the law.

Concerning the date when the decision will be handed down, the most authentic advices are that nothing will transpire within two weeks, and it would be within the range of possibility were the decision withheld for upwards of two months in accordance with customary practice in Courts of Appeal.

Annual Meeting of the S. A. E. Fixed

According to the usual custom the Society of Automobile Engineers will hold the annual meeting in New York City this Winter. The committee on meetings and entertainment has fixed the date of this meeting for January 11 and 12, 1911, at the Automobile Club of America. There will also be a banquet, which will be held on Thursday evening at the Automobile Club of America. It is promised for this banquet that it will hold much of interest, divided up between viands that will whet the appetite and entertainment which will tickle the intellect. Further details will be announced as plans are perfected.

Licensed Dealers Elect Stewart

At the recent meeting of the Licensed Automobile Dealers of New York City Charles A. Stewart was elected general manager, to succeed James M. Carples, who resigned to go with the Daimler Import Company.

Mr. Stewart was formerly assistant educational director of the West Side Young Men's Christian Association, 318 West 57th Street.

M. A. M. Will Banquet January 13

Plans for the annual banquet of the Motor and Accessory Manufacturers have been announced. The banquet will be held January 13 at the Waldorf-Astoria. It is expected that the function will be the largest and most important of the annual banquets of this organization.

Gasoline Engine Men to Meet

RACINE, WIS., Nov. 28—The annual meeting of the National Gas and Gasoline Engine Trades Association will be held in this city from December 12 to 15. An elaborate program for the sessions and an interesting exhibition has been arranged.

Trade Credit Association to Dine

Arrangements have been made for the annual dinner of the Automobile Trade Credit Association of New York, which will be held January 18 on a scale heretofore unsurpassed by that organization. Members will be allowed to invite friends.

News Notes of the Coming Automobile Shows

WHEN the A. L. A. M. show opens in Madison Square Garden next month there will be 68 different makes of gasoline pleasure cars on display, and many of them will show considerable improvements in body design. The sloping front, which lends itself to smaller wind resistance, and therefore augments speed, is being revived. This type was given some vogue about ten years ago, but foreign patents subsequently prevented its general use. These patents have expired in some instances, and the pointed hood will be seen much more frequently than in the past. The general adoption of fore-doors will also strike the visitor, as the trade has accepted this improvement in body construction with much unanimity.

As has been outlined in the past, automobile manufacture, exemplified in the exhibits to be shown at the Garden, has been slowly dividing into two semi-distinct channels. On the one hand is the luxurious touring car and on the other the light surrey or runabout for city use or for short trips out of town. It has been demonstrated that one type of automobile is not sufficient to fill all the uses to which the motor car can be put, and many owners of touring cars have provided themselves with light cars for city work, and vice versa. Both types will be shown in much variety.

Importers' Salon Making Ready

It is announced that the Importers' Automobile Salon will be held this year at the Hotel Astor during the week beginning Monday, January 2. Three of the Astor's largest and most palatial rooms, including the celebrated ball room and the "Rose Room," aggregating a total of 16,000 square feet of floor space, are to be thrown together for this occasion, and it is the intention of the committee to make of this show a distinctly drawing-room affair. Music will be provided by a large orchestra, and private boxes for the accommodation of spectators will be one of the innovations. The Importers' Salon has heretofore always been included as a star feature of the Unlicensed Manufacturers' Show at Grand Central Palace. The cars will be shown to advantage, and, at the same time, crowding and discomfort on the part of the spectators will be avoided.

The new models of practically every well-known foreign car on the market in this country will be exhibited as follows: Panhard & Levassor, A. Massenat, Gen. Mgr., will exhibit the Panhard car; the Darracq car will be shown by Henry Ducasse & Co.; Mr. Paul Lacroix, Gen. Mgr. of Renault Frères Selling Branch, has arranged for a full exhibit of Renault cars; while six new models of the De Dion Bouton car, three of which have been especially designed for the American market, will be shown by Mr. E. Lascaris, Gen. Mgr. of the American selling branch. The Benz Import Co. has made a space reservation for Benz cars; the Itala and the Daimler cars will share the space reserved by A. T. Demarest & Co., and another reservation has been made for the S.P.O. car. Cæsar Conti, for the S.P.A., has arranged to exhibit; Emile Voigt, of the C. G. V. Import Company, will be in charge of the exhibit of these cars; while Burr & Co., the well-known body builders, will show the latest products of their factory. Another exhibit will be that of the Gnome and of the Anzani motor.

Paul Lacroix is chairman of the committee in charge of the Salon, the other members being E. Lascaris, Secy. and Treas., and Warren Demarest.

Aeroplanes at the Palace Show

Associated with the Palace show of automobiles and accessories will be a section devoted to aeroplanes. One whole floor of the building has been set aside for this feature of the show and the plans announced so far contemplate a large exhibition. Several of the aeroplanes that were imported under bond to take part in the recent aviation meet at Belmont Park will be shown. Particular emphasis will be laid upon commercial aeroplanes so far as they have been developed.

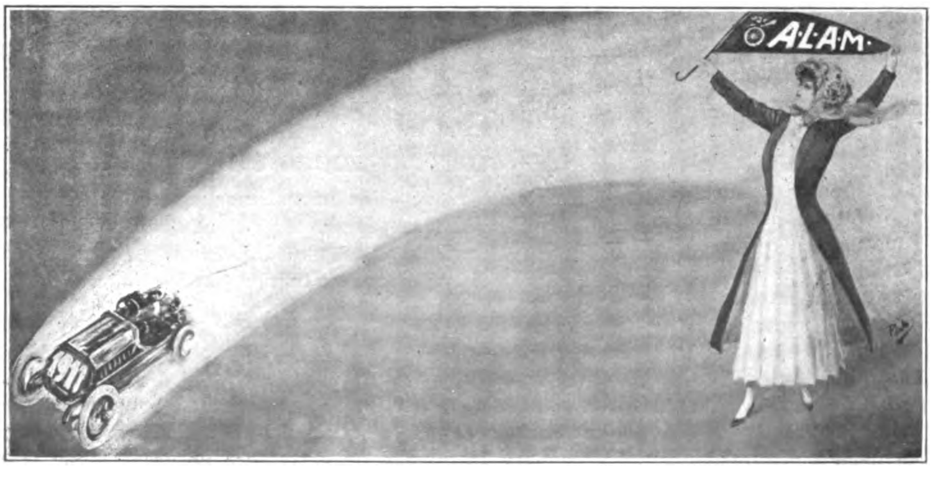
The list of motor car manufacturers signed up so far includes 66 names. The additional list since last week is as follows: Maytag-Mason Motor Co., Waterloo, Ia.; Ideal Motor Car Co. (Sage & Creighton truck), Detroit; Velie Motor Vehicle Co., Moline, Ill.; Colt-Stratton Co. (Cole "30"), New York; Flanagan Motor Car Co. (Monitor truck), Brooklyn; Otto Motor Car Co., of New York (Crown truck), and the Carter Motor Car Corporation, of Washington, D. C.

The color scheme in which the Palace will be decorated will be a groundwork of cream with crimson trimmings.

Omaha Show Plans Far Advanced

OMAHA, NEB., Nov. 28—The officers of the Omaha Automobile Dealers' Show Association are already making elaborate preparations for the automobile show which will be held February 20-25. The list of exhibitors has been prepared and the decorative scheme for the auditorium has already been worked out, containing many new features, but this is being kept quiet at present.

Two new companies have recently been organized in Omaha, and they will probably be added to the list of exhibitors, which is as follows: Capron & Wright, Speedwell automobile; Coit Auto Co., Mitchell; Cadillac Auto Co., Cadillac, Woods Electric; John Deere Plow Co., Velie; Deright Auto Co., Stoddard-Dayton, Locomobile, Waverley; Electric Garage Company, Packard, Rauch-Lang, Baker; E. M. F. Co., E. M. F., Flanders; H. E. Frederickson Co., Pierce-Arrow, Thomas, Chalmers, Hudson; Freeland-Brothers-Ashley, Midland, Maytag-Mason; Ford Motor Car Co., Ford; Huffman Auto Co., Hupmobile; Kissel Auto Co., Kisselkar; Lininger Implement Co., Oakland; Mid-West Auto Co., Cole, Westcott; Andrew Murphy & Sons, Frayer-Miller. Randolph trucks, and International; T. G. Northwall Co., Brush; Nebraska Buick Auto Co., Buick, Olds; Omaha Auto Co., Auburn; Rambler Motor Co., Rambler; Guy L. Smith, Franklin, Peerless; Standard Auto Co., National; United Motor Omaha Company: Van



Striking poster designed to advertise the coming A. L. A. M. show

Brunt Auto Co., Oakland, Marion, Pope-Hartford; Wallace Auto Co., Stearns; Apperson Sales Agency, Apperson; E. R. Wilson Auto Co., Lexington; Baum Iron Co., supplies; Central Tire & Rubber Co.; Omaha Rubber Co., Powell Supply Co., Western Automobile Supply Co.

The two recently organized companies are the Inter-State branch and S. A. Houser, agent for Croxton-Keeton cars.

Factories whose cars are not sold in Omaha have applied for space so that every available inch of room in the auditorium will be occupied.

Only One Show at Milwaukee

MILWAUKEE, WIS., Nov. 28—Milwaukee will have only one motor show in 1911. Up to a few days ago the prospects were for two shows, the first under the auspices of the newly organized Milwaukee Automobile Dealers' Association, and the second under auspices of the Milwaukee Automobile Club, which has conducted two successful shows. The dealers' association is the outgrowth of the opposition offered to the club show in February, 1910, when fourteen representative agents held private exhibitions and refused to join the club's exhibitors. The association stole a march on the club by leasing the Auditorium for the week of January 15. The club held an option for the use of the big exhibition hall during the week of February 13, this date being selected because it is the week following the Chicago passenger vehicle show, from which it draws considerable business. It was well known that Milwaukee could hardly support two shows and that the dealers were powerful enough to make the club's show the lesser of the two. After some negotiation a committee of the club and another of the dealers agreed upon one show, to be held during the week of January 15, or at the same time as the Detroit show. The show will be officially under the auspices of the dealers' association, but with the official co-operation of the club, which will participate in the earnings. Under this arrangement the 1911 Milwaukee show will be one of the biggest expositions of its kind in the United States, with the exception of the New York and Chicago shows. Frank J. Edwards, the Milwaukee Kisselkar representative, is chairman of the show committee. Bart J. Ruddle will manage the show.

Oakland Show Breaks Record

OAKLAND, CAL., Nov. 28—With eighty-one different makes of automobiles on exhibition the Oakland Automobile Show proved to be the largest ever held on the Pacific Coast. The affair was the first at which any considerable number of 1911 models were shown and was a complete success in every way.

The show opened November 19 with over $1,000,000 worth of cars on display in the show pavilion. These included eight makes of electrics, eight freight vehicles and sixty-five kinds of gasoline pleasure cars. In both the electric and commercial lines the displays were the most complete ever shown in the Far West. Among the newcomers exhibited were: Imperial, Amplex, Babb-Carter truck, six-cylinder Locomobile, Moon, Michigan and others.

The Vanderbilt Cup was a feature of the display. Idora Park, where the show was held, was arranged as a redwood forest. Carter truck, six-cylinder Locomobile, Moon, and Michigan.'

Cleveland to Have Two Exhibitions

CLEVELAND, O., Nov. 28—As a result of the incorporation during the past week of the Cleveland Automobile Dealers' and Manufacturers' Association, Cleveland will have two automobile shows in 1911, the same as in 1910. The association will hold its show at Central Armory during the week of March 13. This will allow at least one week intermission between the two shows, the other being, as announced last week, that of the Cleveland Automobile Show Co.

The new incorporation includes mostly those dealers and manufacturers who participated in the second show of 1910. The committee as announced comprises Ray M. Colwell, chairman; W. H. Barger, treasurer; Harry Smith, M. B. McLauchlin and A. R. Twelvetree. Before the meeting adjourned applications had been made for space by twenty-six exhibitors. Spaces will be awarded by drawing, the same as last year.

Pittsburgh Dealers Will Hold Show

PITTSBURGH, PA., Nov. 28—Thirty automobile dealers of Pittsburgh have formed an incorporated association to hold annual automobile shows, and have selected the Exposition building on account of its central location and adaptability for show purposes, having more floor space than Madison Square Garden, New York, where the National Auto Manufacturers' shows are held annually. The show will be held during the week of March 18-25.

Thomas I. Cochran, who was on the show committee and managed the first two automobile shows held in Pittsburgh, has been appointed manager.

A downtown office has been established on the tenth floor of the Union Bank Building. Floor plans of Exposition Hall are being prepared and a drawing of space will take place in another week, and all automobile and accessory dealers will be invited to take space and co-operate to make the show a success.

St. Louis Dealers Want Show

ST. LOUIS, MO., Nov. 28—An independent show seems to be more than a possibility in St. Louis, following the decision of the St. Louis Dealers' and Manufacturers' Association not to hold the regular exhibit. At a meeting of the association held last week there was a vote of 18 to 14 against the 1911 show. There were 33 members present, or about half the membership list.

Many of the dealers are not contented, and persons who have made a thorough canvass report that about 20 are anxious for an independent show.

Other Shows Making Progress

WASHINGTON, D. C., Nov. 28—The annual show will take place the week of February 13. It will be devoted exclusively to automobiles and accessories. The committee in charge consists of the following: W. C. Long, J. R. Thomas, J. M. Stoddard, T. B. Spence, A. G. Carter, William Jose, Claude Miller, T. C. Johnston and S. A. Luttrell. It will be held in Convention Hall.

SYRACUSE, N. Y., Nov. 28—C. Arthur Benjamin, head of the Automobile Dealers' Association, expects to announce dates for the annual show in Syracuse within a short time. The show will probably be held in March at the Armory.

HARTFORD, CONN., Nov. 28—The Hartford Automobile Dealers' Association will conduct a show as usual at the Foot Guard Armory, probably during the first week in February. Applications so far break all local records.

Boom Chicago Show with Stickers

CHICAGO, Nov. 28—The Tenth Annual Automobile Show at Chicago will be advertised by those who have taken space in it, and a peculiarly effective sticker for use in the mails has been devised by Manager S. A. Miles. This sticker is in the form of a seal in black, gold and white. It may be applied to the back of the envelope or upon the face of the correspondence letterhead of the concern interested. The little sticker is well contrived, and it is likely that a large number will go into circulation.

Sticker used to advertise the Chicago Show

As they lined up for the start, showing the White Steamer, National, Stearns, Stoddard-Dayton, Maxwell, Columbia, two of the Pullman starters, Matheson and others

Group of official cars and two of the contestants at the start. The contesting cars are a National in the foreground, and a Reo.

Sturdy Cars Make Trying Two-Day Run in Snow

PLOWING through snow and slush over roads that ordinarily would afford a pleasant ride, but which under the weather conditions of Tuesday were frightful, a column, consisting of 21 automobiles of 1911 models, started from New York on the first leg of the two-day endurance run promoted by the New York Automobile Trade Association.

The route was to Danbury, Conn., and return, 137.6 miles, and the first few stretches of the run were accomplished under favorable conditions. After that the column ran into a snow storm which covered the hills and made the going perilous. Despite the slippery and slushy roads the contesting cars made an excellent showing. No mechanical trouble was reported unofficially at the end of the day's run, and but little tire trouble was experienced. The drivers, observers and officials were so thoroughly exhausted at the end of the day that no formal report was published.

Unofficially it was learned that several of the cars had difficulty in keeping the course. Confetti in a snow-storm is impossible, and the route had to be indicated with a series of red arrows. Some of the cars missed these, with the result that the bulk of the penalties imposed for road work on the first day were for lateness at controls.

In order to show just how excusable it was to miss the road, the fact may be cited that the checkers' car, which was a contestant in the Vanderbilt Cup race this year, missed the route and had to make a detour of over ten miles, going over part of the extra loop at better than 60 miles an hour. The pacemaker, a Zust, was also well back in the procession during the return trip.

On the first day checking stations had been established at Brair Cliff and Greenwich in addition to the noon and night controls.

The route followed on the second day was to Newburgh, N. Y., and return, 139.2 miles. The roads were muddy in the morning through Hudson County, but the day was much pleasanter than Tuesday. The route lay through Ramapo and Tuxedo, over splendid highways. After leaving Newburgh a snowstorm dampened the ardor of everybody, and when the cars straggled into Weehawken the tourists were pretty well exhausted. Some little mechanical trouble developed during the run and many cars experienced tire trouble. A large number of the contestants will be penalized for lateness at control. and the technical examination is expected to develop some weaknesses. The officials have taken the scores and announce that the results will be given out next Saturday.

The prizes offered for the winners in each class were more than usually numerous. An even dozen valuable trophies were hung up by various individuals and accessory companies. A. R. Pardington acted as referee. C. H. Larson was starter.

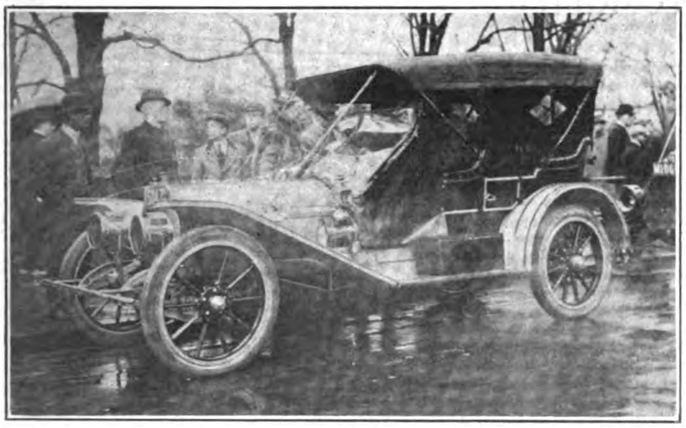
The entry list included the following:

Class A, Division 1-A—

Car	Entrant	Driver.
Ford	Ford Motor Co	D. B. Young
Division 2-A—		
Mitchell	Mitchell Motor Co	O. R. Delamater
Hudson	A. Elliott Ranney Co	A. M. Day
Division 3-A—		
Pullman	Cimiotti Bros	Roy Stains
Reo	R. M. Owen & Co	P. Haycock
Marion	Chas. E. Reiss	P. G. Thebaud, Jr.
Maxwell	W. B. Byrnes	J. Ross
Division 4-A—		
Pullman	Cimiotti Bros	Norman Gallatin
Haynes	Haynes Auto Co	R. Schmidt

The White Steamer (press) with perfect, unofficial score

Reo, No. 8, a contender in Division 3-A



Powerful Matheson 6, which did well on the slushy hills

Hudson runabout, which performed in its usual good form

Car	Entrant	Driver
Division 5-A—		
National	Union Auto Co	F. Hermance
National	Poertner Motor Car Co	W. C. Poertner
Stoddard-Dayton	Stoddard Motor Co	H. Harding
Pullman	Cimiotti Bros	Herbert Welker
Babcock	Short & Wright	C. White
Corbin	Warner Instrument Co	H. H. Knepper
Speedwell	Garland Auto Co	A. Holtzmueller
Division 6-A—		
Columbia	United Motor Co	Gordon M. Wagner
Oldsmobile	Oldsmobile Co	T. Spear
Matheson	J. C. Blanch	D. A. Hall
Pope-Hartford	Pope-Hartford Co	A. Warren
Stearns	Mrs. G. H. Wallace	G. H. Wallace

Lozier First in Star Santa Monica Events

Los Angeles, Nov. 24—Making motor history, a Lozier driven by a Los Angeles pilot, Tetzlaff, proved the winner of the Santa Monica road race of 202.006 miles, run on Thanksgiving day, broke the American road racing record with an average of 71.4 miles an hour and also won the heavy stock car race at 151.5 miles, averaging 73.29 miles an hour.

A Pope-Hartford was a fair second in the stock car race and a rather distant runner-up in the free-for-all.

Two light car events were staged prior to the big races, and a Maxwell annexed the honors in the 161-230 class; while a Duro, a Los Angeles product, was first at the tape in the 231-300 cubic inches class.

It was a perfect day on a perfect course. Not an accident marred the enjoyment of the 75,000 spectators, and the mechanical troubles of the cars contesting were not many.

The heavy stock car event was started at 9:15, and the Lozier took command at the outset and held it throughout, winning by nearly six minutes.

The car was not removed from the course before taking part in the Santa Monica free-for-all. Changed spark-plugs and a hasty manicuring constituted its preparation for the big trial. In the running of the race, the Fiat racer led for one lap, when the Lozier came along and took the pace. From there to the finish the white car stayed in front, but at one time the Fiat nearly caught it. At the end the Lozier was jogging along, taking things rather easily, to win by some 15 minutes.

The Pope-Hartford was second, having suffered trouble with a valvespring in the middle distance. While these two were the only cars to complete the course officially, the Knox was running along in its twenty-second round and the Ohio in its sixteenth when the checkered flag announced the end of the race. The Fiat, after performing creditably for sixteen laps, broke its crankcase. The Isotta entry broke a connecting rod in the sixth and The Only Car froze its piston before the end of the first lap. The Apperson did a dozen rounds before engine troubles put it out of the contest.

Dick Ferris managed the races and presented the trophy that went to the winner of the heavy stock car race. The summary:

Car	Driver	Time
161-230 Cubic Inch Class—12 laps		
Maxwell	Farcher	1:02:31
Oakland	Okerman	Out, 3d lap
Staver	Fouch	Out, 1st lap
231-300 Cubic Inch Class—12 laps		
Duro	McKeague	1:01:04 3-5
Maxwell	Smith	1.04:15
Petrel	Arthur	1:58:48
Mitchell	Greer	Out, 11th lap
Mercer	Bigelow	Out, 10th lap
Buick	Mikrent	Out, 5th lap
Cutting	Clark	Out, 1st lap
301-600 Cubic Inch Class—18 laps		
Lozier	Tetzlaff	2:04:10 4-5
Pope-Hartford	Dingley	2:10:00 3-5
Franklin	Seibel	Running, 17th lap
Knox	Brown	Out, 6th lap
Apperson	Ryall	Out, 4th lap
Free-for-all—Prize, $2,000—24 laps		
Lozier	Tetzlaff	2:49:59
Pope-Hartford	Dingley	3:04:47 1-5
Knox	Brown	Running, 22d lap
Ohio	Henwood	Running, 16th lap
Fiat	Dearborn	Out, 17th lap
Apperson	Ryall	Out, 13th lap
Isotta	Soules	Out, 6th lap
Only	Van Valin	Out, 1st lap

One of the three Pullmans on the road

New type Columbia checking in at Danbury

Thanksgiving Day Races at Guttenberg Track

FAVORED with glorious weather and a large attendance, the automobile races held at the old Guttenberg race track on Thanksgiving Day for cars nominated by Hudson County auto dealers should prove the commencement of a series of good meets easily accessible to Jerseyites and New Yorkers alike.

Two of the three star performers—"Cyclone" Fiat and Grand Prize Buick—gave good account of themselves, while troubles prevented the other, a Pope-Hartford, from showing its speed. Previous to the racing proper, during a trial spin of the Fiat at a fast clip, one of the rear tires blew off and hit the driver in the face, swelling his lip badly. Later, in the 20-mile free-for-all, while leading the field by nearly a mile in the eighth lap, the Fiat was seen to turn round on the lower bend and slide through the small fence; this was caused by the snapping of a steering arm short off at the axle, rendering the steering gear useless and putting the car out of the race.

In the 15-mile race, when over a lap in the lead, the Pullman broke a wheel, but this was replaced later and the car came in second in event No. 5. The National, entered by the Union Auto Company, proved the best prize winner, finishing first in the 20-mile free-for-all and 5-mile stock class for cars with engines of from 30 to 60 cubic inches piston displacement and second to the big Fiat in the 10-mile free-for-all.

Burman's exhibition on the Grand Prize Buick proved that the track has possibilities for fast driving, although the dust was apparent when a bunch of cars came together.

In the 20-mile free-for-all one of the entrants, a Matheson, fired its right rear brake, but no damage was done.

It was interesting to note what pressures some of the tires on the racing cars were inflated to, and when tested with a gauge three showed under 45 pounds per square inch.

The method of timing employed was for the four timers to start their watches at the gun and clock off as they thought the cars finished, and discrepancies were only matters of fifths of a second.

The management of the meet was in the hands of O. D. Corbett and its success is greatly due to his hard work. The following gentlemen comprised the officials: Referee, P. T. Powers; representative of the contest board of the A. A. A., A. F. Camacho; judges, F. W. Dunham, J. F. Bernstein, E. J. Schroeder; starter, G. A. Blakeslee; assistant starter, C. W. Grant; chief timer, L. L. Niedrach; deputy timers, H. E. Adams, J. F. Johnson, Hugh Falvey and Bert Ackland. The announcing was in the hands of J. F. Drumm, and the legal adviser was W. J. MacFadden.

The paddock at the Guttenberg races on Thanksgiving Day

The summary:

Class E—Five miles for stock cars under 231 cubic inches—

No.	Car	Driver	Time
8	Maxwell	T. Costello	6.07
9	Abbott-Detroit	M. Bassle	6.09
7	Maxwell	T. C. Wolverton	6.20

Class D—Ten-mile free-for-all—

10	F. I. A. T	R. De Palma	10.16
18	National	D. C. Teetor	11.35
17	Buick	C. Beach	11.45
14	Pullman	W. Burke	12.11

Class C—Fifteen-mile stock chassis, 231 to 300 cubic inches—

19	Mitchell	V. Wilhelms	20.21 1-2
	Pullman	Broke wheel when leading by two laps; did not finish	

Exhibition—Ten miles—

Marquette Buick, B. Burman. Time, 9.57½.

Time by laps—1st, 1.07; 2d, 2.07; 3d, 3.07; 4th, 4.05; 5th, 5.04; 6th. 6.03; 7th, 7.01; 8th, 8.00; 9th, 8.58; 10th, 9.57½.

Class D—Twenty-mile free-for-all—

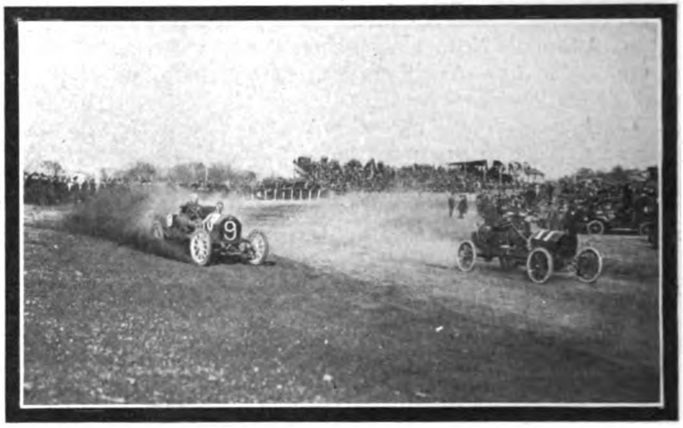
18	National	D. C. Teetor	23:00
23	Matheson	Neil Whalan	23:12
8	Maxwell	T. Costello	23:19 1-2
15	Pullman	W. Burke	23:20

Class E—Five miles, stock chassis, 300 to 600 cubic inches—

18	National	D. C. Teetor	5:32
14	Pullman	E. T. Gilliard	5:34 1-2
15	Pullman	W. Burke	5:54

First Race Meet at Bridgeton

BRIDGETON, N. J., Nov. 28—Thanksgiving Day saw the first race meeting for automobiles ever given by the newly formed South Jersey Motor Club. The races were held on the track of the Bridgeton Driving Association, a half-mile oval, and were well contested. Seven events were carded and the fields were small.



Hudson and Abbott-Detroit in the 20-mile free-for-all

The program opened with a match between a Pullman (Harvey Ringler) and a Parkin (Parkin). The latter won, the five miles being made in 7 minutes. The same car also scored in the next event against a Jackson (Blockson). In the next a Mercedes (Kelley) defeated a Kline. The Jackson won the following number from a Pullman and the tri-country race went to a Buick (Harry Hunt). The special handicap was won by a Mercedes, and in the last race of the day a Buick finished ahead of a Pullman. A big crowd was present.

Pullman Wins Big Class and Sweepstakes

HARRISBURG, PA., Nov. 28—Winning its class, 6A, as well as the sweepstakes offered in the Autumn run of two days given by the Motor Club of Harrisburg, Pullman No. 3, driven by Herbert Walker, finished with clean road and technical scores.

The other class winners were as follows: Division 3A, touring car section, Reo; runabout section, Kline. Division 4A, touring car section, no contestants; runabouts, Velie. Division 5A, touring car section, Pullman; runabouts, Pullman. Division 6A, touring cars, Columbia; runabouts, Pullman.

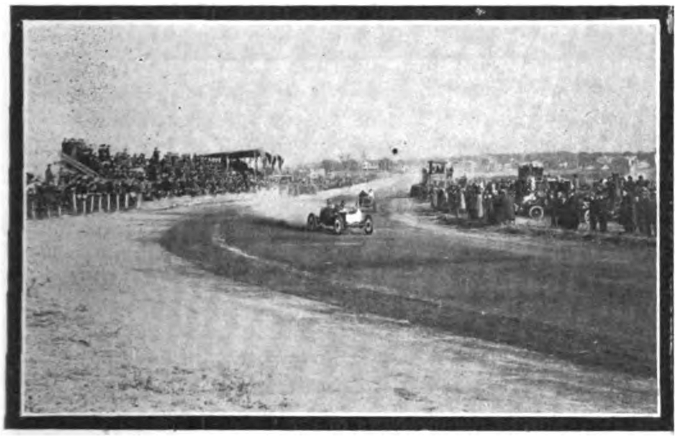
Fakers' Friend Breaks Out Again

Sane regulation of automobile racing and the protection of drivers and spectators are things so entirely to be desired that they are not debatable. Far be it from the intention of The Automobile to defend such things. But the prospects for improvement in conditions are always injured by misrepresentations, and The Automobile takes occasion to correct some statements that appeared in a New York evening paper of wide circulation, signed by the sporting editor of the publication.

In a recent article this writer says: "Two drivers and a mechanic were killed at the Savannah Grand Prize race, and it won't be long at this rate before all of the men we saw out on Long Island that fatal day are numbered among those who gave up their lives and are forgotten. Ten per cent. of the men who started in the Vanderbilt Cup race have been killed outright or died from injurious [*sic*] received in auto racing!"

It is easy enough to make wild statements that appear ridiculous after they get cold, and the above is one of these. Without considering the opening inaccuracy about the Savannah race, in which nobody was killed at all, the rest of the conclusions are based as follows: There were 43 actual starters in the Vanderbilt Cup race and light car contests. Consequently there were 86 men engaged in driving the contesting machines. Of these, two mechanicians were killed. Since that time Al Livingston met with a fatal mishap while practicing at Atlanta and Tobin De Hymel was killed in a race upon a Texas dirt track.

All of which is lamentable, deplorable and worthy of sober thought. But in the name of common sense, what is the use of slobbering over cold facts? Four men were killed who took part in the running of the Vanderbilt Cup. That is bad enough. Thus less than 50 per cent. of what the sporting editor wrote and signed was true.



Pullman leading Mitchell in the 15-mile stock chassis race

Naturally enough, that might be considered a flattering percentage of truth coming from the only sporting writer in New York who did not know that the recent Sheepshead Bay fiasco and moving-picture fake between an outlaw driver and a negro pugilist was such long before it was perpetrated upon the public. Right up to the last gasp this writer handled the nauseating publicity dope sent out by the fakers, and undoubtedly a considerable portion of the crowd of dupes that paid real money to see the "race" were attracted by his articles.

Atlanta Speedway Free to Flyers

Atlanta, Ga., Nov. 28—When the coming aviation meet is staged in Atlanta the airmen will fly at the grounds of the Atlanta Speedway. The big plant has been donated to the use of the flyers by the Atlanta Automobile Association with its immense stands, inclosure and complete equipment. Official notification of the action of the association has been conveyed to the Atlanta *Journal*, which is promoting the meet.

Hunt Jackrabbits in Automobiles

Hiawatha, Kan., Nov. 28—Over 300 automobiles were used Thanksgiving Day in the most throughly unique jackrabbit hunt ever attempted on earth. The game was started from its hiding places in the bunch grass by a wire, half a mile long, to each end of which was attached a big automobile. The cars were run across country and the wire scraped along the flat surface of the fields. Dogs did the actual hunting, a matched pair riding in the tonneau of each car until the game was flushed. They were then unleashed and "worked" the rabbit until he was captured.

Farmers from all over this country "followed the hounds" in their motor cars.

Maryland Club Maps Campaign

Baltimore, Md., Nov. 28—The Automobile Club of Maryland has mapped out a progressive program for the winter and appointed the following committees for the ensuing year: Runs and tours—Joseph M. Zamoiski, chairman; Isaac Field and H. C. Weiller. Laws and Ordinances—O. I. Yellott, chairman; C. H. Millikin and James W. Bowers, Jr. Auditing Committee—W. A. Dickey, chairman; R. M. Rother and Dr. S. C. Pennington. House Committee—James S. Reese, chairman; C. W. Strok and L. F. Lambert.

The club sent a delegation to the Police Board of Baltimore to talk over the traffic laws of the State, and an agreement was reached whereby the board and club members will co-operate.

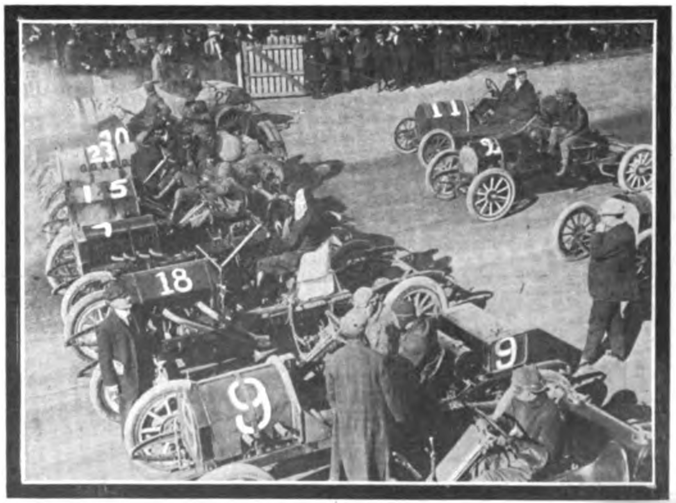
Newark Club to Give Annual Banquet

Newark, N. J., Nov. 28—The New Jersey Automobile and Motor Club will hold its eighth annual banquet in Newark in the early part of January next and Vice-President Harry D. Bowman, who has this event in his charge, expects to make this year's event bigger and better than ever.

Legislative matters will be discussed and speakers of national repute will address the assemblage, which will prove the banner social event of North Jersey.

Camden Motorists Form Club

Camden, S. C., Nov. 28—The Camden Automobile Club was recently organized with Jno. W. Corbett, M. D., president; F. M. Wooten, vice-president; H. L. Watkins, treasurer; and M. H. Heyman, secretary. The club has already gone to work to post the through roads of Kershaw County, with particular reference to the connecting link between the National and Capital highways, from Charlotte, N. C., on the National highway, to Camden, on the Capital route.



Start of 20-mile free-for-all at Guttenberg, won by National

Briscoe Compares Foreign with American Cars

LOOKING actually rested from his six weeks' trip abroad, during which he accomplished an immense amount of work, Benjamin Briscoe, president of the United States Motor Company, with Mrs. Briscoe, reached home last week on the Mauretania. He visited England twice and toured in France and Germany, established the foundation of a great factory and distributing plant—perhaps two—visited leaders in the trade and attended the Olympia show in London. Despite all of that activity, he had time to discuss the fundamentals of trade on numerous occasions for technical press and newspapers and created a favorable impression upon the British public.

The concrete result of Mr. Briscoe's trip was the formation of the United International Motors, Limited, which, as has been outlined in THE AUTOMOBILE, will be affiliated with the United States Motor Company and will build and sell several models of the American cars in foreign fields.

Mr. Briscoe's examination of the European situation developed the fact that there is a considerable potential demand for cars of moderate and low price, that may be used for business purposes by professional men, contractors, etc., and which also possess the features and advantages of purely pleasure cars.

In discussing this matter, Mr. Briscoe said:

"The average price of English-made automobiles is about $1,900, which indicates quite strongly that the English manufacturer has not grasped to the full the ultimate universal mission of the automobile. But the English public is fast becoming aware of the fact that the automobile spells economy, for the demand for moderate priced cars seems to be growing much faster than the production, although several of the British makers are turning out cars selling around $1,000. Last year 14,239 cars were made and sold in England, while in Germany and France the number was about 8,000 each. The total sales in those three countries amount to about one-sixth of the American sales, while the value is about one-half of the total amount realized from motor car sales in the United States.

"The amount represented by cars imported from the United States is very small compared with the figures from other countries. Out of a business of nearly $20,000,000 in 1909 the portion of the United States was only a trifle over $600,000. These figures might seem to indicate some prejudice in England against American-made cars and undoubtedly that does constitute an element in the totals, but the main fact that militates against the American cars is that they are made to travel American roads, which are far different from those of England. In my opinion it is impracticable for American manufacturers to place lines of cars in England (cars that are made to meet American road conditions) with the hope of doing a very large business.

"I found that there are over 240 models of cars made in Great Britain, and an average of 60 cars to the model is a fair estimate. Thus it seems as if the British manufacturers actually wished to multiply the number of models, with all the confusion to the trade that such a condition might presuppose. But I would not wish to give the impression that the trade is anything but prosperous over there, for it is extremely so.

"The Olympia show is more of a coach-makers' exhibition than it is a show of mechanical construction. The fore-door idea is practically universal and the bodies run more to curves than they do with us. The Knight engine seems to be meeting with much favor, although a spirited controversy is now going on as to the merits of the poppet valve as against the sliding valve motor.

"I noticed one remarkable and noteworthy fact with regard to the show that illustrates the difference between social conditions over there and the same conditions here. It was being gravely discussed whether the general public should be admitted to future automobile shows. It was maintained on one hand that the attendance should be restricted to those who were able and actually intended to purchase a car.

"The condition of our affairs over there is progressing satisfactorily. The site for the factory has not been announced so far, but it will be in due course. With the advantage of our organization there is no question in my mind that the company can make and sell cars on a growing scale. The experience of American makers and the vast practical application they have made of it in the line of construction will undoubtedly be of much value in putting out cars for British and foreign use. In mechanical construction the American cars, in my opinion, occupy quite as high a plane as those of other lands, if they are not superior. As our product is turned out on a wholesale scale, while theirs is largely individual, the difference in cost must be in our favor and the market must be broader.

"It will be the policy of the United International Motors to adapt American methods to foreign conditions and as the composition of the United States Motor Company is largely international it is to be assumed that the usual prejudice against foreigners will be mitigated to a certain extent as far as we are concerned."

During his trip to Germany Mr. Briscoe laid the foundation for a German branch of the international company.

Storrow Heads General Motors

At a meeting of the directors of the General Motors Company held in New York late Wednesday afternoon, four directors of the First National Bank of Detroit were ratified as members of the new board of General Motors. They are: Emory W. Clark, M. J. Murphy, Andrew Green and Thomas Neal.

Later an election of officers was held and James J. Storrow, representative of Lee, Higginson & Company, of Boston, was chosen president; W. C. Durant was re-elected to the first vice-presidency; W. J. Mead, general manager of the Olds Motor Works, was also elected vice-president, and C. R. Hathaway, secretary and treasurer.

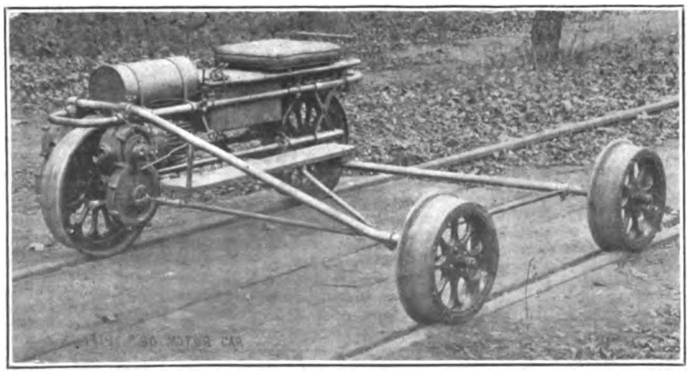
Among other matters considered was the proposed removal of the general offices of the company from New York to Detroit.

President Storrow is expected to go to Detroit within a few days to arrange the transfer and other affairs of the company.

The First National Bank of Detroit has already distributed over $4,000,000 in liquidating the debts of the reorganized company.

Takes Place of Railroad Velocipede

THREE RIVERS, MICH., Nov. 28—The accompanying photograph shows a railway automobile of unique design and much power, which is made by the Sheffield Car Company. The engine of this device develops 30 horsepower. It is used for a large number of purposes, including inspection, track repair and generally for anything that requires quick transportation upon a railroad.



Railroad automobile of compact form

Road Builders to Meet in Annual Convention

THE seventh annual convention of the American Road Builders' Association will be held at Indianapolis, December 6 to 9 inclusive. The program is assuming form. Acceptances from quite a number of prominent men are expected before a detailed arrangement of dates and hours can be fixed. Among those who have consented to make addresses or prepare papers on subjects with which they are especially familiar are the following:

N. J. Bachelder, Master of the National Grange, "The National Grange and Good Roads."

F. J. Robinson, Deputy Minister of Public Works, Province of Saskatchewan, Canada, "Pioneer Road Making in Saskatchewan, Canada."

Samuel Hill, president Washington State Good Roads Association, "Convict Labor in Road Building."

S. Percy Hooker, chairman New York State Highway Commission, address (subject to be announced).

Major W. W. Crosby, chief engineer Maryland State Roads Commission, "A Division of Road Interests for Better Results."

James H. MacDonald, State Highway Commissioner of Connecticut, address (subject to be announced).

Harold Parker, chairman Massachusetts State Highway Commission, address (subject to be announced).

Col. Frederick Gilkyson, Commissioner of Public Roads of New Jersey, address (subject to be announced).

A. B. Lea, director Public Service of Cleveland, Ohio, "Relation of the City to Its Adjacent Country Highways."

A. N. Johnson, State Highway Engineer of Illinois, "Some Features of Road and Bridge Construction."

E. J. Watson, Commissioner of Agriculture of South Carolina, address (subject to be announced).

James C. Wonders, State Highway Commissioner of Ohio, "Present Highway Laws of Ohio and the Proposed New Law."

C. D. Miller, Assistant Territorial Engineer of New Mexico, address (subject to be announced).

Jos. W. Hunter, State Highway Commissioner of Pennsylvania, "Application of the Highway Law of Pennsylvania."

Townsend A. Ely, State Highway Commissioner of Michigan, "Progress of Road Building in Michigan."

Logan Waller Page, director U. S. Office of Public Roads, "State Highway Legislation."

Geo. W. Cooley, State Engineer of Minnesota, address (subject to be announced).

Charles P. Light, Commissioner of Roads of West Virginia, "Earth Roads."

Jos. Hyde Pratt, State Geologist of North Carolina, "The Best Method of Supervision and Control of Road Construction in a State."

Samuel H. Lea, State Engineer of South Dakota, "Road Building in South Dakota."

T. R. Atkinson, State Engineer of North Dakota, "Road Building in North Dakota."

Paul D. Sargent, State Highway Commissioner of Maine, address (subject to be announced).

W. O. Hotchkiss, chief of Highway Division, Geological Survey of Wisconsin, address (subject to be announced).

P. St. J. Wilson, State Highway Commissioner of Virginia, address (subject to be announced).

W. S. Gearhart, State Highway Engineer of Kansas, "Bridge and Culvert Construction."

Good Roads Men for Organization

WASHINGTON, D. C., Nov. 28—One of the most important good roads meetings ever held in this country culminated Tuesday in the formation of the American Association for Highway Improvement with Logan Waller Page, director of the office of Public Roads, as president. W. C. Brown, president of the New York Central lines, was elected vice-president; Lee McClung, treasurer of the United States, treasurer, and J. E. Pennybacker, Jr., chief of road management, Department of Agriculture, secretary.

The executive committee is composed of a number of leading railroad presidents, automobile men and others.

Virginia Autoists Plan New Road

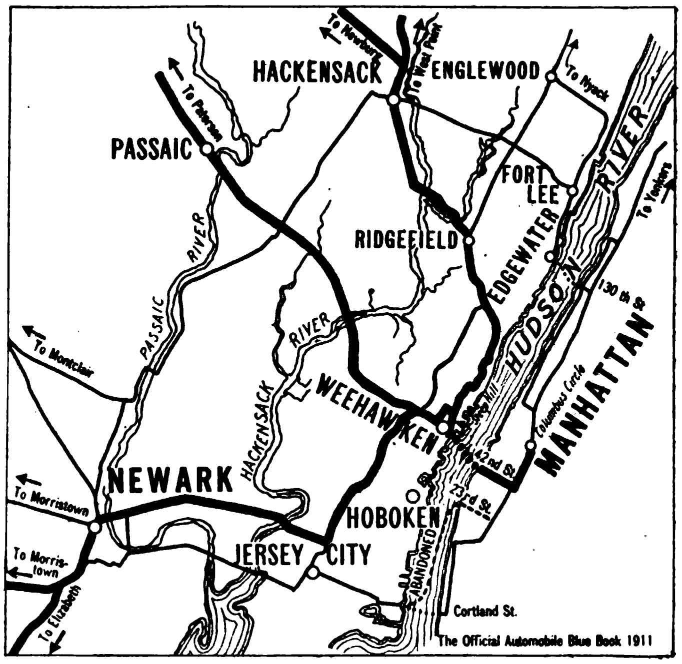
RICHMOND, Nov. 28—With the view of building a new automobile road in Virginia, which will connect Richmond and Newport News, the automobile clubs of the two cities are effecting an organization which it is thought will be completed by January 1 and ready to begin actual work upon the proposed new highway.

The distance between the cities is just eighty-six miles, and a route has been mapped out which will make the trip one of but four hours by automobile. W. F. Gordon and L. M. Foster recently selected the proposed road, posting signs along it. They were accompanied from Newport News by President W. A. Post, of the Newport News Automobile Club, and L. B. Manville. Both are very optimistic over the prospect.

The Passing of the 23rd Street Ferry

Coincident with the opening of the big new station on Seventh Avenue, the "Pennsy's" old Twenty-third Street Ferry to Jersey city has been abandoned. Users of the Official Automobile Blue Book will be glad to know that an equally good route to Newark is offered via the Forty-second Street Weehawken Ferry, with but slight difference in mileage when starting from up-town points.

Below is reproduced the complete route from the ferry to Newark, as it will appear in the 1911 edition of the Blue Book, together with a map which shows this connection and the availability of the Forty-second Street Ferry for reaching Passaic, Hackensack and Englewood.



Forty-second St. Ferry Connections into North Jersey

Peeps Through Auto Goggles at Distant Lands

MADRID has 775 licensed automobiles; but there are no automobile trucks. One reason is because gasoline costs 48 cents per gallon. Doubtless there would be a more rapid increase in the number of private automobiles if it were not for the ultra-conservatism of the old aristocratic families, the great majority of whom are inclined to stick to their horses and carriages. Again, the prices that are demanded for machines by the Madrid dealers would in many instances be considered exorbitant even in the United States. As a rule the machines used in Spain are from 10 to 16 horsepower. But as a number of these cars are out of date the owners are anxious to sell their old machines and purchase new ones of higher horsepower. There would appear to be a market there for moderate-price cars and the demand for them will grow. The roads in and around Madrid, as well as in many parts of Spain, are quite equal to the famous roads in France. Even in the face of Spanish conservatism many aristocratic families, following the wake of the sport-loving young king, are taking to automobiling as a fashionable diversion and automobile excursions have become the fad throughout various sections of the country. There is not an American car to be seen in Madrid. One reason for this is the fact that local dealers are bound by contract with European manufacturers not to handle American-made machines. Besides, the fault is, to a certain degree, with the American manufacturers themselves. It should be understood that in order to sell cars in the capital of the dons it is absolutely necessary that they should be placed on exhibition, thoroughly tried out, and the cost of delivering the machines in Madrid plainly stipulated. The catalogue and letter-writing method of doing business does not go in Spain. It is a mere waste of time and postage. It is also indispensable that the salesman representing the manufacturer shall speak the Spanish tongue. The bodies used in building automobiles in Spain are of foreign make. The Spanish customs provide for a high tariff on motor cars imported into that country.

A company has been organized for the purpose of furnishing the principal cities of Australia with an effective system of taxicab service. Four-cylinder, 15-horsepower cabs are being put into commission. With the exception of 25 of the bodies, which were manufactured in and sent out from London, the remainder will be made in Australia. Three hundred taxicabs will comprise the complement. Their operation will be regulated by the new Motor Act of the State of Victoria, which provides for the registration and the licensing of motor cabs to ply for hire. Under this act provision is also made for ranks and stands, and a schedule of rates has been established similar to those fixed for ordinary cabs.

At Dawson, in the Yukon Territory, Canada, there are now two automobiles in use: A 60-horsepower, 3-passenger car and a 20-horsepower, 4-passenger machine. There is one touring car in the Klondike, a 7-passenger, 35-horsepower machine. The passenger tariff is a cheerful item for a chauffeur to contemplate, namely, $15 for the first hour; $10 for the second hour, and $75 for the day. The car in question drinks ten gallons of gasoline each day, at a cost of 75 cents per gallon. The chauffeur receives $150 per month and his expenses. Freight rates for automobiles by the White Pass and Yukon Route are $190 per ton.

The automobiles in use in Johannesburg, which constitutes a larger market for machines than all of the rest of South Africa combined, are of various grades, including German, French and English, a very few American, and a small percentage of Italian patterns. The highest price cars in use are made in Continental Europe and in England. They range in price from $5,000 to $10,000 delivered in Johannesburg. While there are many high-price cars in commission there, and although the market for this class of cars is encouraging, the expensive machines are mainly bought by or for the parties desiring to use them. For this reason expensive cars are not as a rule kept in stock by the local dealers. There is a fifteen per cent. duty on automobiles imported into South Africa, based on the value of the machines, a 3 per cent. preference being given in favor of machines manufactured in the United Kingdom, and therefore reciprocating in the case of British Colonial trade. The popular demand is for cars of from 16 to 20 and from 20 to 28 horsepower, whose seating capacity is from three to five persons. There also is a call for cars of the small runabout class. Climatic conditions are to be considered by exporters of cars into South Africa. The climate being very dry, it is necessary that any wood used in the construction of machines shall be thoroughly seasoned. It is due to neglect in this direction that many complaints are made relative to wooden wheels. Preference is given to aluminum bodies. Bad roads obtain in the country as a rule. There are a large number of streams to be crossed while touring. Therefore, high clearance is demanded. Some of the machines have a clearance of not more than eight inches, which is not enough in the event of crossing a stream. Neither is this enough when running over roads having deep ruts and high crowns made by the wheels of wagons. The springs should be made very heavy. At least one leaf should be added to the ordinary spring for use in South Africa. Flimsy axles bend after having run over rough country roads a short time. The favored plan is to reinforce the front axle with a strong bow-string, or with a sort of truss. As the hot climate dries out the wood very rapidly, it is necessary to use the highest grade of paint.

New York Goes After Smoking Autos

Officers of New York have started a movement, headed by Mayor Gaynor, to suppress the smoking automobile. Investigators, in securing evidence of the prevalence of this abuse, have reported that about one-third of the automobiles that are driven about the city violate the provision of the Sanitary Code prohibiting excessive smoke.

The movement is based on sound sense, for a smoking automobile is not only a nuisance to the public generally, offensive to the senses and flagrantly illegal, but it is indicative of ignorance on the part of the driver and is wasteful and careless practice.

Smoke is caused by the excessive use of lubricating oil in the engine. Where such conditions exist it shows that little knowledge of the motor is possessed by the operator. In the first place excessive lubrication is a potent cause of carbon deposits in the cylinders; it decreases power when the motor is throttled down for slow motion; it lends itself to defective combustion and augments slipping gears. With excessive lubrication, flexibility, so much desired in heavy traffic, is spoiled.

Then, too, the practice is costly without adequate return.

The man who obeys the law with regard to smoke is a better driver than the one who comes under the ban. He saves expense in two ways—his oil bill is not so large and he avoids fines.

Electric Vehicle Men in Meeting

With an attendance of about 100 the first regular monthly meeting of the newly formed Electric Vehicle Association of America was held Tuesday night. C. L. Morgan made an address on the essentials of operation and care of commercial trucks. He advocated more care in inspection and periodic overhauling. The society has a membership of 250.

Floods Threaten French Automobile Plants

PARIS, Nov. 21—There is every indication that French automobile manufacturers will be as seriously affected by floods this winter as during last season. Even now, at the beginning of the winter, the river Seine is in an abnormal condition, and although none of the factories is yet flooded it only needs another foot rise to bring the water to their doors. The situation is rendered serious by the fact that practically nine-tenths of the automobile factories of France are grouped along the banks of the river Seine, just below Paris; that the river and all its tributaries are high and still rising, and that the ground is so sodden by several wet seasons that it has no further powers of absorption.

Although adequate warning has been given of the possibility of floods this winter, very few preventive measures have been taken. To remove all possibility of danger would entail an expenditure of several million dollars, and a series of changes requiring five to seven years to accomplish. Temporary measures have been adopted in the city of Paris; but in the suburbs, where all the automobile factories are located, nothing has been done by the authorities.

Profiting by last year's experience, arrangements have been made by manufacturers for putting up dikes and using powerful pumps, whenever necessary, and much valuable machinery has been removed to positions of safety. Thus, supposing the record height of last year is again attained, the damage will be less, but it will not prevent the total or partial closing down of some of the leading factories. The firms most seriously threatened are Brasier, Renault, Darracq, Charron, Gnome, Unic, De Dion Bouton, Bayard-Clement, Continental tires, and Bosch magneto. Among the few altogether out of reach of the floods are Panhard-Levassor and Delahaye, both of which are located on high ground within the city of Paris.

France now seems to regret her decision to abstain from racing, for it has just been decided that there shall be a big speed test next year, to be known as the Grand Prix de France, and to be run on a fast course in the Sarthe district, on some date between May 15 and July 15. It is the Automobile Club de la Sarthe which is responsible for the race, with the patronage and official sanction of the Automobile Club of France.

The racing board of the French club is under a vow not to promote any road race, but as the last two seasons have shown abstention to be a mistake the leaders are quite willing to turn the difficulty by backing a race promoted by a private club. The Sarthe district is the one in which the 1906 two-day Grand Prix was held. Its roads provide perfect, well-surfaced straightways of a switchback nature.

Two races are scheduled for next year, one for cars limited to 4.3 by 7.8 inches bore and stroke, and another for any type of car of any weight or power. The two races will be run on the same day, over a distance of about 370 miles. In addition to medals offered by the Automobile Club of France, there will be a trophy for the winner in each class of the value of $1,000, or this amount in cash. Entries will be received until February 1, 1911.

Objections will doubtless be made by constructors to the dimensions fixed for the limited power cars. France is much more interested in cars of 80 or 90 millimeters bore (3.1 and 3.5 inches) than in those of 4.3 inches, the great majority of motors for next season not exceeding 3 1-2 inches bore. Several firms are now producing standard touring cars with a stroke twice the value of the bore, and one French firm will confine itself next year to cars having a ratio of 2.42 to 1 stroke to bore; these, it must be remembered, are standard touring cars, as delivered to the public, and not special racing models. For these latter the ratio runs as high as 4 to 1.

The unrestricted class is not likely to reveal anything new. It is doubtful if there will be many specially constructed cars in the unlimited class; such firms as Fiat, Benz, Lion-Peugeot, Opel and a few others already having fast cars may be expected to enter them, but the old French houses have so long neglected special racers that they are not likely to come back to the game with any relish.

The raising of the bore limit to 110 millimeters will keep out an important group of the smaller firms having done a lot of pioneer work with motors of not more than 90 millimeters bore. These firms will have to build special motors to enter in either class, whereas had the limit been lower they could have entered in the limited bore class with modified stock cars costing very much less to build than a special racer. Although the Automobile Club of the Sarthe can be congratulated on taking up a work that the Automobile Club of France has long neglected, its technical regulations are far from being satisfactory.

Mercedes Patents Sustained in England

LONDON, Nov. 21—Mercedes patents upon gate change speed control, honeycomb radiator, honeycomb radiation in connection with fly-wheel fan, brake cooling device and dished axle and differential, which were called into question by the Fiat Motor Company, have been sustained and the report is current that the applicants for the overthrow of the patents already have paid over about $100,000 in royalties.

The main question raised was as to the jurisdiction of the British courts where the patented device was manufactured abroad. Throughout the litigation the courts upheld the patents. Several other actions are contemplated by the Mercedes company against British manufacturers who have been infringing upon the radiator and the gate speed control devices. The matter has been in the courts for 18 months.

Motor Taxes Are Higher Abroad

PARIS, Nov. 21—The following comparative table shows the amount that would have to be paid in taxation for one year on a five-passenger car with four-cylinder motor of less than 4 inches bore in Paris, the French provinces and Belgium. The sums spent on driving licenses are included, although in some cases a driving license once secured is good for all time.

	Paris	French Provinces	Belgium
Car tax	$35.08	$11.28	$4.80
Horsepower tax	22.80	11.28	25.00
Car registration	0.12	0.12	none
Owner's driving license	4.00	4.00	none
Chauffeur's license	4.00	4.00	none
Road making tax	none	6.24	none
Gasoline tax	54.48	17.28	none
	$120.48	$54.20	$29.80

Syracuse Chauffeurs Organize

SYRACUSE, N. Y., Nov. 28—The Chauffeurs, Automobile Drivers and Automobile Workers' Association of Syracuse is just formed, not as a trade union, it is stated, but for mutual benefits. A principal object is the watching of legislation, and an effort is afoot to have the automobile workers in other cities of the State form similar organizations.

When this is done efforts will be made to try and secure a reduction of the annual $5 fee for registration, which the drivers think excessive. The Callan bill sets this fee, which is higher than that of other States.

The Syracuse organization is incorporated, the directors being Robert W. Masters, John C. Greaves and Christopher Murphy. At the organization the members were addressed by Assembly Clerk Ray B. Smith and Senator-elect J. Henry Walters.

News in Brief from the East, West and South

New York, Nov. 28—Announcement is made by the Farrell Auto Company, of Brooklyn, that it has taken on the agency of the Beyster-Detroit business wagon.

Pittsburgh, Pa., Nov. 28—The Inter-State Company is preparing to move its Pittsburgh headquarters to 5817 Penn avenue.

Denver, Col., Nov. 28—The world-touring Hupmobile which left Detroit two weeks ago reached this city in good condition and started West, after a short rest for the party.

Los Angeles, Cal., Nov. 28—The Premier car, in charge of Ray F. McNamara on its transcontinental trip, has reached this city after a series of experiences that run the whole gamut of motoring fortune. The car was in the midst of a terrific storm in Arizona last week and was out of communication with civilization for several days.

Philadelphia, Nov. 28—Taking advantage of the fact that there were many changes wrought in the Pennsylvania Legislature at the last election, the Pennsylvania Motor Federation has become unusually active in urging sane automobile laws and good roads. A number of candidates were pledged to the cause of adequate laws on these subjects before they were given the support of the Federation.

Detroit, Nov. 28—David Hunt, Jr., general manager of manufacturing for the E-M-F Company, was killed Sunday, when his car turned over near Yale, Mich. The car skidded on the edge of a steep embankment. He leaves a widow and daughter.

Detroit, Nov. 28—Representatives of the Chalmers Motor Company met in annual convention here to-day and will remain in session until December 1. Over 150 salesmen were present.

Chicago, Nov. 28—R. S. Fend, superintendent of agencies of the Woods Motor Vehicle Company, has left on a tour that will include the Pacific coast territory.

Indianapolis, Nov. 28—The Croxton-Keeton Motor Company, of New York, Inc., will control the sale of Parry cars in the city of New York for the season of 1911. The salesrooms are located at 1662 Broadway.

Mexico, Nov. 28—The United States and Mexican Trust Co. has been appointed sales agent for the Lozier cars in the Republic of Mexico.

New York, Nov. 28—Chas. E. Miller announces the removal of the Brooklyn branch of his company to 1420 Bedford avenue, corner of Prospect place.

Syracuse, N. Y., Nov. 28—The Automobile Dealers' Association of Syracuse, at a meeting of its board of directors this week, elected John H. Valentine treasurer to succeed Harry Conde, who resigned to leave Syracuse and engage in the automobile business elsewhere.

Garage and salesroom of the W. C. Moore Auto Company, which has just been completed at Wilkes-Barre, Penna.

Boston, Nov. 28—The Massachusetts Motor Company has been formed in Boston and incorporated under the laws of Massachusetts to handle the Oakland car in the Bay State east of Hampshire, Franklin and Hampden counties. G. B. Williams is president; F. D. Stranahan, vice-president; W. H. Tucker, treasurer; F. S. Snow, secretary, and F. A. Daly, manager. Mr. Stranahan formerly handled the Buick in Boston. Salesrooms have been opened at 591 Boylston street.

Boston, Nov. 28—Dr. Charles G. Percival and Montague Roberts, who are doing 100,000 miles in an Abbott-Detroit car, reached Boston in time to have Thanksgiving with some of the former's relatives. On Friday they were introduced to Mayor Fitzgerald by E. P. Blake, the Boston representative for the Abbott-Detroit, and handed him a letter from the Mayor of Detroit. Then they started for Maine. They had traveled 17,000 miles when they reached Boston.

Portland, Ore., Nov. 28—Business men, farmers and automobilists throughout Oregon have joined hands in the road-bettering movement in a definite way since the adoption of the amendment at the recent election making it possible for counties to provide funds as they elect for road construction.

Boston, Mass., Nov. 28—Peter Cole, formerly of Chicago, has just accepted the position of superintendent of the maintenance department of the Velie Motor Vehicle Co., of the New England States, with headquarters at No. 8 Waltham street, Boston.

New York, Nov. 28—The Havoline Oil Co. has made an arrangement with the Indian Refining Co. whereby the latter will act as distributing agent for Havoline automobile lubricants.

Meriden, Conn., Nov. 28—The Connecticut Telephone & Electric Co., of Meriden, Conn., is distributing 1911 catalogs covering automobile and motor boat ignition specialties. This catalog describes the new Connecticut Magneto in detail. Other types which are illustrated are the new Connecticut Shock Absorbers, Hinged Bracket Spark Coils, Magneto Lock Switch, new type Steering Wheel Switch, new 1911 Pocket Meters and Connecticut Auto Lock.

South Bend, Ind., Nov. 28—Ground has been broken for the new building which will be occupied by the United States Motor Car Co. as a garage and salesroom. The building will be two stories at the present, although the foundation will be constructed capable of supporting a ten-story structure.

Omaha, Neb., Nov. 28—C. L. Gould, manager of the Omaha branch of the Ford Motor Car Company, has contracted with the following new agents for 1911 cars: Glass & Evans, Cushing, Neb.; Johnson & Nelson, Newman Grove; Campbell Auto Company, Campbell; Lichliter & From, David City; Reeves & Linn, Madison; West Brothers, Wisner, and C. A. Darling, Lyons.

Cleveland, Nov. 28—F. S. Gassaway, formerly manager of the New York branch office of the Willard Storage Battery Co., has been transferred to the main office at Cleveland, where he will act as general manager of sales.

New York, Nov. 28—Among the passengers arriving on the *Mauretania* last week were Charles Y. Knight, inventor of the "Silent" Knight motor.

Indianapolis, Nov. 28—The G. & J. Tire Co. announces that it has made arrangements with the Oriental Rubber Company, of 1140 Bedford Avenue, Brooklyn, N. Y., whereby the latter company will in future act as sole representative for G. & J. tires for Kings County, New York.

Kansas City, Nov. 28—The Winton Motor Car Co. has established a permanent branch house at 3328-3330 Main Street, with George Arbuckle as manager.

Rockford, Ill., Nov. 28—The Cotta Transmission Company, of Rockford, Ill., maker of the "Cotta Transmission," has reorganized and resumed operation under new management.

What the Makers and Dealers are Now Doing

PORTLAND, ORE., Nov. 28—During the past week the Portland Automobile Dealers' Association held their third annual banquet at the Portland Commercial Club. Seventy-five automobile dealers, representing practically every automobile sold in Portland, were present and celebrated the completion of the best year that the automobile industry has known in Portland.

The toastmaster of the evening was Charles F. Wright, of the firm of Ballou & Wright, president of the association. The guest of honor of the evening was E. Henry Wemme, the leading spirit in the automobile industry in Portland since its inception.

To Manufacture Two Inventions

BOSTON, Nov. 28—Carmine Basile, a young Italian engineer who has been in America a few years and formerly worked in some of the big motor factories, has formed the Basile Automobile Company at Boston, capitalized under the Massachusetts laws for $150,000, for the purpose of putting on the market some of his inventions.

One of these, for which patent papers are pending, is a device to gain economy of operation. Another device is an automatic arrangement to be attached to each wheel so that a motor car may go over obstacles or depression in the road without the body of the car being changed from its horizontal position.

Elmore Plant Nearly Finished

DETROIT, MICH., Nov. 28—The roof of the Clyde plant of the Elmore company has been completed, and machinery from the old factory is now being removed to its new location. The addition of this big factory to the plant of the Elmore gives a capacity of 3000 cars during the coming year.

Coggswell Company to Start Work Jan. 1

GRAND RAPIDS, MICH., Nov. 28—The "Coggswell 35," a four-cylinder, five-passenger car with bore of 4 inches and stroke of 4 1-2 inches, is to be made by the Coggswell Motor Car Company. The company, which was formed recently, is capitalized at $250,000 and active work will commence about January 1. It is intended to assemble the cars only at first, letting out the manufacture of parts to various concerns.

Automatic Machinery Makers Merge

DETROIT, Nov. 28—Through a deal just consummated Detroit becomes headquarters for the largest automatic machinery company in the world. The deal involves a consolidation of the Potter & Johnston Company, of Pawtucket, R. I., the large manufacturers of automatic machinery in America, and the Grant & Woods Manufacturing Company, of Chelsea, Mich., manufacturers of automatic screw machinery and balls for ball bearings.

The Potter & Johnston Company is capitalized for $1,500,000, one-half of its product going abroad. The Grant & Woods Company, organized a few months ago by Detroiters, has a capital of $1,000,000, all paid in. The company has a large plant at Chelsea, a few miles from this city, and is engaged in manufacturing automatic machinery for turning out nuts, bolts, cap screws, piston pins and bushings. Bearing balls are made at Chelsea after the German method on Grant machines, which are controlled in this country by the Chelsea concern.

The Potter & Johnston Company will continue to operate in Pawtucket, but it is understood that as a result of the consolidation the Chelsea plant will be materially enlarged. The executive and selling headquarters for both companies will be located in Detroit.

New Six-Cylinder Nance

Nance Motor Car Company, of Philadelphia, Pa., Introduces a New Car

INTENDING to supply the wants of a discriminating clientèle of the character which expresses its preference for six-cylinder, long-stroke motors, the Nance Motor Car Co., with headquarters at 1209-1217 Vine street, Philadelphia, Pa., is ready for business. The general appearance of the new automobile is shown in the accompanying illustration. The body is of the fore-door type, and is regularly equipped in the manner shown, including a top. The wheelbase is 122 inches, with a tread of 56 inches, and the regular tire equipment is 34 inch. The power plant is of the unit type, 4-cylinder, water-cooled, and the motor is rated at 35 horsepower, at 900 r.p.m. The cylinders are 3 5-8 inches bore by 4 1-16 inches stroke. The carbureter is of the Stromberg type, and ignition is by the Bosch Dual system. The radiator is of the true honeycomb type.

The power plant is platformed by a cold-pressed channel section frame, narrowed at the front with a drop over the rear axle. The front axle is a drop-forged I-beam of stout dimensions. The rear axle is of the full floating type, equipped with internal and external hub brakes. The shaft drive is straight line. The steering gear is of the irreversible screw and worm type with an 18-inch steering wheel. The rake of the steering post is 30 1-2 degrees.

The company announces that it is prepared to offer two options to its purchasers, the first of which is in the form of a 5-passenger touring model and the second in the shape of a runabout. The power plant and other mechanical features remain the same in both cases. When it is considered that the price of this car is $1,900, and due allowance is made for the excellence of design and construction, it will be readily appreciated that the company is preparing to "popularize" six-cylinder automobiles from the price point of view, and taking advantage of the state of the art, including the most modern and well thought out facilities, the undertaking must be regarded as ambitious.

New six-cylinder Nance car, which is the latest Philadelphia offering with a $1,900 price tag

Among the Accessory Makers

THOMAS AUXILIARY SPRING; SIMPLEX VACUUM BOTTLES; SECOND-MAN TIRE TOOL; MICHELIN NON-SKID TIRE; HAGSTROM BLOW-OUT PATCH

BOON FOR WINTER AUTOISTS

The Simplex vacuum bottle (Fig. 2) serves two purposes, viz.: to keep liquids hot or cold, as may be desired. At this time of year a warm drink often relieves the occupants of a car from the biting cold, and the makers of this bottle claim that it will keep its contents hot for thirty hours. The principle of the two bottles shown is the same, the difference being that the cheaper one, the Junior, is covered with a plain japanned metal case, whereas the better quality has a metal body which is securely fastened to an aluminum or nickel top by means of four catches. The bottle may readily be removed for cleaning and sterilizing. It is made by the Simplex Vacuum Mfg. Co., 369 Washington Avenue, Newark, N. J., and the New York City branch is located at No. 156 Fifth Avenue.

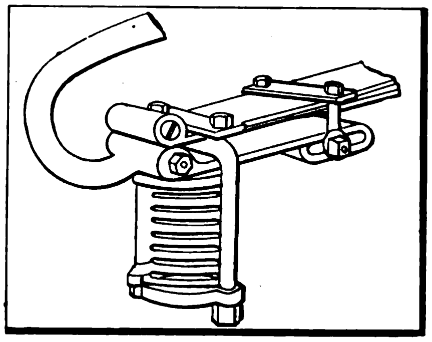


Fig. 1—The Thomas auxiliary spring

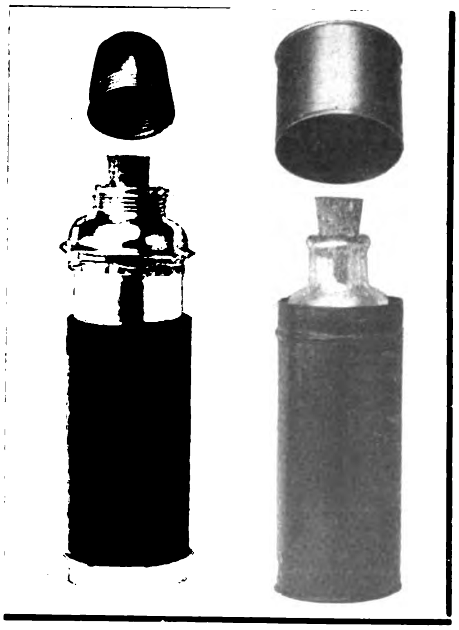


Fig. 2—Simplex and Simplex Junior Bottles

AUXILIARY SPRING TO ABSORB SHOCK

As the name implies, the Thomas Auxiliary Spring (Fig. 1) is an attachment to be fitted to each of the chassis springs of a car to prevent all the shock from road inequalities being transmitted to the latter. The device consists of a coiled spring attached inside a cage, so that when the shackle gives with the flexure of the spring the rebound action is taken up in the concertina movement of the auxiliary spring. These springs are made by the Thomas Auxiliary Spring Works, Canisto, N. Y.

A HANDY BLOW-OUT PATCH

Every autoist should carry in his kit some means of repairing a blow-out. The Hagstrom patch (Fig. 5) is designed to get a car home after a blow-out, and the sides are constructed in such a manner that the metal hook will grip the rim and prevent creeping and so uncover the hole. The patch is made by Hagstrom Bros. Mfg. Co. (Inc.), Lindsborg, Kan.

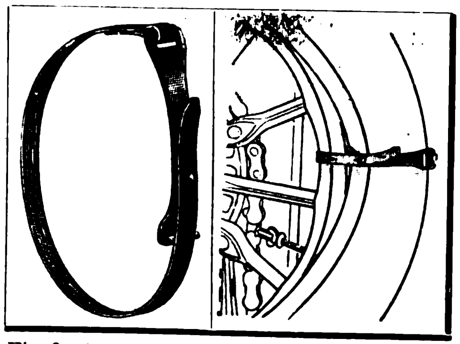


Fig. 3—A useful tire tool, and how it is applied

SECOND-MAN TIRE TOOL

How often has a motorist wished he had another hand so as to grip the tire and prevent it leaving the rim when both of his hands are in use! A useful accessory to effect this is made by the Gus Balzer Co. (Inc.), 1777 Broadway, New York, and the illustrations (Fig. 3) practically speak for themselves. The device consists of a band partly of steel and partly of leather; the leather part has eyelets and these can be hooked over a stud after the band has been passed round the felloe of the wheel, holding the tire firmly to the rim.

MICHELIN "SEMELLE" NON-SKID

The idea depicted in Fig. 4 is being marketed by the Michelin Tire Company, of New York City, and it is based upon the use of diagonally placed non-skid tires on one of the two front and rear wheels, respectively, of an automobile. It is claimed for this plan that it prevents skidding of either the front or rear ends of the automobile, requiring the use of but two non-skid tires. The non-skid tire furnished by the makers for this work consists of a strip of specially prepared leather and steel studs that cover the part of the tire that touches the road. The makers claim that the use of this non-skid does not reduce the resiliency in the least, as the leather does not inclose the entire casing. The experiences so far with this form of non-skid, coupled with this method of applying, have worked out well.

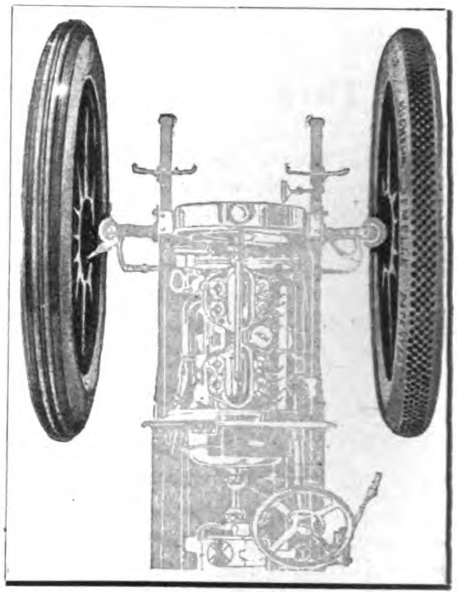


Fig. 4—Non-skids on opposite wheels

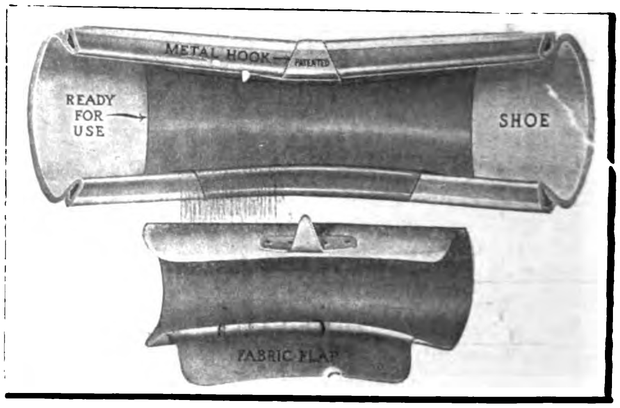


Fig. 5—Blow-out patch and method of attachment

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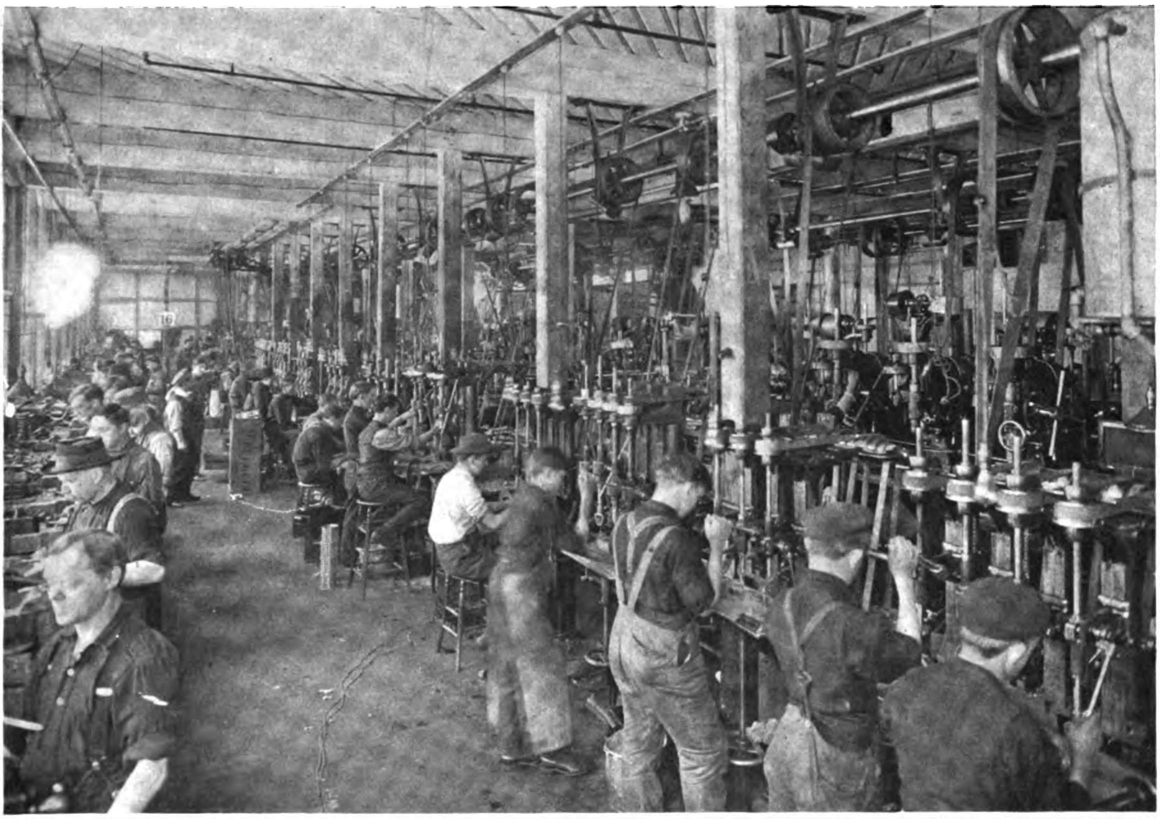
THE AUTOMOBILE

LEADING UP TO 1911 SHOWS



EMBLEMATICAL OF ACTIVITY IN THE PLANTS OF THE MAKERS WHO ARE PREPARING THE 1911 AUTOMOBILES FOR THE GROUP OF APPROACHING SHOWS

APPROACHING the 1911 automobile shows, those who have long been given to the practice of noting improvements and advances are exhibiting a rare brand of curiosity. All are agreed, however, that the only way to obtain real advantage by visiting automobile shows is to have clearly in mind the points of interest which are to be examined, going there with a definite aim, with a clear understanding of the whole situation rather than to ignore the project and then attend the show on a purely curiosity basis. But if it is proposed to display discriminating intelligence at show time, it remains to coach up on the subject.

Granting that it would be too formidable an undertaking to discuss the details of design and construction of all of the automobiles that are listed in the coming exhibition, second choice lies in picking out more or less at random a number of the cars and subjecting them to a sufficient analysis to enable the interested reader to grasp their significance, and fix in his own mind a foundation that will serve him in good stead at the propitious time.

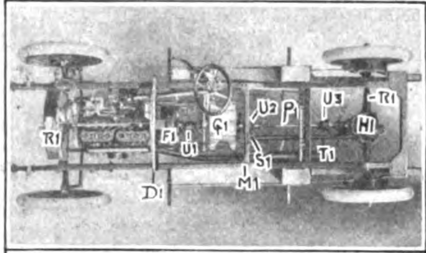


Fig. 1—Kissel Kar Chassis

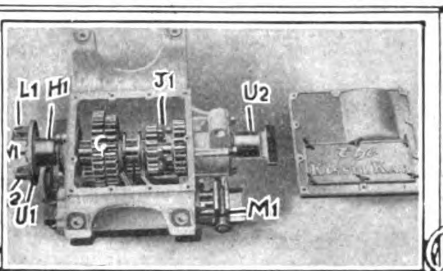


Fig. 2—Kissel Kar Transmission

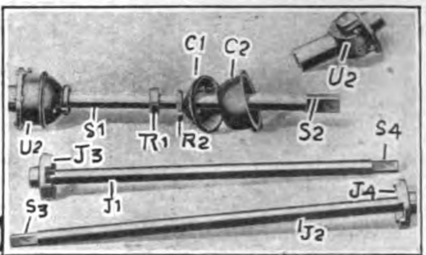


Fig. 3—Kissel Kar Details

The method of procedure in this undertaking will include a brief discussion of the relatively new ideas, coupled with an exposé of the leading underlying mechanical principles, and a tabulation is also made up in such a way as to afford precisely similar information about the several makes and the models thereof in such convenient form that it will be but the matter of a moment to observe the differences, if such there are, between the respective makes, or if the situation permits, arrive at a substantial understanding of the trend in design and fashion of the cars of the year.

In the process of depicting the particular automobiles here taken, no attempt has been made to delve into any particular school of design, nor is it the idea to make any comparison between the respective designs, leaving such matters to readers.

It is better to see things just as they are without any attempt at constructing a theory with the hope, perchance, that it will serve in the guidance of the buyer, with the expectation that he will get more nearly what he wants or more value per dollar. In all truth, the mind must be dressed in the cloth of practicability when an automobile is to be purchased, and in order to take advantage of this process it goes without saying that the fixed considerations govern. The primary fixed consideration is the work that the automobile must do but the mere selecting of a car that may be designed to accommodate a given traffic will barely suffice on the assumption that the road condition does not have to be taken into account as a general rule.

But the road must be considered. There is a great difference between town car work in a great metropolis, and overland touring service. It is even possible to view the road situation on a localized basis. A man who desires to use his automobile over the flat macadam roads of Long Island would not have to wrestle with the hill-climbing problems which would surely confront an automobilist whose radius of travel might be confined to the rough and ready roads of the Ozark Mountains.

Of the ten cars here taken, but one complete model of each make is illustrated. The table, however, will suffice to indicate that each maker has a considerable number of models, and it is noteworthy that the fore-door type of body is offered as one of the options in each case. For Winter service, this type of body lends itself advantageously, and while experience with completely enclosed bodies in the Summer time is meager, the fact remains that there would be no insurmountable difficulties involved in removing the fore-door if it becomes troublesome, although the consensus of opinion is that it is more of an advantage than otherwise, due to the fact that if it does prevent the circulation of air currents to some extent, it also keeps the silt of the road out.

Referring to the wheel-base length of the various automobiles, it will be seen that the town cars are provided with a chassis with a wheel-base between 90 and 110 inches, with a tendency to

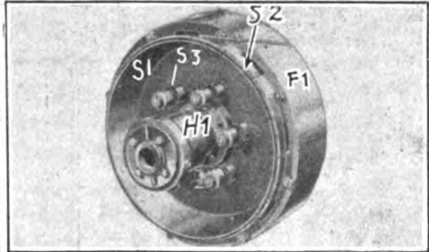


Fig. 7—Cadillac 30 Clutch

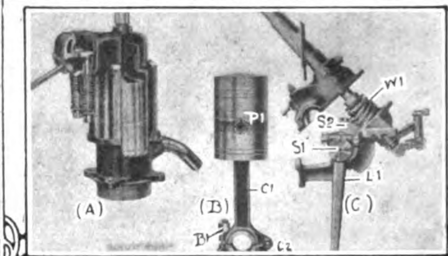


Fig. 8—Cadillac 30 Cylinders, etc.

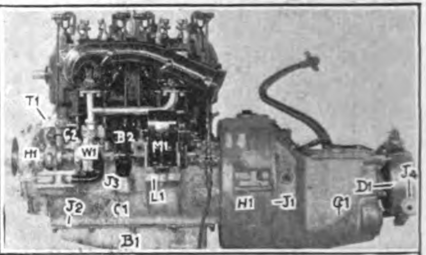


Fig. 9—Left Side Chalmers 30 Motor

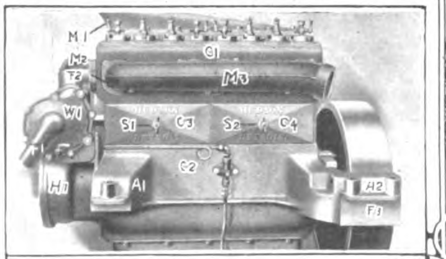


Fig. 13—Left Side Hudson Motor

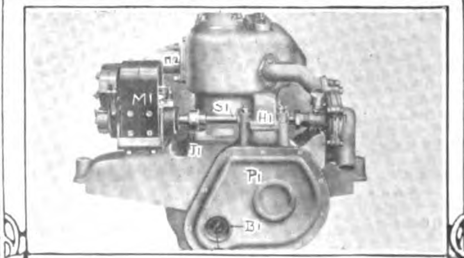


Fig. 14—Front End Hudson Motor

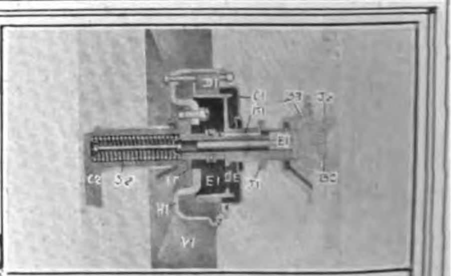


Fig. 15—Section Hudson Flywheel

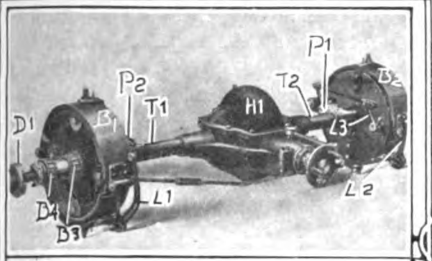


Fig. 4—Kissel Kar Live Rear Axle

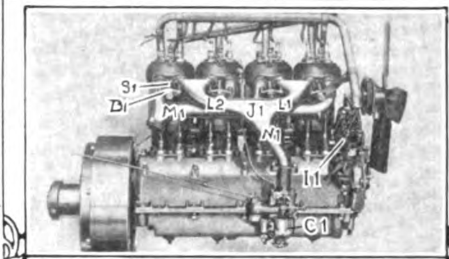


Fig. 5—Right Side of Cadillac 30 Motor

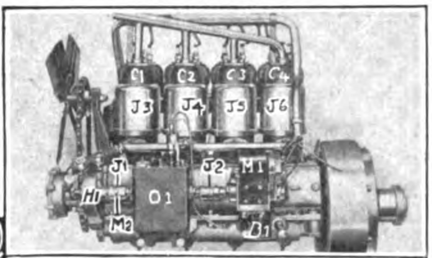


Fig 6—Left Side of Cadillac 30 Motor

make it as long as possible consistent with a "street-width" turning radius. It will be understood that it is extremely difficult to so cant the front wheels that an automobile can be turned in a circle within the width of an ordinary street without an undue locking angle if the wheel-base far exceeds 110 inches.

For general touring service, the wheel-base this year seems to be greater than in former practice, with a maximum of 142 inches, quite a number of examples between 120 and 124 inches, and a goodly sprinkling between 115 and 120 inches. The good adjustment of the wheel-base length of the various cars coupled with relatively large diameter tires and a power plant relation in keeping with the requirement, seems to have made it unnecessary to extend the speed changes in the transmission gear, notwithstanding which fact, however, quite a number of the models shown are provided with four speeds.

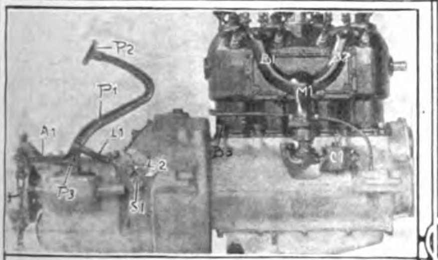


Fig 10—Right Side Chalmers 30 Motor

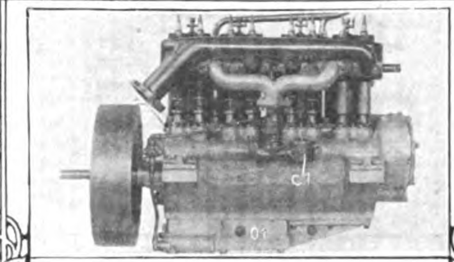


Fig 11—Right Side Chalmers 40 Motor

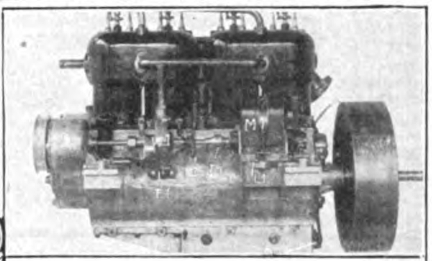


Fig 12—Left Side Chalmers 40 Motor

The ignition systems are uniformly high tension, with a battery auxiliary, and the high character of the workmanship involved in the installation of the ignition equipment should be regarded as one of the advances. The cooling problem is shown in the several approved ways in the models depicted, resort being had to cellular radiators with a centrifugal pump in some instances, tubular radiators, combined with centrifugal pumps, in other cases. The honeycomb type of radiator is well represented, and thermo-syphon cooling is continued in some examples.

The price question ranges all the way from $600 to just under $5,000, with intervening increments but a few hundred dollars apart. The motors are of the 4-cylinder, water-cooled type for the most part, with only one example of the 2-cylinder opposed type of motor, and seven examples of 6-cylinder motors as produced by three of the ten makers involved. It will not now be possible to depict the trend from the motor point of view, due to the fact that considering only ten makes would be insufficient to satisfy a statistical theory, hence relating matter must be put off until space permits considering a sufficient number of all the automobiles made to establish an arithmetical mean.

Mechanical Points of Kissel Kars

Referring to the tabulation, it will be observed that the Kissel Kar is first on the list, and that the four models of power plants afford 15 options to the purchaser. The general designing of Kissel Kars will best be appreciated by examining Fig. 1 of one of the chassis showing the 4-cylinder motor of the L-type so located with respect to the front axle that the radiator R1 comes directly over the axle, and the flywheel F1 comes back of the dash line D1. A universal joint U1 occupies a position in the tumble shaft, connecting with the transmission gear G1, and a second universal joint U2 takes care of the angularity of the propeller shaft P1, there being a third universal joint U3 adjacent to the housing H1 of the rear axle R1, and torsion is resisted by a long circular torsion tube T1.

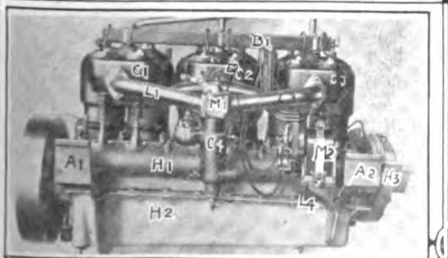


Fig. 16—Locomobile Model M Motor

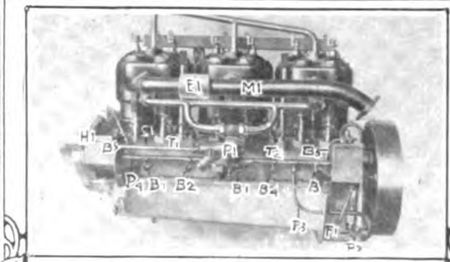


Fig 17—Locomobile Model M Motor

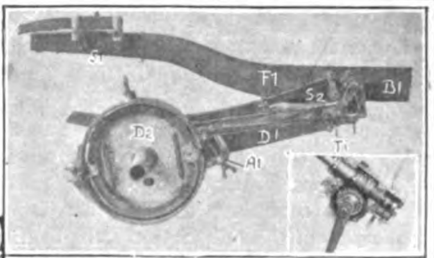


Fig. 18-19—Locomobile Model M Details

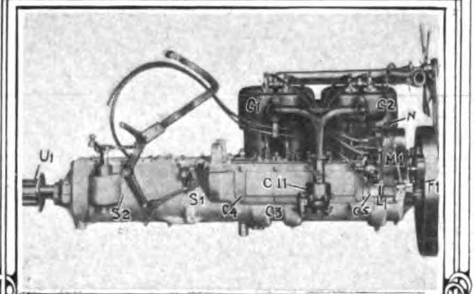


Fig 20—Maxwell Model I Power Plant

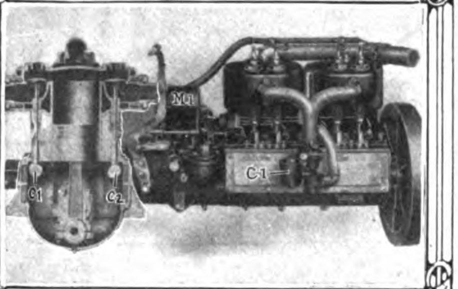


Fig. 21-22—Maxwell Model G Power Plant

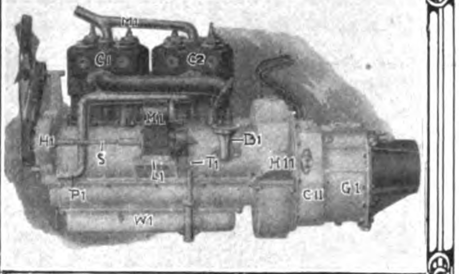


Fig. 23—Left Side Ohio Motor

The transmission is shown in Fig. 2. It is of the three-speed selective type with a jaw J1 for the direct drive, and large diameter gears G meshing with the lay-shaft gears below. The shifting mechanism M1 is an ingenious and substantial contrivance. A universal joint U1 comprises a flange with lugs L1 and L2, which are related to mating members in the other half. The hub H1 of the universal joint fetches up on a taper and is held by a nut N1. The universal joint U2 at the other end shows the mating half to that of U1. The transmission gear case has a tight cover which may be removed for the purpose of exposing the gear-set, but a handhole is also provided with the cover held down by studs secured by wing-nuts, the idea being to permit of quickly getting at the gears for the purpose of cleaning and inspection.

Refinement in point of detail is the trend in this car, and referring to Fig. 3 an opportunity will be afforded for observing with what minuteness and care each little part has been schemed out and brought to a high state of perfection ready for manufacture under fixed and advantageous conditions. In this illustration, the propeller shaft S1 is shown with its universal joint U1 at one end and the square shaft S2 at the other, with the universal joint U2 removed, and the cover members C1 and C2 slipped up on the shaft showing how they overlap each other, making tight, flexible joints; the covers are held in place by the ring members R1 and R2. The jackshafts J1 and J2 are also shown with square ends S3 and S4, while the jaws J3 and J4 through which power is delivered to the rear road wheels are exhibited at the other extremities.

Still another example of Kissel Kar practice is depicted in the live rear axle assembly as shown in Fig. 4; of the jack, and propeller shafts in detail. The enlargement H1, for the accommodation of the differential and bevel drive, is of neat design and light construction, with liberal provision of bearing surface and support for the tubes T1 and T2, which extend out, terminating in the brake spiders, with spring perches P1 and P2. The brake drums are of large diameter with internal expanding and external constricting brake-bands. The constricting brake bands B1 and B2 are actuated by levers L1 and L2, while the internal expanding bands are actuated by levers L3, and a similar lever at the other extremity, which does not show in this illustration. The Timken roller bearings B3 and B4 are selected as to size for long and severe work. The jackshaft is squared at the differential, fitting in broached holes in the sun gears, and it being of the full floating type the drive is transmitted through dog members D1 to the road wheels.

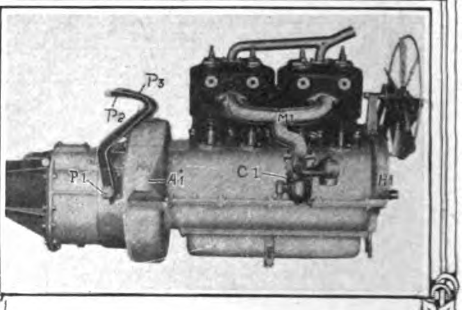


Fig. 24—Right Side Ohio Motor

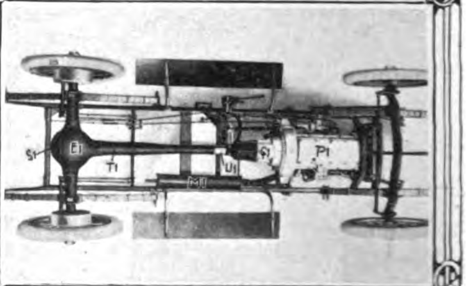


Fig. 25—Underside Ohio Chassis

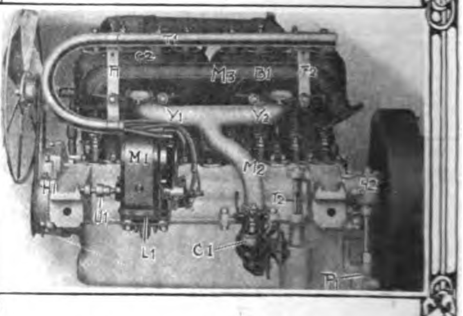


Fig. 26—Left Side Regal 30 Motor

Mechanical Features of the Cadillac Thirty

The general appearance of the Cadillac motor will be gleaned from an examination of Figs. 5 and 6. Referring to Fig. 5, the carbureter C1 of the Schebler type is located sufficiently low down to demand the use of a long neck N1 of the intake, and to make it feasible to use a gravity feed. The intake manifold as it reaches up from the carbureter through the neck N1 reaches a flaring junction J1 and spreads out therefrom with one leg L1 reaching to the front two cylinders and the remaining leg L2 passing back to the rear two cylinders. The shape of this manifold is out of the ordinary, and in addition to aborting back-firing it has the virtue of reducing losses so that the total depression on the intake side is reduced to the barest necessity as it relates to carburetion. The method of securing the intake manifold and the exhaust manifold M1 involving the use of studs S1, a bridge piece B1 for each cylinder in common to the two manifolds is not unusual, but the details are worked out to a fitting conclusion. The distributer I1 for the uni-sparker system is located on the right side to the front of the motor, and it is set outboard from the vertical plane with a view to accessibility.

Referring to Fig. 6, the magneto M1 is mounted on a bracket B1 and is driven in common with the oiler O1 by a shaft fitted with a pinion, taking power from the half-time system in the housing H1. Oldham joints J1 and J2 are placed, breaking the continuity of the shaft so that the oiler O1 and the magneto M1 may be regarded as flexibly mounted. These Oldham joints are well contrived with a floating member M2, which not only adds to the freedom of motion, but silences the joint as well. The four cylinders C1, C2, C3 and C4 have copper jackets J3, J4, J5 and J6 enclosing the cooling water, which is a regular Cadillac feature that has served admirably in several models. It offers the advantage which comes from being able to machine the cylinders all over so that they may be inspected for blemishes and the thicknesses of the walls may be uniform, eliminating the misfortunes of floating cores and other foundry incongruities.

The details of the Cadillac clutch are shown in Fig. 7, comprising the flywheel F1 and the truncated cone member of pressed steel S1, this being a noticeable practice in clutch work in view of the fact that it is customary to use cast aluminum for this character of service. The conical steel member is leather faced, and being somewhat flexible it accommodates itself to the conical face in the flywheel, but the latter is split S2 at equidistant points around the periphery for the purpose of compensation. Instead of using one spring there are six clutch springs S3 occupying equidistant positions around the face of the steel member outside of the housing H1. The remaining details of this clutch will be obvious from examination.

Referring to Fig. 8, (A) shows a section of one of the cylinders, clearly indicating the method of attaching the copper jacket and indicating how the valves are located T-fashion, cast integral with the cylinder, occupying a position above the stopping-off point of the cover packet. (B) of this illustration shows the long piston P1, and the I-section connecting rod C1 with a swivel crankpin cap C2, and a lock holding bolt B1. (C) of this illustration presents a detail of the steering gear with a lever L1 fitted to the square shaft S1, utilizing a split hub and a clamping bolt. The details of the mechanism clearly show that this gear is of the worm and sector type, but it differs from ordinary practice in that the sector S2 has its teeth cut to diverging radii, and it floats on an eccentrically bushed bearing with a means for adjusting the sector S2 with respect to the worm W1, altering the distance between the pitch line on the sector S2 and the same line on the worm W1, as the exigencies of service demand in the process of taking up lost motion. In other respects, the details of design will scarcely have to be commented upon since they conform to the Cadillac practice of interchangeability of parts throughout the makeup of the whole automobile; and while the 1913 models are in close accord with last year's practice the general get-up is smarter and refinements abound.

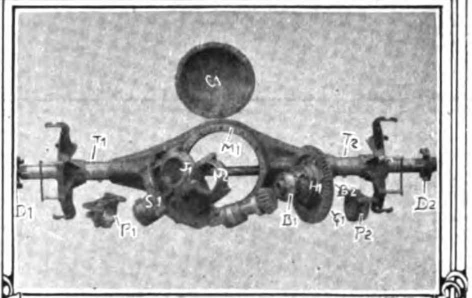


Fig. 30—Corbin 40 Rear Axle

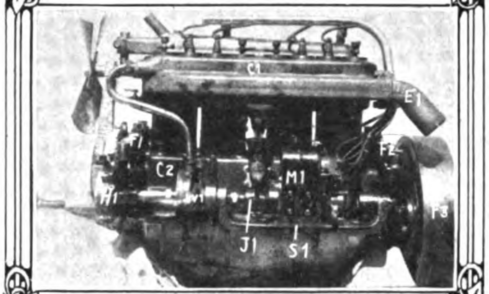


Fig. 31—Everitt 30 Block Motor

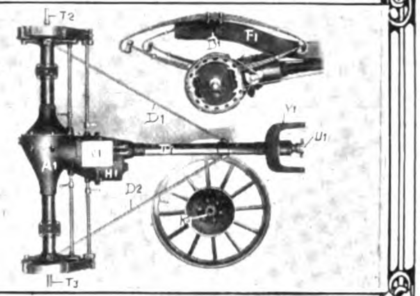


Fig. 32—Everitt 30 Axle and Transmission

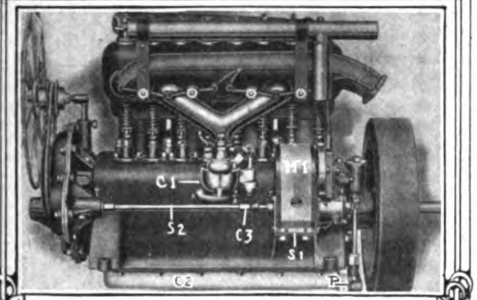


Fig. 27—Left Side Regal 30 Motor

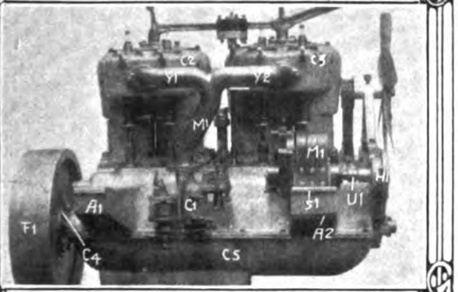


Fig. 28—Right Side Corbin 40 Motor

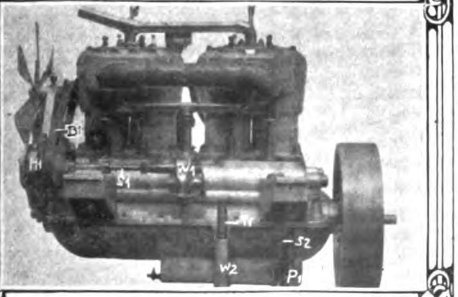


Fig. 29—Left Side Corbin 40 Motor

Two Types of Chassis Will Come from the Chalmers Plant

Patrons of this company will have seven options with the Chalmers "30" motor as shown in Figs. 9 and 10, and nine options using the "40" motor as shown in Figs. 11 and 12. The "30" motor is of the self-contained design with the crankcase C1 integral with the flywheel housing H1, with a flanged joint J1 connecting the transmission gearcase G1. The crankcase C1, instead of being split on the horizontal center, has an oil basin B1 which is flanged to the case and by removing the holding bolts at the flanging J2 the base B1 may be dropped down, exposing the internal mechanisms including the crankshaft, etc., permitting of the taking up of "shake" and doing such other work as may be required in the proper maintenance of the motor. The magneto M1 is located on a ledge L1, and is driven in common with the water pump W1 by a shaft which is geared to the halftime system within the housing H1, with an Oldham joint J3 breaking the continuity of the shaft between the water pump and the magneto. The service brakes with the drum D1 are mounted upon the prime shaft, where it extends out of the transmission gearcase G1, and a quick adjustment J4, through the good offices of a hand wheel accessibly provided. An inspection of this illustration will disclose a series of little refinements, as the grease cup G2 for the timer T1, and the breather B2 with a means for preventing the wasting of lubricating oil, whereby the air pressure is equalized in the crankcase. Referring to Fig. 10 of the "30" motor, the carbureter C1 is flanged to the manifold M1, the latter having branches B1 and B2 which extend up and are fastened by faced flanges to the block casting of the four cylinders at points midway between the front two and the rear

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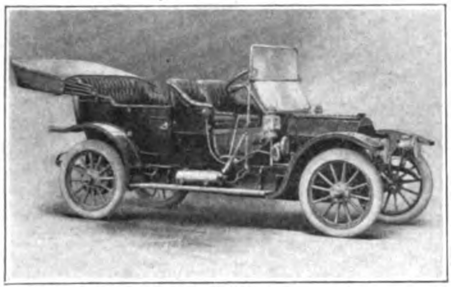
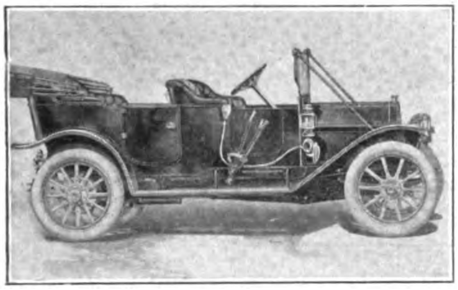
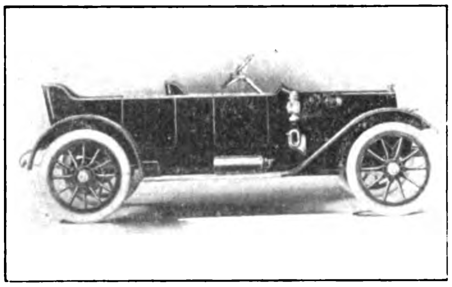


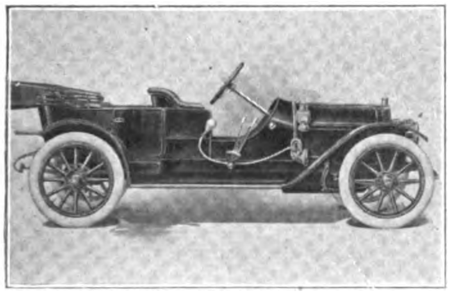
Kissel Kar with a touring body equipped complete



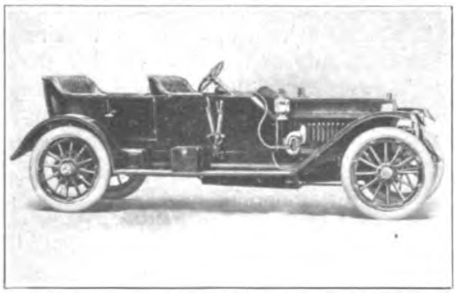
Cadillac "30" fore-door touring car



Chalmers "40" with a torpedo body



Hudson "30" touring car



Locomobile Type M torpedo body touring car

MAKE AND MODEL	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		Lubrication
			Type	Seats	Cyl.	Bore Inches	Stroke Inches	Cyl. Cast	Radiator	Pump	Magneto	Battery	
Kissel Kar LD-11	$1500	28.9	Tour'g.	5	4	4¼	4¼	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar LD-11	1600	28.9	F.d.Tg.	5	4	4¼	4¼	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar LD-11	1500	28.9	B. ton	4	4	4¼	4¼	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar LD-11	1600	28.9	S.racer[1]	2	4	4¼	4¼	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar D11 & WS11	2000	38.0	Tour'g.	5	4	4⅞	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar D-11	2100	38.0	F.d.Tg.	5	4	4⅞	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar D11 & WS11	2000	38.0	B. ton	4	4	4⅞	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar D-11	2100	38.0	S.racer[1]	2	4	4⅞	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar F-11	2500	48.6	Tour'g.	7	6	4½	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar F-11	2600	48.6	F.d.Tg.	7	6	4½	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar F-11	2500	48.6	B. ton	4	6	4½	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar F-11	2600	48.6	S.racer[1]	2	6	4½	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar G-11	3000	59.0	Tour'g.	7	6	4⅞	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar G-11	3100	59.0	F.d.Tg.	7	6	4⅞	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Kissel Kar G-11	3000	59.0	B. ton	4	6	4⅞	4¾	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump
Cadillac "Thirty"	1700	32.4	Tou'g.	5	4	4½	4½	Single	Tubular	Cent 'fl	H. T.	Dry	Splash
Cadillac "Thirty"	1700	32.4	D.Tou'g	4	4	4½	4½	Single	Tubular	Cent 'fl	H. T.	Dry	Splash
Cadillac "Thirty"	1700	32.4	R'ster.	3	4	4½	4½	Single	Tubular	Cent 'fl	H. T.	Dry	Splash
Cadillac "Thirty"	1800	32.4	F'd.T'g.	5	4	4½	4½	Single	Tubular	Cent 'fl	H. T.	Dry	Splash
Cadillac "Thirty"	1850	32.4	Torp'o.	4	4	4½	4½	Single	Tubular	Cent 'fl	H. T.	Dry	Splash
Cadillac "Thirty"	2250	32.4	Coupe	3	4	4½	4½	Single	Tubular	Cent 'fl	H. T.	Dry	Splash
Cadillac "Thirty"	3000	32.4	Limous.	7	4	4½	4½	Single	Tubular	Cent 'fl	H. T.	Dry	Splash
Chalmers "30"	1500	25.6	Tour'g.	5	4	4	4¾	Block	Tubular	Cent 'fl	H. T.	Storage	Splash
Chalmers "30"	1500	25.6	R'ster.	2	4	4	4¾	Block	Tubular	Cent 'fl	H. T.	Storage	Splash
Chalmers "30"	1600	25.6	P. ton	4	4	4	4¾	Block	Tubular	Cent 'fl	H. T.	Storage	Splash
Chalmers "30"	3000	25.6	Limous.	5	4	4	4¾	Block	Tubular	Cent 'fl	H. T.	Storage	Splash
Chalmers "30"	2400	25.6	Coupe	3	4	4	4¾	Block	Tubular	Cent 'fl	H. T.	Storage	Splash
Chalmers "40"	2750	40.0	Tour'g.	7	4	5	4¾	Pairs	Cellular	Cent 'fl	H. T.	Storage	Splash
Chalmers "40"	2750	40.0	R'ster.	5	4	5	4¾	Pairs	Cellular	Cent 'fl	H. T.	Storage	Splash
Chalmers "40"	3000	40.0	Torp'o.	4	4	5	4¾	Pairs	Cellular	Cent 'fl	H. T.	Storage	Splash
Hudson "33"	1250	25.6	Tour'g.	5	4	4	4½	Block	Tubular	Cent 'fl	H. T.	Dry	Splash
Hudson "33"	1300	25.6	T. ton	4	4	4	4½	Block	Tubular	Cent 'fl	H. T.	Dry	Splash
Hudson "33"	1350	25.6	Torp'o.	5	4	4	4½	Block	Tubular	Cent 'fl	H. T.	Dry	Splash
Hudson "25"	1000	22.5	R'ster.	3	4	3¾	4½	Block	Tubular	Cent 'fl	H. T.	Dry	Splash
Locomobile "L"	3500	30.0	Tour'g.	5	4	4½	4½	Pairs	H'comb.	Cent 'fl	H. T.	Storage	F.feed
Locomobile "L"	4600	30.0	F.d.Li.	6	4	4½	4½	Pairs	H'comb.	Cent 'fl	H. T.	Storage	F.feed
Locomobile "L"	3500	30.0	B.ton	5	4	4½	4½	Pairs	H'comb.	Cent 'fl	H. T.	Storage	F.feed
Locomobile "M"	4800	48.0	Tour'g.	7	6	4½	4½	Pairs	H'comb.	Cent 'fl	H. T.	Storage	Pump
Polished Chassis		48.0	Tour'g.	7	6	4½	4½	Pairs	H'comb.	Cent 'fl	H. T.	Storage	Pump
Maxwell "E A"	1600	30.0	Tour'g.	5	4	4¼	4¼	Single	H'comb.	Syph'n	H. T.	Dry	Grav.
Maxwell "G A"	1600	30.0	Tour'g.	4	4	4¼	4¼	Single	H'comb.	Syph'n	H. T.	Dry	Grav.
Maxwell "I"	1100	25.0	Tour'g.	4	4	4	4	Pairs	H'comb.	Syph'n	H. T.	Dry	Grav.
Maxwell "Q"	900	22.0	R'bout.	2	4	3¾	4	Pairs	H'comb.	Syph'n	H. T.	Dry	Grav.
Maxwell "A B"	600	14.0	R'bout.	2	2	4½	4	Single	H'comb.	Syph'n	H. T.	Dry	Grav.
Ohio Forty L	2450	32.4	Torp'o.	5	4	4½	4¾	Pairs	H'comb.	Cent 'fl	H. T.	Dry	Splash
Ohio Forty A	2150	32.4	Tour'g.	5	4	4½	4¾	Pairs	H'comb.	Cent 'fl	H. T.	Dry	Splash
Ohio Forty K	2150	32.4	R'ster.	3	4	4½	4¾	Pairs	H'comb.	Cent 'fl	H. T.	Dry	Splash
Ohio Forty B	2150	32.4	Coupe	4	4	4½	4¾	Pairs	H'comb.	Cent 'fl	H. T.	Dry	Splash
Regal N	$900	22.5	R'ster.	2	4	3¾	4½	Block	Tubular	Syph'n	H. T.	Dry	Splash
Regal Y	1250	25.6	Tour'g.	5	4	3¾	4½	Pairs	Tubular	Syph'n	H. T.	Dry	Splash
Regal S	1750	32.4	Tour'g.	7	4	4½	5	Pairs	Tubular	Syph'n	H. T.	Dry	Splash
Corbin 18	2750	32.4	Tour'g.	5	4	4½	4¼	Single	H'comb.	Gear'n	H. T.	Dry	Pump
Corbin 18	2750	32.4	T.ton	4	4	4½	4¼	Single	H'comb.	Gear'n	H. T.	Dry	Pump
Corbin 30	2000	32.4	Tour'g.	4	4	4½	4¼	Single	H'comb.	Gear'n	H. T.	Dry	Pump
Corbin 30	2000	32.4	T.ton	5	4	4½	4¼	Single	H'comb.	Gear'n	H. T.	Dry	Pump
Corbin 40	3000	36.1	Tour'g.	4	4	4¾	5½	Pairs	H'comb.	Gear'n	H. T.	Storage	Pump
Corbin 40	3100	36.1	Torp'o.	5	4	4¾	5½	Pairs	H'comb.	Gear'n	H. T.	Storage	Pump
Corbin 40	4000	36.1	Limous.	7	4	4¾	5½	Pairs	H'comb.	Gear'n	H. T.	Storage	Pump
Everitt "30"	1350	30.0	Tour'g.	5	4	4	4¾	Block	Cellular	Cent 'fl	H. T.	Storage	Splas
Everitt "30"	1350	30.0	F.d.Tg	4	4	4	4¾	Block	Cellular	Cent 'fl	H. T.	Storage	Splas
Everitt "30"	1350	30.0	Coupe	4	4	4	4¾	Block	Cellular	Cent 'fl	H. T.	Storage	Splas
Everitt "30"	1350	30.0	D.ton	2	4	4	4¾	Block	Cellular	Cent 'fl	H. T.	Storage	Splas

[1] Wheelbase, wheels, gear ratio and carbureter on Kissel Kar semi-racer optional

For the convenience of those who may care to address the various makers whose automobiles are depicted here, and for which data is given in the tabulation above, the home addresses of the companies are set down as follows:

Kissel Kar—Kissel Motor Car Company, Hartford, Wis.
Cadillac—Cadillac Motor Car Company, Detroit, Mich.
Chalmers—Chalmers Motor Company, Detroit, Mich.
Hudson—Hudson Motor Car Company, Detroit, Mich.
Locomobile—Locomobile Company of America, Bridgeport, Ct.
Maxwell—Maxwell-Briscoe Motor Company, Tarrytown, N. Y.

MODELS LOOK

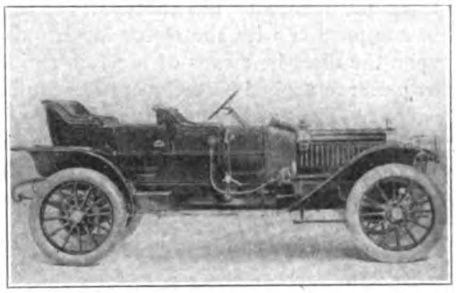
pal Mechanical Dimensions

Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
	Type	Speeds	Location	Drive				Crankshaft	Trans-mis'n	Axle		Front	Rear
Cone	Sel	3	S. Frame	Shaft	116	56	P. Steel	Plain	Ball	Roller	.....	34x4	34x4
Cone	Sel	3	S. Frame	Shaft	116	56	P. Steel	Plain	Ball	Roller	.....	34x4	34x4
Cone	Sel	3	S. Frame	Shaft	116	56	P. Steel	Plain	Ball	Roller	.....	34x4	34x4
Cone	Sel	3	S. Frame	Shaft	Op.	56	P. Steel	Plain	Ball	Roller	.....	Opt'al	Opt'al
Cone	Sel	4	S. Frame	Shaft	124	56	P. Steel	Plain	Ball	Roller	.....	36x4	36x4
Cone	Sel	4	S. Frame	Shaft	124	56	P. Steel	Plain	Ball	Roller	.....	36x4	36x4
Cone	Sel	4	S. Frame	Shaft	124	56	P. Steel	Plain	Ball	Roller	.....	36x4	36x4
Cone	Sel	4	S. Frame	Shaft	Op.	56	P. Steel	Plain	Ball	Roller	.....	Opt'al	Opt'al
Cone	Sel	4	S. Frame	Shaft	132	56	P. Steel	Plain	Ball	Roller	.....	36x4	36x4½
Cone	Sel	4	S. Frame	Shaft	132	56	P. Steel	Plain	Ball	Roller	.....	36x4	36x4½
Cone	Sel	4	S. Frame	Shaft	132	56	P. Steel	Plain	Ball	Roller	.....	40x4	40x4
Cone	Sel	4	S. Frame	Shaft	Op.	56	P. Steel	Plain	Ball	Roller	.....	Opt'al	Opt'al
Cone	Sel	4	S. Frame	Shaft	142	56	P. Steel	Plain	Ball	Roller	.....	36x4½	36x5
Cone	Sel	4	S. Frame	Shaft	142	56	P. Steel	Plain	Ball	Roller	.....	36x4½	36x5
Cone	Sel	4	S. Frame	Shaft	142	56	P. Steel	Plain	Ball	Roller	.....	40x4	40x4
Cone	Sel	3	Unit	Shaft	116	56	P. Steel	Plain	Ball	Roller	.....	34x4	34x4
Cone	Sel	3	Unit	Shaft	116	56	P. Steel	Plain	Ball	Roller	.....	34x4	34x4
Cone	Sel	3	Unit	Shaft	116	56	P. Steel	Plain	Ball	Roller	.....	34x4	34x4
Cone	Sel	3	Unit	Shaft	116	56	P. Steel	Plain	Ball	Roller	.....	34x4	34x4
Cone	Sel	3	Unit	Shaft	116	56	P. Steel	Plain	Ball	Roller	.....	34x4	34x4
Cone	Sel	3	Unit	Shaft	116	56	P. Steel	Plain	Ball	Roller	.....	34x4	34x4
Cone	Sel	3	Unit	Shaft	116	56	P. Steel	Plain	Ball	Roller	.....	36x4½	36x4½
M. Disc	Sel	3	Unit	Shaft	115	56	P. Steel	Ball	Ball	Ball	.....	34x3½	34x3½
M. Disc	Sel	3	Unit	Shaft	115	56	P. Steel	Ball	Ball	Ball	.....	34x3½	34x3½
M. Disc	Sel	3	Unit	Shaft	115	56	P. Steel	Ball	Ball	Ball	.....	34x3½	34x3½
M. Disc	Sel	3	Unit	Shaft	115	56	P. Steel	Ball	Ball	Ball	.....	34x4	34x4
M. Disc	Sel	3	Unit	Shaft	115	56	P. Steel	Ball	Ball	Ball	.....	34x4	34x4
Cone	Sel	3	Unit	Shaft	120	56	P. Steel	Plain	Ball	Roller	.....	36x4	36x4
Cone	Sel	3	Unit	Shaft	120	56	P. Steel	Plain	Ball	Roller	.....	36x4	36x4
Cone	Sel	3	Unit	Shaft	120	56	P. Steel	Plain	Ball	Roller	.....	36x4	36x4
Disc	Sel	3	Motor	Shaft	114	48	P. Steel	Plain	Ball	Roller	2400	34x3½	34x3½
Disc	Sel	3	Motor	Shaft	114	48	P. Steel	Plain	Ball	Roller	2350	34x3½	34x3½
Disc	Sel	3	Motor	Shaft	114	48	P. Steel	Plain	Ball	Roller	2400	34x3½	34x3½
Cone	Sel	3	Motor	Shaft	100	48	P. Steel	Plain	Plain	Roller	1700	32x3½	32x3½
Cone	Sel	4	Unit	Shaft	120	54	P. Steel	Plain	Ball	Ball	.....	34x4½	34x4½
Cone	Sel	4	Unit	Shaft	120	54	P. Steel	Plain	Ball	Ball	.....	34x4½	34x4½
Cone	Sel	4	Unit	Shaft	120	54	P. Steel	Plain	Ball	Ball	.....	34x4	34x4
M. Disc	Sel	4	Unit	Shaft	135	54	P. Steel	Plain	Ball	Ball	.....	36x4	37x5
M. Disc	Sel	4	Unit	Shaft	135	54	P. Steel	Plain	Ball	Ball	.....	36x4	37x5
M. Disc	Prog	3	Motor	Shaft	110	56	P. Steel	Plain	Plain	Roller	.....	34x4	34x4
M. Disc	Prog	3	Motor	Shaft	110	56	P. Steel	Plain	Plain	Roller	.....	34x4	34x4
M. Disc	Prog	3	Motor	Shaft	104	56	P. Steel	Plain	Plain	B. & R.	.....	32x3½	32x3½
M. Disc	Prog	3	Motor	Shaft	93	56	P. Steel	Plain	Plain	Ball	.....	30x3½	30x3½
M. Disc	Plane	2	Motor	Shaft	86	56	P. Steel	Plain	Plain	Ball	.....	28x3	28x3
M. Disc	Sel	3	Unit	Shaft	115	56	P. Steel	Plain	Ball	Ball	2850	34x4	34x4
M. Disc	Sel	3	Unit	Shaft	115	56	P. Steel	Plain	Ball	Ball	2850	34x4	34x4
M. Disc	Sel	3	Unit	Shaft	115	56	P. Steel	Plain	Ball	Ball	2850	34x4	34x4
M. Disc	Sel	3	Unit	Shaft	115	56	P. Steel	Plain	Ball	Ball	2850	34x4	34x4
Cone	Sel	3	Axle	Shaft	100	56	P. Steel	Plain	Roller	Roller	.....	32x3	32x3
Cone	Sel	3	Axle	Shaft	110	56	P. Steel	Plain	Roller	Roller	.....	33x4	33x4
Cone	Sel	3	Axle	Shaft	123	56	P. Steel	Plain	Roller	Roller	.....	34x4	34x4
Cone	Sel	3	Unit	Shaft	120	56	P. Steel	3pl.-2B.	Ball	Ball	2700	34x4	34x4
Cone	Sel	3	Unit	Shaft	120	56	P. Steel	3pl.-2B.	Ball	Ball	2700	34x4	34x4
Cone	Sel	3	Unit	Shaft	115	56	P. Steel	3pl.-2B.	Ball	Ball	2300	34x4	34x4
Cone	Sel	3	Unit	Shaft	115	56	P. Steel	3pl.-2B.	Ball	Ball	2300	34x4	34x4
Cone	Sel	3	Unit	Shaft	120	56	P. Steel	3 Plain	Ball	Ball	3000	36x4	36x4
Cone	Sel	3	Unit	Shaft	120	56	P. Steel	3 Plain	Ball	Ball	3000	36x4	36x4
Cone	Sel	3	Unit	Shaft	120	56	P. Steel	3 Plain	Ball	Ball	3000	36x4	36x4
Cone	Sel	3	Axle	Shaft	110	[1]56	P. Steel	Plain	Plain	Roller	2200	34x3½	34x3½
Cone	Sel	3	Axle	Shaft	110	[1]56	P. Steel	Plain	Plain	Roller	2200	34x3½	34x3½
Cone	Sel	3	Axle	Shaft	110	[1]56	P. Steel	Plain	Plain	Roller	2200	34x3½	34x3½
Cone	Sel	3	Axle	Shaft	110	[1]56	P. Steel	Plain	Plain	Roller	2200	34x3½	34x3½

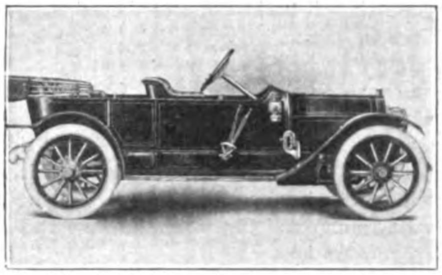
[1] Also 60 inches.

Ohio—Ohio Motor Car Company, Cincinnati, O.
Regal—Regal Motor Car Company, Detroit, Mich.
Corbin—Corbin Motor Vehicle Company, New Britain, Conn.
Everitt—Metzger Motor Car Company, Detroit, Mich.

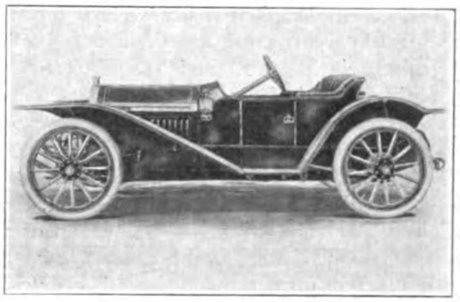
Note:—In addition to the information given in the table it will be found that the illustrations have been selected for the purpose of bringing out the characteristics of the various makes rather than to show each car complete in all its details.. Experience has shown that purchasers express a preference for just enough information to whet the interest.



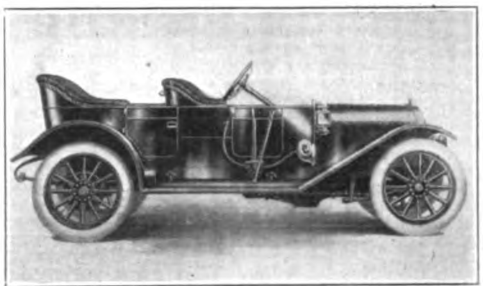
Maxwell Model G touring car



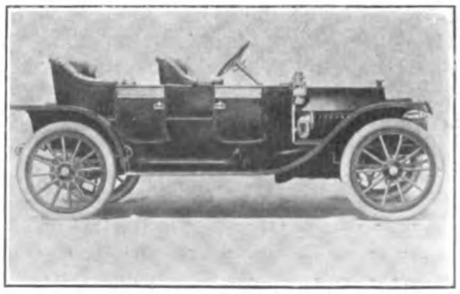
Ohio "40" touring car with smooth exterior torpedo body



Side view of the Regal "20" roadster



Model "30" Corbin touring car of the fore-door type



Everitt "30" fore-door close-coupled touring car pair. The block casting is fastened to the crankcase by means of six holding bolts B3. The clutch is of the multiple disc type nested in the flywheel. It is actuated by the pedal P1, the latter having a rocking pad P2; it rotates on the pin P3 and by means of an adjustable link L1 motion is communicated to the lever L2, thence to the shaft S1, from whence to the yoke in conjunction with the clutch shell, ultimately putting pressure upon the discs by means of a clutch spring or relieving the same by pressure applied by the operator with his foot, pressing on the pad P2. The extension of the pedal P1 in the shape of an arm A1 communicates to the linkage L3, which actuates the service brake bands of the constricting type. This motor has a ball bearing crankshaft utilizing two annular type ball bearings at the extremities.

Referring to Fig. 11 of the right side of the Model "40" motor, the carbureter C1 is attached to a symmetrical two-branch manifold, and flanges to the cylinders below the exhaust manifold. A further examination of this side of the motor will disclose the oil basin O1, and the scheme of oil pump and connections by means of which lubrication is rendered profuse, taking care of each bearing throughout on a basis of certainty. Fig. 12 shows the left-hand side of the same motor with the magneto M1 setting on a ledge L1, and the water pump W1 bolted to a machine face F1. A common shaft drives the water pump and magneto, taking power by a pinion from the halftime system within the housing H1, with an Oldham joint J1 between the water pump and the magneto, thus rendering the latter immune from vibrations.

New Ideas Prominent in the Hudson Output

The product of the Hudson plant will be appreciated by examining the tabulation accompanying this article, and mechanically the scheme of the designer is reflected in the motor as depicted in Figs. 13 and 14. Referring to Fig. 13, the block casting C1 of the 4-cylinder water-cooled motor is flanged to the crankcase C2, and inspection covers C3 and C4 are fitted to openings of a rectangular shape above the line of the crankcase, which is rather a new idea. The covers are held against finished flanged faces by studs S1 and S2 fitted with wing nuts. The water connection M1 on the top of the block casting flares from the vanishing point at the rear end of the motor to a circular conformation at the other extremity for the attaching of the flexible hose connection leading to the radiator in front. The water pump W1 is of the centrifugal type, occupying a position over the halftime gear housing H1 in front, and is driven by a laterally disposed shaft, which also serves to actuate the magneto M2. Water returning from the radiator enters the pump W1 through the central fitting F1, and is forced through the outlet fitting F2 into the block casting of the cylinders through the flanged orifice O1. The exhaust manifold M3 is flanged to finished faces of the block casting C1. The motor is mounted on the chassis frame by arms A1, of which there are two at the front, and offset arms A2 which connect to the chassis frame through a ledge and a face F3 in the plane of the flywheel F4. This construction includes an advance in engineering work, resisting the gyrations of the flywheel in the most direct way, thereby limiting the torquing moment of the chassis frame by the difference between this direct application of the stress and that which would transpire with an intervening lever arm. Fig. 14 is a front end view of the motor showing the lateral shaft S1 actuating the magneto M1 through an Oldham joint J1, taking power by means of a helical set in the housing H1, and the shaft protrudes through the opposite wall, the stub end of which enters the water pump W1 for purposes of driving. The halftime gears are get-at-able through the plate P1, which is screwed to a finished face, and the starting crank is guided by the bushing B1, entering the journal thereby formed until the dogs which are cut on the extremity of the starting crankshaft enter into engagement with the pin P2. The carbureter is back of the magneto M1, but its manifold M2 shows.

It will be necessary to examine Fig. 15, which is a section of the flywheel F1, with veins V1 serving as a fan, connecting the rim with the clutch housing H1. The clutch discs D1 are enclosed in the oil-tight chamber formed out of the clutch housing H1 and the cover C1 for the same. This construction is novel and as simple as it is substantial. Power comes from the crankshaft C2 through the flange F1 to the housing H1 to the driving discs communicating to the driven discs of the set D1, thence to the spider S1, from whence to the key K1, delivering the torque to the square end E1 of the tumble shaft, with a thrust ball bearing B1, resisting the clutch spring S2, and a radial ball bearing B2 at the universal joint J2, with a second radial type ball bearing B3 which takes the pedal pressure and communicates it to the clutch spring in the process of opening the clutch.

How the Locomobile Will Look to a Mechanical Eye

Among the particularly interesting features of the Locomobile exhibition will be the type M 6-cylinder water-cooled motor rated at 48 3-5 horsepower, the right side of which is shown in Fig. 16, presenting a certain symmetry of design, with three pairs of cylinders, C1, C2 and C3, of the T-type, flanged to a manganese bronze upper half H1. This crankcase is flanged on the center line, and the aluminum lower half H2 slopes back toward the flywheel, bringing the lowest point of the oil well under the last main bearing, and a plug P1 is fitted in a flaring enlargement so that upon removal of the plug the contents of the oil chamber will run out. The manganese bronze upper half has arms A1 and A2 which are provided with ledges and finished faces where they engage with pads, the latter being fitted into the channel section side bars, thus securing the motor to the chassis and sustaining the same laterally. The carbureter C4, of the Locomobile make, flanges to the manifold M1, and three legs L1, L2 and L3 radiate off to the respective pairs of cylinders. The magneto M2 of the high tension type (which, by the way, is a 1911 Locomobile feature, it having been the previous practice to employ low tension wipe-spark magnetos) sets on a ledge L4, with a quick release fastening strap to hold it down, and it takes its drive from a pinion in the halftime gearset in the housing H3. The wiring from the magneto reaches up to a box B1, through which the high tension wires are distributed to the respective spark plugs.

Referring to Fig, 17 of the left-hand side of the type M motor, the enlargement E1 over the exhaust manifold M1 is the jacket of the heater of all the air which passes through the auxiliary valve to the carbureter. Water circulation for the cooling system is maintained by the pump P1, which is driven by the shaft S1 from a gear which meshes in the halftime train within the oil-tight housing H1. Lubricating oil is circulated by the pump P2 through the piping P3 to the standpipe P4 and leads off therefrom to the respective bearings through branches B1, B2, B3, B4, B5, B6 and B7. The oil leads into the pump from the lowest point in the oil well through the flanged fitting F1. In addition to the connections as above noted, there are other oil connections besides, and lubrication, taking it as a whole, is adequately cared for. Pressure in the crankcase is equalized through breathers T1 and T2, with long connections leading up to the top of the motor and means for preventing lubricating oil from being cast out.

Characteristic Features of the Maxwell Cars

The Maxwell idea is shown in Fig. 20 of a 4-cylinder water-cooled motor, with the cylinders C1 and C2 cast in pairs, and the carbureter C11 leading up through a narrow-necked manifold to flanged faces between the intake valves of the respective pairs of cylinders. The magneto M1 sets on a ledge L1 near the front end of the motor and is fastened down by a quick detachable strap with a wing nut N1 for take-up purposes. The flywheel F1 is at the front end of the motor; the crankcase C3 is provided with large openings and covers C4 and C5, which may be taken off if it is desired to examine the mechanisms within. The crankcase is not split in the horizontal plane, but it extends back, maintaining a substantially circular shape, taking in the space for the clutch S1, terminating in the part which holds the transmission gear S2, bringing the power shaft out through the rear, ending in a universal joint U1.

As a modification of the Maxwell scheme, which holds closely to the general plan, reference may be had to Fig. 21 of the 4-cylinder water-cooled, 22-horsepower motor, as used in the Model G car. In this case the carbureter C1 is located in substantially the same position as shown in Fig. 20, but the magneto M1 is situated back of the last cylinder over the position occupied by the clutch, thus bringing this magneto just under the footboards when the body is in place, and by a trapdoor, which is provided in the body design, it is possible to get at the magneto without getting out of the car. Fig. 22 is a cross-section through the cylinders of the motor showing the location of the camshafts C1 and C2, also the relations of the valves to the cylinder, and a certain symmetry of design which is in conformity with the Maxwell plan of lightness with strength.

Ohio Includes a Self-Contained Power Plant

The cars of this make comprise four models with self-contained power plant in common for all, and referring to Fig. 23, which is the left-hand side of the 4-cylinder water-cooled motor, with cylinders C1 and C2 cast in pairs, the magneto M1 rests on a ledge L1, and is driven by a shaft S1 from a gear in the housing H1. Lubrication is regulated with the oil in a well W1 and a telltale T1 affords a means for noting the quantity of lubricating oil available at any given time. The breather B1 is trumpet-like with a screen at the top and so shaped as to prevent oil from shooting out. Water circulation is maintained by a centrifugal pump forcing the water through the piping P1 into the water jackets, and thence through the water manifold M1 back to the radiator. The flywheel is enclosed in the housing H11, and the transmission gearcase G1 is enlarged at C11, finally flanging to a face of the flywheel housing H11.

Looking at the other side of the motor, as shown in Fig. 24, the carbureter C1 of the Schebler type is connected by a manifold M1 to the respective pairs of cylinders. The pedals P2 and P3 turn on a shaft P1, they being the means for actuating the clutch and service brakes respectively. The motor is suspended on three points, two of which by arms A1 in the plane of the flywheel at opposite sides, the remaining support coming in front in the plane of the halftime gear housing H1.

The general scheme of the Ohio chassis is shown in Fig. 25, which is turned upside down for convenience, presenting the under side of the crankcase with a plate P1, which may be removed, thus affording accessibility to the space within for the purpose of adjustment. The live rear axle has a spherical enlargement E1, a screwplate S1 at the back, and a tapered torsion tube T1 enclosing the propeller shaft, terminating in a universal joint U1 back of the transmisison gear G1. The muffler M1 is located in the fore and aft plane, fastened to a chassis side bar in juxtaposition to the running board. The front axle is an I-section forging, and the various levers and links in the control system are of straight line design with an orderly arrangement of the components.

Regal Will Come to the Show with Expanded Line

The Regal "30" will be well known to the patrons of the company excepting that it has undergone the refinements a year's service has dictated. The magneto M1 (Fig. 26) is located on ledge L1 driven by a shaft from a gear in the housing H1 and a universal joint U1 establishes a condition of flexibility. The wiring from the magneto leads up to the spark plugs through a yoked tube T1 with fastenings F1 and F2, making a substantial and neat arrangement. The carbureter C1 has an offset manifold M2, with branches Y1 and Y2 leading to the twin cylinders C2 and C3 at a point under the exhaust manifold M3 and the two sets of manifolds are held in place by bridges B1. Lubrication is by means of a circulating pump P1 driven by a shaft in the vertical plane from a gear in the housing H2, and a telltale T2 shows the oil level.

Fig. 27 presents the left-hand side of the "20" motor showing the carbureter C1 in the mid position, and the magneto M1 at the back on a shelf S1. The lower half of the crankcase C2 carries the oil pump P1 and the excess of oil. The magneto is driven by the shaft S2 with a coupling C3 near the magneto so that the long end of the shaft comes out of the housing H1, taking power from a gear which meshes in the halftime train.

Mechanical Refinements of the Corbin Car

An excellent idea of Corbin engineering is shown in Fig. 28 of the right-hand side of the Model 40 motor with a Stromberg carbureter C1 a little to the back of the mid position with an offset manifold M1 connecting to the pairs of cylinders C2 and C3 through branches Y1 and Y2. The magneto M1 sets on a shelf S1 and is driven by a short shaft with a coupling U1 taking power from the halftime train through a gear in the housing H1. The motor is suspended to the chassis frame by arms A1 at the rear and similar arms A2 at the front. The flywheel F1 is flanged to the crankshaft C4. The lower half of the crankcase C5 has an oil well W1, and a drain D1 is placed to let the stale oil run out.

The opposite side of the Model "40" motor is shown in Fig. 29. The water pump W1 is driven by the shaft S1, taking power through a gear in the housing H1, and a wide flat belt B1 runs over a shrouded pulley on the water pump shaft to a reduced diameter shrouded pulley on the fan shaft. The oil pump P1 is driven by a vertical shaft S2, taking power from the camshaft, and a telltale T1 comes out of a well W2, indicating the amount of the lubricating oil present at any given time.

Reference will be had to Fig. 30 of the live rear axle disassembled in the further process of showing the care with which the Corbin car is wrought to a state of 1911 completion. In this unit the differential gears of the bevel type are in the housing H1, and the bevel gear G1 is flanged thereto. This unit rolls on annular type ball bearings B1 and B2, nesting in the journals J1 and J2, which are fastened to the shell S1, which in turn is flanged to the axle member M1, and a cover C1 protects the other end. The axle tubes T1 and T2 terminate at the dog plates D1 and D2 through which power is flexibly transmitted to the road wheels. The spring perches P1 and P2 are free on the tubes T1 and T2 so that the bounce of the body as it is taken by the springs is not permitted to transmit torsion to the axle tubes. This type of axle is a good one to manufacture, and it affords the requisite strength for serious service.

Refinements of the Everitt "Thirty" Plant

In the Everitt scheme of design, as shown in Fig. 31, the block casting C1 of the motor is integral with the upper half of the crankcase C2, and the exhaust fitting E1 connects with a common transfer port reaching all of the cylinders without the use of a separate manifold. The magneto M1 sets on a shelf S1 and is driven by a shaft with an Oldham joint J1 which passes through the water pump W1 to a gear in the housing H1. The motor is suspended on the chassis frame by means of I-section forgings F1 and F2, the latter just coming in front of the flywheel F3. The motor is water-cooled, worked 4-cycle, and represents a scheme of design of which there is no other example just like it.

Referring to Fig. 32 of the live rear axle A1, the housing is integral with the gear housing H1, and a cover C1 permits of access to the gears. The torsion tube T1 reaches up to a yoke Y1 and a universal joint U1 is the terminal of the propeller shaft. The torsion tube is braced by diagonals D1 and D2. The rear wheels are fetched up on tapers T2 and T3 on the extremities of the jackshafts, and in addition to keys with keyways K1, castellated nuts are screwed up on the ends of the jackshafts for the further purpose of securing the wheels thereto. The chassis frame F1 has a kickup at the rear, and the three-quarter elliptic scroll type springs are secured thereto on brackets B1. The brakes are internal expanding and external contracting on the rear road wheels.

Operation and Care

LIKELY CLUTCH TROUBLES; OUR WOMEN DRIVERS; CARE AND REPAIR OF TIRES; QUESTIONS; LETTERS; DON'TS; CANTOR LECTURES; PRACTICAL REPAIRING, ETC.

DIFFICULTIES overtake the automobilist who just graduates from the realm of the horse, with the same impartiality that they cling to the man who is contemplating the purchase of his fourth automobile. The time was when the internal combustion motor was regarded by inventors and engineers alike as one of the seven wonders of the world of impossibles. It will be understood that it is not natural to an internal combustion motor to work at widely varying speeds nor to go in the reverse direction at the will of the operator. Couple this constant speed type of power plant to a vehicle which must go at all degrees of speed, and in both directions, and the missing link at once renders its absence manifest; in other words, there must be a clutch as a prime requisite, and a speed-changing mechanism to work in conjunction therewith.

The clutch problem is a serious one, and it has a marked influence upon the life of the automobile, with particular reference to the wear and tear upon tires. When a clutch grips, it is said to be "fierce," and when this disorder takes up its abode in the mechanism the automobile is subjected to the character of rack which spells ruin. The suddenness with which the power of the motor is applied to the car under conditions of a gripping clutch is sufficient to wither the inherent strength of the parts and destroy the harmony of inter-relations, and, unfortunately, every bolt and stay throughout the car is strained and distorted in the process, until the torquing moment finally arrives at the point of contact of the tires with the road, putting it up to them to accelerate the weight, but they slip betimes, and the epidermis of the tire is chafed.

Likely Clutch Troubles

A TO Z SUGGESTIONS OF THE MOST LIKELY FORMS OF CLUTCH TROUBLE AND A DEADLY PARALLEL OF HOW TO FIX THEM

UNTIL ingenuity contrives a type of internal combustion motor which will be capable of running at all speeds, furnishing power in proportion to the requirement under the several road conditions, the clutch and the transmission gear will remain as component parts of the power units. If it will be remembered that the clutch is the most used, and probably the most abused mechanism in the train of units, it will remain to suggest that certain forms of trouble are expectant heirs, and the problem of the automobilist on the road remains within the realm of speculation until difficulty, if it arises, is accurately classified and a precise remedy is applied. Unfortunately, a "fierce" clutch has a most exasperating influence upon the life of a car. A clutch that has this disorder grabs when it is thrown in, and the terrific rate of acceleration thereby induced racks the mechanism of the car from the tip of the toe in front to the end iron at the back—nothing escapes. A slipping clutch is a monument to refined stupidity; the motor becomes absolutely valueless, and the automobile ranks as an economic waste. A clutch that will not release quickly is a silver-tongued advocate before the bar of Paradise—the occupants of the automobile are breathing an atmosphere of imminent danger.

Clutch does not grip	How to cure it
(a) Leather face oily.	Wash with kerosene or gasoline and sprinkle fuller's earth when dry.
(b) Leather face charred.	Fit new leather caused by overheating or slipping.
(c) Leather face hard and does not press uniformly.	Take out clutch, turn level in lathe and apply castor oil.
(d) Clutch spring weak.	If tightening is no good, fit new spring.
(e) Clutch out of alignment.	Realign till shaft runs true.
(f) Sliding bearings are dry.	Wash with kerosene and apply oil.
(g) Leather worn and will not advance to a bearing.	Fit new leather.
(h) Clutch band broken.	If possible, re-rivet; if not, fit new band.
(i) Clutch lever bent.	Straighten same.
(j) Dog bent or worn.	Straighten, true-up or re-bush.
(k) Toggle with excessive lost motion.	Re-bush.
(l) Foot lever strikes deck.	Cut part of deck away.
(m) Take-up all in.	Take out and cut more thread on rod.
(n) Disc facings worn out.	Fit new discs.
(o) Discs adrift from keys.	Take clutch apart; refit discs; if keys worn fit new ones.
(p) Cork inserts worn below surfaces.	Fit new cork inserts.
(q) Clutch cone worn.	Take out and true up in lathe.
(r) Wedge cut away.	Fit new wedge.
(s) Screw worn.	If adjustment all in, fit new screw.
(t) Excessive oil.	Leather, wash with kerosene; metal, drain some oil or add kerosene.
(u) Dirt impediment.	Wash out with kerosene.
(v) Take-up backs off.	Improvise locking device.
(w) Engine or transmission out of alignment.	Re-align till shaft runs true.
(x) Spiral band too long.	Shorten and re-rivet holder.
(y) Affected by centrifugal force.	Mechanical fault; angle of cone insufficient or weak spring.
(z) Brakes either on or too tightly adjusted.	Loosen brakes.

Clutch sticks	How to cure it
(a) "Frozen" shaft.	Keep running and apply castor oil or graphite.
(b) Lack of lubrication.	If scored, take out and clean up.
(c) Congealed oil (cold weather).	Apply hot rags, run engine and let clutch slip.
(d) Sag in chassis frame.	Have it straightened and fit strengthening plate.
(e) Shaft twisted.	Straighten, if possible, or fit new one.
(f) Spring broken.	Requires new and stronger one.
(g) Disc deformed.	Straighten steel discs, but renew bronze.
(h) Broken motor or gearcase arm.	Have it welded, if possible.
(i) Deformed driving arm.	Straighten.
(j) Thickened leather or other facings of disc clutches.	Turn down leather face; true-up metal faces.
(k) Damage due to thrust.	Fit new thrust races; if possible, larger.
(l) Bent crankshaft.	Straighten shaft.
(m) Bent planetary shaft.	If caused by weakness, fit shaft of stronger metal.
(n) Deformed linkages.	If weak, fit stronger ones.
(o) Stuck dogs.	Soak in kerosene, dismantle and readjust; fit oiler.
(p) Worn screw.	Fit new one.
(q) Tight spiral band.	Slack off slightly.
(r) Dent in housing.	Hammer out carefully.
(s) Shifted motor.	Tighten up bolts and fit lock nuts or washers.
(t) Shifted transmission.	Tighten up bolts and fit lock nuts or washers.
(u) Dirt (foreign substances).	Wash out with kerosene.
(v) Bent pedal.	Straighten, and if weak, reinforce.
(w) Insecure locking devices.	Fit one of better design that does lock.
(x) Centrifugal force trouble.	Faulty design up to makers under guarantee.
(y) Torn leather facings of leather clutch.	Fit new leather.
(z) Worn facings, changing the distance of travel.	Fit new facings.

Washing the Car

Pure Water and a Little Judgment Superior to Any Other Combination

THERE is nothing better with which to wash a car than pure water—and the more the merrier. A coach builder who has completed a fine piece of varnishing work, after allowing it to dry, takes a turkey sponge and several pails of water undiluted and pours it over without rubbing, drying it with a chamois leather. His chamois leather, however, is absolutely clean. He washes the car to harden the varnish and keep it bright. Scratches on varnish are caused exactly in the same way as a diamond cuts glass—by rubbing a sharp instrument over the surface. The instrument in this case is fine particles of sand and dirt that attach themselves to the varnish. The only way to get them off is to apply plenty of water to soften them. This can be done either with a hose or with a soft sponge. If force is used with the hose the particles will be driven into the varnish instead of washing them off, so the conclusion is obvious that the stream of water must be gentle and the volume of water from the nozzle large. Inch piping requires no nozzle, the fingers will form what is wanted in this respect, and if a sponge is used it must be soft and frequently cleaned. The bucket should contain absolutely clean water and the only way to keep it clean is to put the hose in it and allow the water to run slowly all the time. Another disadvantage of using water with force behind it is that when the front of the car is washed quite a lot of water finds its way (especially through hoods that have slits in them) into the motor parts such as the magneto, carbureter and distributor. Occasionally a small quantity of good soft soap, well lathered, helps to remove grease stains, but the practice of using gasoline or a dry rag for this cannot too strongly be condemned. Parts of the car that collect grease and oil can be washed with water to which a small quantity of kerosene has been added, but there is no necessity of using this mixture on the body parts. The upholstery should be wiped over with a damp chamois leather, taking care to get under the tucks and go over with the chamois nearly dry. Always hang a chamois leather up to dry. Each wheel requires to be jacked up in turn and the dirt removed.

About Non-Freezing Solutions—There are three bases of chemical change that must be watched in the use of non-freezing solutions in order to be sure of the aborting of freezing. They complicate the problem. True, if water freezes it will disrupt some part of the system on account of the larger bulk that ice, over water, assumes. But if an acid solution is used it will corrode the parts of the radiator and tend to destroy it. If alkaline solutions are used, hydrates of the metal parts may be produced, but no matter which reaction takes place, electrolytic decomposition of the metal is to be looked out for in any event.

Our Women Drivers

ADELEINE VOUGHT SETS FORTH THE MODUS OPERANDI OF COMFORT AND ENJOYMENT OF WINTER DRIVING, ADVOCATING THIS FORM OF RECREATION FOR WOMEN AUTOMOBILISTS

WITH the advent of Winter our women motorists are very apt to look pensive, shudder and then order their cars put up for the season. Such, however, need not be the case. Motoring in Winter is really delightful, especially to lovers of outdoor life, and oftentimes the automobile is an absolute necessity. A good motor car will ask no favors of the weather. Owners who pack their cars away with the first descent of Jack Frost are indeed fewer than ever. They have realized that a car is an all-year necessity, and as pleasurable in one season as another. Who is afraid of the bracing cold days or the stinging Winter air? To drive in such weather adds new charm to life. The bracing cold and snow stimulate an unconscious superiority which makes light of the heaviest burdens. The allurements of Winter motoring should appeal to any whole-souled woman. She —and her friends—will enjoy the car more completely than ever before, and all will agree that the good times far surpass those afforded by the motor car even during the superb days of Spring and Fall, with their kindred attractions.

To thoroughly enjoy Winter automobiling one must be amply fortified against the onslaught of the biting cold and wind. It is proposed to offer here some suggestions toward making Winter driving the more pleasant and comfortable, and, perhaps, enable those who are undecided to join the multitude and add to their own pleasure and vigor—for Winter motoring is undoubtedly the greatest of health-giving sports.

One need not have a limousine to venture forth—just the same old touring standby, which served so comfortably on long trips during enchanting Autumn days. Any changes or alterations? No; a few additions, possibly. Leather protectors extending from the dash to the seats are necessary to keep out the cold draughts, unless the car is equipped with a fore-door body. Any one of a number of good wind shields can be attached, but the ideal arrangement is that shield which acts as a wind

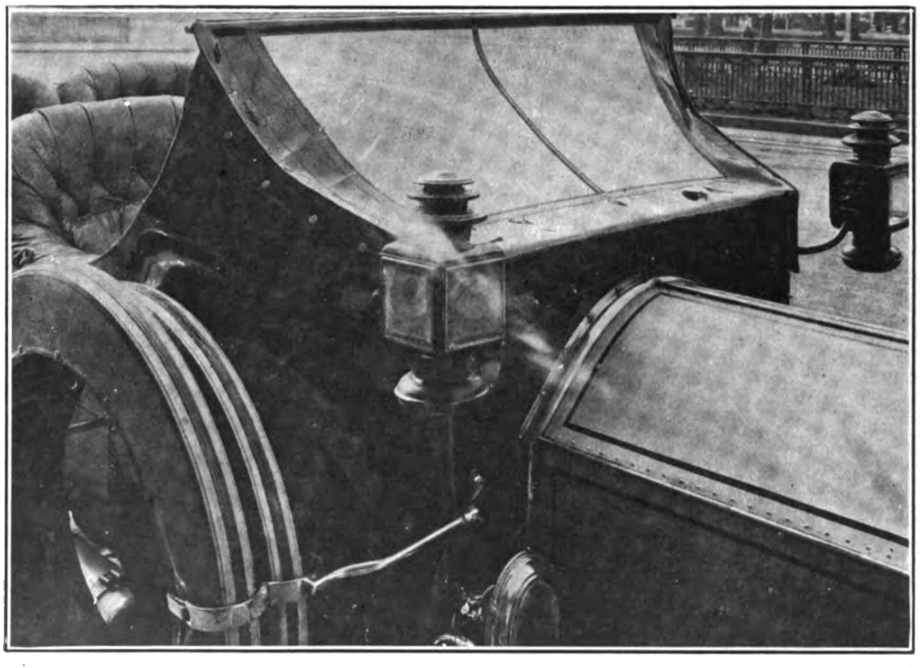


Fig. 1—Presenting a condition of comfort through the employment of an ideal windshield, lamps that are in good order, the spare tires incased and ready for instant application, also a suitable horn, and robes for the fair driver and her guests

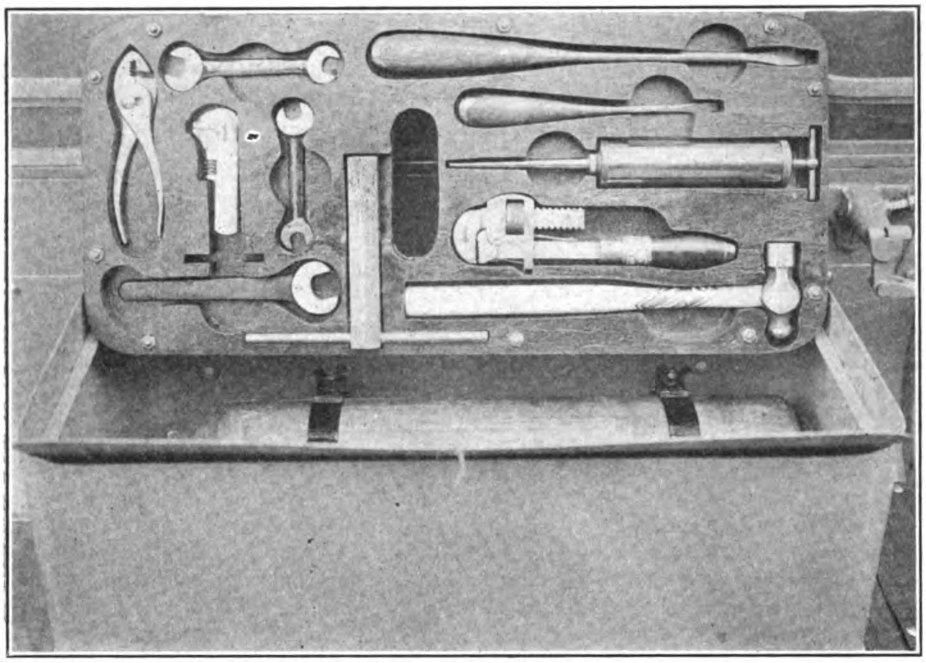


Fig. 2—Showing how the Franklin tool-box is arranged, with a place for everything and everything in its place; this is important in Winter driving; when the weather is inclement it is no time to hunt around for necessary tools

deflector, sending the currents of air above the driver. Such an equipment will render the front seat occupants immune from drafts and virtually protected from the cold. The top need be used only during a snow or rain fall.

Arrange to have a priming rod—should the car not already possess this detail—extend through the radiator, so that the same is handy when about to crank the car. Priming is, as a rule, very necessary in cold weather to enable easy starting, and a more convenient method is thus available than that of raising the hood. And in this connection, have the exposed surface of the radiator reduced in area, so as to lessen radiation and conserve the heat in the cooling system. The average touring car radiator will function properly in the Winter with its effective area reduced by one-fourth or one-fifth. This can be done accurately and cheaply by your garage-man, and should present a respectable appearance.

No adjustments are recommended, and, in fact, are seldom needed, save to the carbureter to enable regular running until the motor warms up. Experience recommends a change to a lighter grade of oil for the motor—for the viscosity of the oil varies with the temperature. Oil, like molasses, becomes thick or thin, depending as the weather is cold or warm. When the weather becomes cold, the oil, like the molasses, flows sluggishly, and some provision must be made to enable a sufficient quantity to reach the working parts of the motor. The remedy is a lighter oil. Likewise the semi-solid lubricants in the transmission and bevel-gear housing. Thin them to fair consistency by the addition of some oil.

So much for the car itself. As additional equipment always carry chains or other anti-skidding devices. The cost is slight, and the benefits great. Safety is actually increased and greater speed can be made. Or have studded shoes fitted—one to a front wheel and one to a rear, on opposite sides. This combination will successfully render the control of the car easy and safe at all times, and prove economical, as there will be no need to remove the shoes in the Spring unless retreading or replacement is absolutely necessary.

The value of an anti-freezing solution in the circulating system of a car which is kept in continuous service is not questioned. Its advantages to the woman driver are many, but whether her car is used often enough to require such a solution is, of course, indeterminate. For those who might desire to use one, the following will be of some help. Do not use any poorly prepared mixtures. They are expensive when poorly made and often injurious. A good solution can be made for less than half the cost, and in the making the driver acquaints herself with the composition and peculiarities of the different mixtures, and this close association tends toward a certain interest and observation on her part which are necessary to the accomplished chaffeuse. Alcohol solutions are recommended. A 20 per cent. solution of denatured alcohol (procurable at any drug store) will withstand a temperature of 5 deg. Fahrenheit. A solution of three parts water and one part alcohol (a 25 per cent. solution) will require a temperature of more than 2 deg. below zero before it is susceptible to freezing. To make this solution in quantity sufficient for the average car a total of about 75 cents only need be expended, and but several minutes are required to mix the solution. This is cheap insurance, but the solution must be watched and occasionally more added to replace the loss due to evaporation. Those who have good facilities for keeping their cars, including heat, need not use this solution, but it is best, when not using any anti-freezing mixture, to keep the motor slowly running when leaving the car at the curb. Of course, a car can be drained when brought in if water alone is used to keep the motor at the proper temperature, but this is a disagreeable little task and good for soiling one's hands and garments.

Having prepared the car, let us look to the outfitting of its occupants. It is very important that the hands be warmly and comfortably gloved, as the accurate guidance and control of the car depend largely upon these members. One-fingered mittens of leather, lined with lamb-skin or fur, are always roomy and warm, and are really not clumsy at all. Wear heavy shoes and the feet will have little opportunity to complain. For the rest, a greatcoat of heavy material, over a heavy woolen sweater or V-neck, or perhaps the use of a fur coat, which will more than suffice for protection and warmth. Thus equipped, Winter motoring becomes, instead of a hardship, a delight.

Efficacy of Glycerine and Water.—Using pure water in the cooling system of a motor presents two classes of trouble, the first being due to the water boiling at 212 degrees Fahrenheit. This low boiling point is responsible for the loss of cooling water and the growth of a crust formation in practice. Water is added from time to time to re-establish the proper level, making up for the loss and adding the material incrustration; foreign matter is in the water and it goes into the radiator with it. Then, the thermal efficiency of a motor is maximum at a temperature higher than 212 degrees Fahrenheit in most motors, but on account of the low boiling point of the water it is not expedient to run the motor at a high enough heat to realize the highest thermal efficiency.

To add to the troubles due to the use of water, there is the high temperature at which it freezes. In winter time the temperature is frequently considerably lower than 32 degrees Fahrenheit. This leads to complication and requires that some means be utilized for preventing the cooling solution from freezing.

It has been suggested that hydrocarbon oil grades so as to be (a) thin when the temperature is low, (b) with a high boiling temperature, (c) with a low congealing point, (d) with a high specific heat, and (e) not likely to deteriorate in cooling service. Experiments have not as yet resulted in a suitable mixture of the hydro-carbons.

As a General Rule—

If you take your best young lady out for a ride and you want to show off, just drive at a safe speed.

If you are driving a peppery automobile and some "junker" offers an opportunity to place you in a winning race, pass it up.

If your automobile suddenly stalls, keep cool; perhaps the gasoline has all been drunk up by the motor.

If your last shoe comes to a blowout, never mind; wrap a clothes line around it; patch the inner tube; inflate; run 100 miles on the fixing if you so desire.

If there is lost motion in the steering equipment, have it removed.

If the road ahead is obscured by trees, have them cut down, or cut down the speed of the automobile.

If a cross-road is being approached, look out for your brother in his wagon; you might bump into him.

If a railroad crossing is to be negotiated, let the locomotive go by first; you might damage it.

If a mud-hole appears in the offing and you are speeding along, pocket your curiosity; the hole might be a foot deep.

Care and Repair of Tires

AMATEUR VULCANIZING ON THE ROAD AND IN THE GARAGE WITH AN ALCOHOL VULCANIZER, SHOWING THAT THE WORK CAN BE DONE BY A NOVICE

WHILE taking a run it may happen that a tire receives some damage that renders it inadvisable to run on the tire for fear of increasing the size of the cut and letting in moisture and dirt. Such an occurrence may happen to any one when out of reach of help and a spare tire cannot be obtained. A vulcanizing outfit is an accessory that can easily be stored in the tool box. It takes no longer to vulcanize an inner tube than it does to stick a patch properly. The outfit consists of the parts shown in Fig 1. V1 is the vulcanizer proper, and the heater H1 is attached to this by the small arm A1. The bracket B2 is screwed to the table or to the step of the car, if the repair is to be carried out on the road, to hold the vulcanizer V1 while it is heating and while the repair is being prepared. C1 is a container for alcohol for the heater H1. The heat of the vulcanizer is ascertained by inserting the thermometer T1, registering from 250 to 300 Fahrenheit, which is carried in a small wooden box. The cardboard box S1 contains wax paper W1, rubber compound R1, and the vulcanizing cement S2. The plate P1 is inserted in the bracket B3, which is screwed in a similar manner to B2. In the plate P1 is fixed a bolt, and together with the bolt B1 the vulcanizer is clamped to the plate after the tube has been inserted. The vulcanizer V1 has two sides—the concave side shown for outer casings, and the other, which is flat, for inner tube repairs. The six books of instructions I1 are comprehensive and should be carefully read and followed. To carry out a repair to a casing it must be first examined to ascertain if the canvas has been damaged. The damage in Fig. 2 was not so deep as to require taking the casing off, although it is on the side of the tire, and the following different processes, which can be effected while the vulcanizer is heating, must be faithfully carried out in order named to ensure the vulcanization having the desired effect. Fig. 2 shows the method of cleaning a cut C1 with a stick or penknife, as was used in this case, I1, the tire T1 having previously been cleaned off with gasoline around the part C1. With the aid of an oil gun G1 and a piece of rag R1 and some gasoline the cut can be cleaned in a short space of time, and half the battle rests right here, for cleanliness in this operation is essential, and unless rubber is clean it will not vulcanize, or if it looks apparently good it will not last. The next thing to do is to cover well every part with the compound S1. This should be stirred before using and applied with some instrument T1 in the manner indicated in Fig. 3, so that the inside of the cut C1 is entirely covered. Allow the first coat to dry, which takes about two or three minutes, and apply another coat lightly over the first. Fig. 5 shows how the Para rubber P1 is cut in strips and forced into the cut C1 with the instrument I1; the cut should be well filled but not quite to the level of the tire, and as the rubber is soft and gives to the instrument it can be pushed right home into the cut.

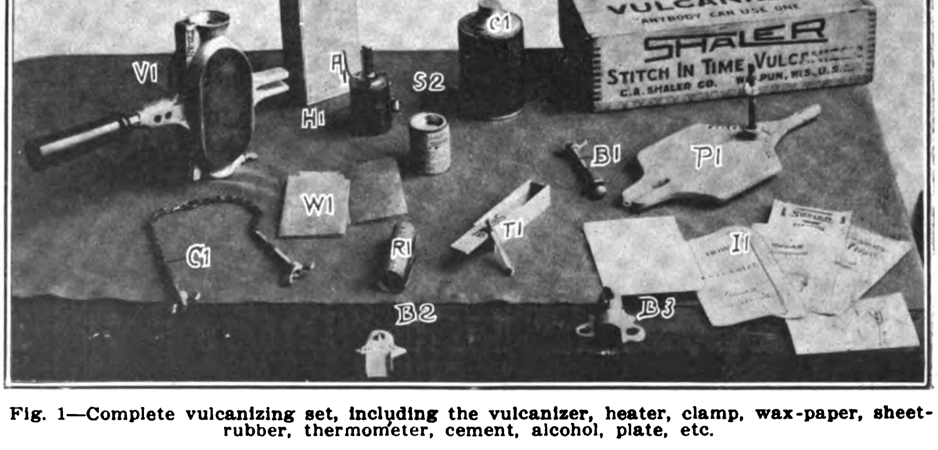
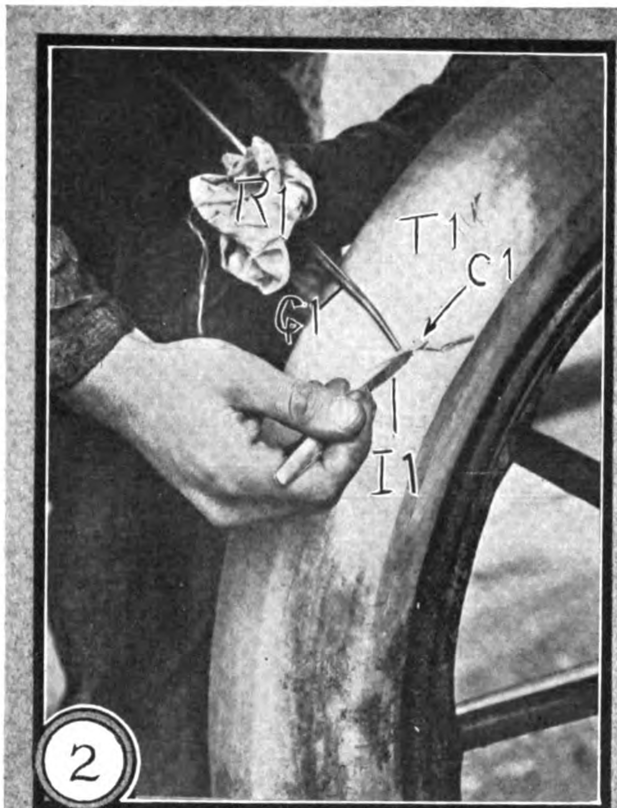
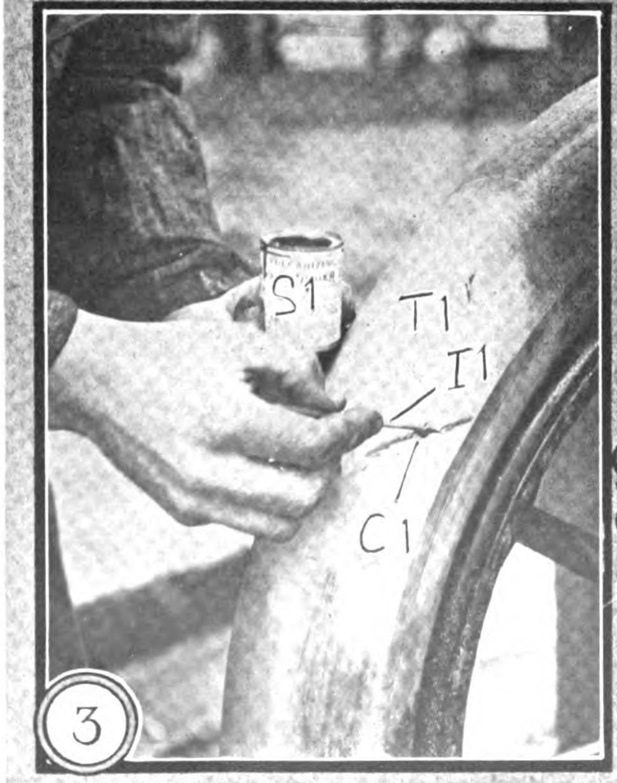


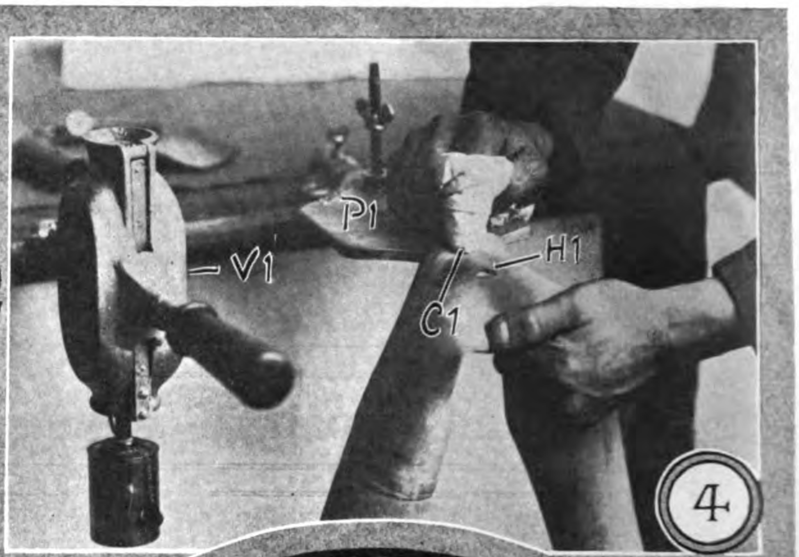
Fig. 1—Complete vulcanizing set, including the vulcanizer, heater, clamp, wax-paper, sheet-rubber, thermometer, cement, alcohol, plate, etc.

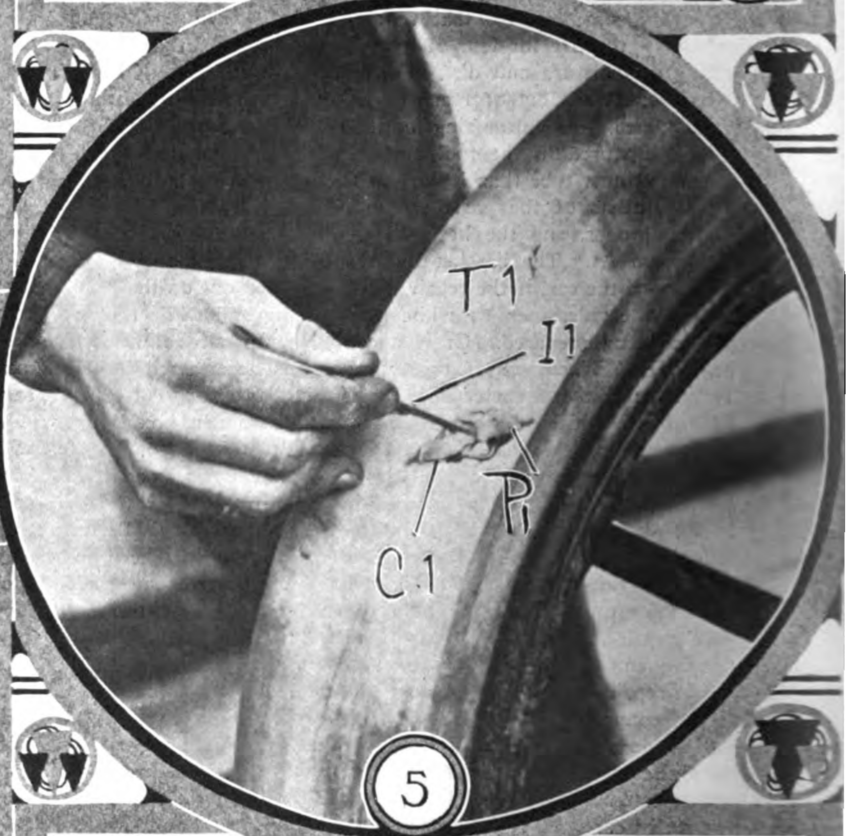
During these operations the vulcanizer will have had time to heat, and should register on the thermometer T2 265 degrees. To set the vulcanizer V1 for heating attach the burner H1 by the set-screw H2, shown in Fig. 11, with the wick protruding about one-quarter of an inch, and it will give a flame 3 inches high; see the damper works freely before lighting lamp. The temperature is controlled by a thermostat that opens and closes the damper, more or less, as may be required, automatically. In case adjustment of the thermostat seems necessary the method of altering same will be shown later.

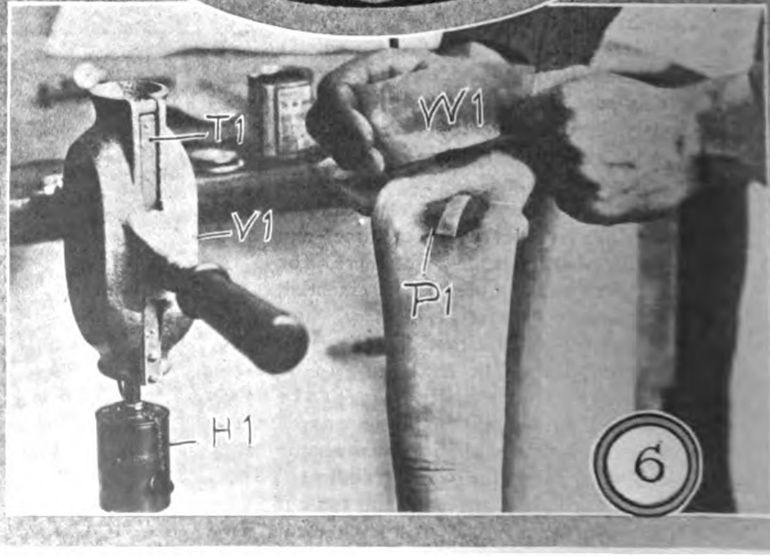
With the vulcanizer at the proper temperature, a small piece of wax paper W1, commonly known as grease paper, is inserted between the vulcanizer V1 and the part to be repaired, and snugly clamped on by the chain and bolts B1 and B2, Fig. 11. Should the section of the tire be smaller than the concave shape of the vulcanizer, let out sufficient air for the two surfaces to properly touch. There is no fear of burning oneself if the handle H1 alone is touched, and the length of time required to effect the repair depends upon the depth of the cut; this varies from 20 to 40 minutes. If the finger nail pressed on the vulcanized part leaves an indentation the work is not completed, but if no mark is left then the work is finished and the rubber cured. When the vulcanizer has been removed and the part allowed to cool off some sandpaper might with advantage be used to clean around and level off the repair to the same thickness as the casing.



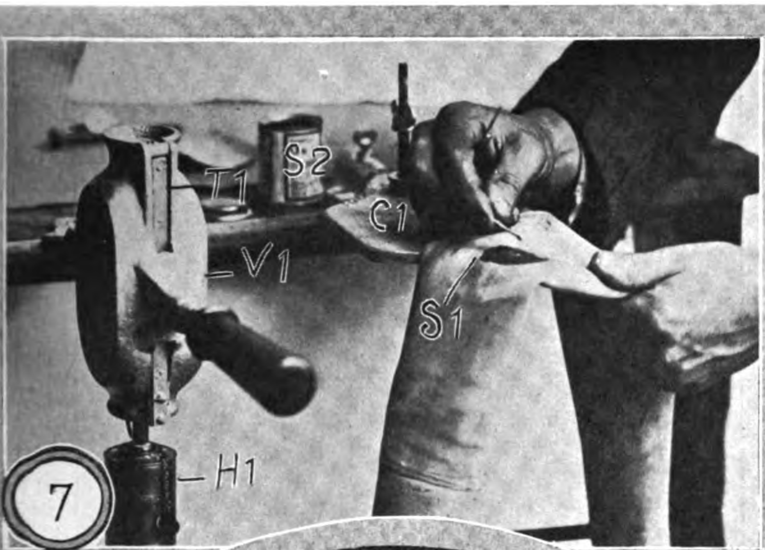








STEP BY STEP IN THE PROCESS OF REPAIRING TIRES AND CASES, BEGINNING WITH THE EXAMINATION AND CLEANING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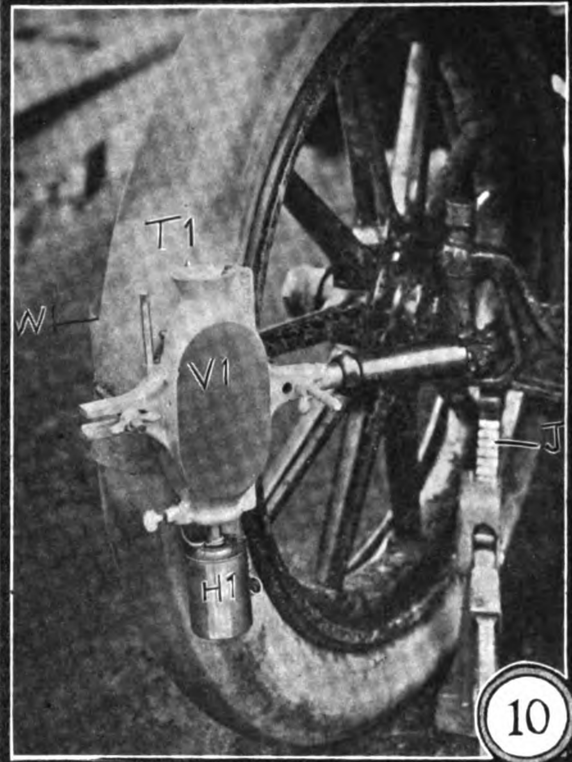
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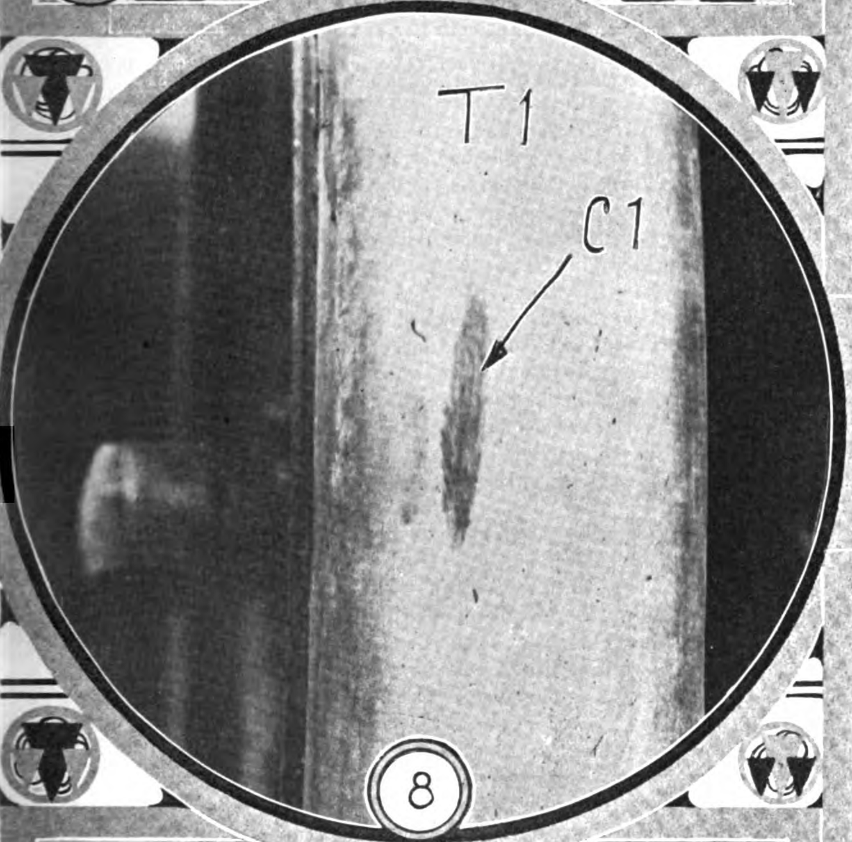
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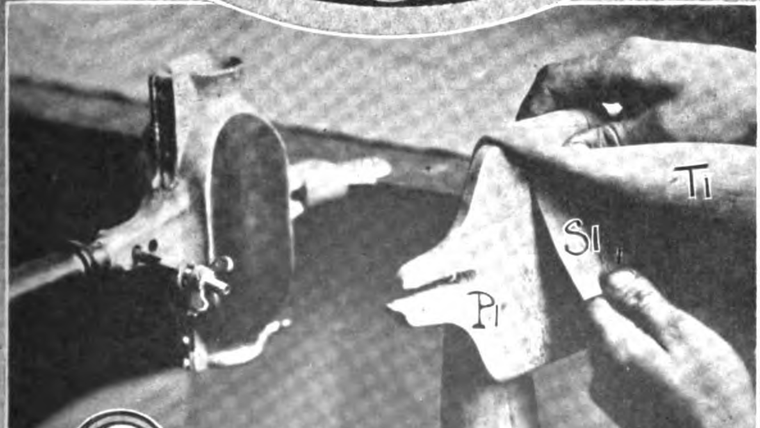
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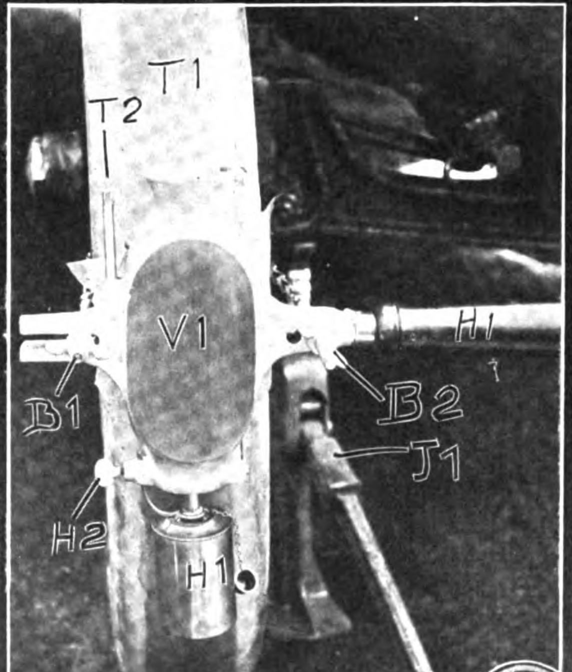
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OF THE WOUND, LEADING THROUGH THE OPERATIONS, AND ENDING WITH THE REPAIR AS DESCRIBED IN THE STORY

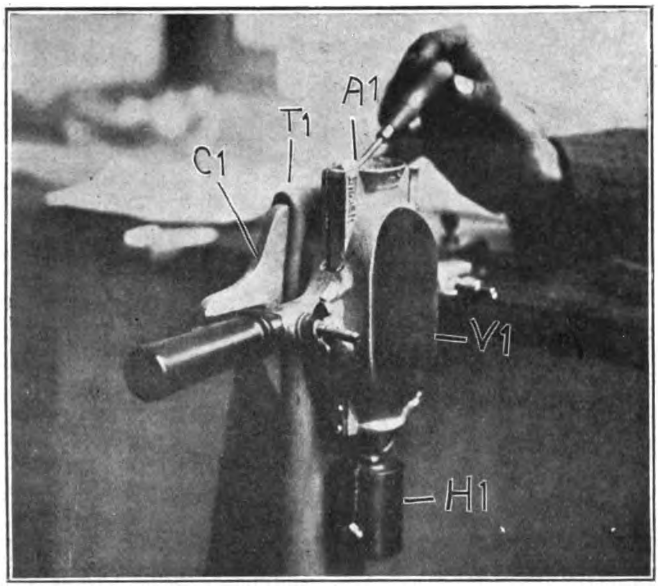


Fig. 12—Vulcanizer clamped into place; adjusting the thermostat for the proper control of the heat

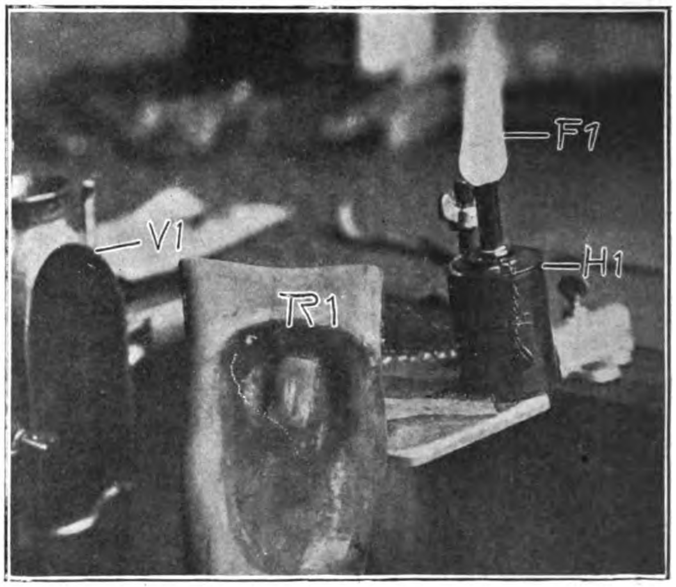


Fig. 13—Showing the inner tube after the repair is completed; the heater is shown also with a 3-inch flame, which is correct

Cleanliness in connection with tube repairs plays an equal part if the work is to be crowned with success, as with the outer casings the rubber must be cleaned with gasoline as shown in Fig. 4, holding the cut open in order to better get at the job. The part must be roughed up, and the best way to do this is to use sandpaper. The cloth C1 is moistened with gasoline and rubbed over the hole and about an inch around, the plate P1 being used as a rest, while the vulcanizer V1 rests on the bracket alongside. Apply, as in Fig. 7, thin coating of cement solution S1 over the hole and on the lips of the same and allow to dry; this takes about four minutes, and then apply another coat of solution and let dry as before. If a simple puncture, take a small piece of Para rubber and work it into the hole with a match. If a small hole, fill to surface with layers of Para rubber cut to size of hole, making sure the Para sticks to the tube around the edge. Then cut a piece of rubber one-eighth of an inch larger than the puncture or cut and apply over same. Then cut another patch P1 one-half inch larger than the hole and apply over all (Fig. 6). The tube is now ready for vulcanizing. By this time the temperature should have reached 265 degrees if the thermostat T1 is correctly adjusted. The method of adjusting this, as shown in Fig. 12, should it require same, is to loosen the locking screw and turn the adjusting screw A1 in to raise and out to lower the temperature. Do not make more than one-fourth turn at one time, and do not expect temperature to change immediately when you make the adjustment. Apply a piece of paraffin paper W1 (Fig. 6) over the patch to prevent it sticking to the vulcanizer, and underneath, next the plate P1, which has been turned in a vertical position, insert a strip of pasteboard or rubber (a piece of an old tube will do) several times larger than the patch, but narrower than the flattened tube, so as to bring the pressure on the patch and relieve the edges of the tube from pressure (Fig. 9).

Clamp the vulcanizer V1 (Fig. 12) to the plate C1 with the tube T1 inserted, leaving the heater H1 alight. When the repair is effected, which takes from 15 to 20 minutes, the patch should have a gray color and should not retain an impression from a finger nail. If it looks brown and stays dented put it back in the vulcanizer and leave for a longer time. Remove the paper by rubbing with a wet cloth.

Fig. 13 shows the repair complete, which took twenty minutes from the time the tube was taken out of the tire, and no amount of pulling would dislodge it after cooling, and examination showed that the patch had virtually become part of the tube.

Questions That Arise

SOME OF THOSE THAT COME UP IN EVERY-DAY AUTOMOBILING ARE ANSWERED BY THE MATTER WHICH IS BEING PREPARED BY FOREST R. JONES IN THE NEW EDITION OF THE "AUTOMOBILE CATECHISM" THAT WILL SOON GO TO PRESS

[291]—How is the necessity of removing a tire-shoe from its rim obviated on the road?

A.—By the use of a detachable rim, a spare wheel, etc.

[292]—How can a tire be inflated on the road without the labor of pumping air into it by hand?

A.—By carrying a tube of compressed air. They can be obtained in various sizes, ranging from that which will inflate a large tire once to that which will give several inflations.

Air pumps that can be driven by the motor are also obtainable.

[293]—How can a liquid (gasoline, oil, etc.) be best poured from a can without a spout?

A.—Tip the can quickly so that the top passes beyond a vertical position with the opening at the highest part. The liquid will then flow clear of the can without dribbling. This method also gives the most free access of air and the smoothest flow with absence of surging.

[294]—What precaution should be taken when pouring gasoline into the automobile tank?

A.—Stop the engine and extinguish all lights that burn with a flame. This should be especially observed in a closed room.

[295]—Where should the gasoline tank pipes and carbureters be placed in an automobile?

A.—In positions such that it is not possible for gasoline to drop on the exhaust pipe or muffler in case of leakage. The tank should not be close to the exhaust outlet or any part that will warm it much.

[296]—How can water be separated from gasoline when filling the tank of the automobile?

By straining it through a closely woven cloth, felt or chamois skin, taking care that the strainer is wet with gasoline before the water touches it. The gasoline will then pass through freely while the water will be retained. Cloth which will give much lint should not be used.

Water in gasoline always settles to the bottom, so that by pouring the gasoline out carefully, no water will be carried with it, except the minute quantity which is held in suspension.

[297]—If gasoline vaporizes in a closed room, where does the vapor gather?

At the floor. Gasoline vapor is heavier than air.

[298]—Where should openings be made in a room to allow gasoline vapor to escape?

In or near the floor.

[299]—Will ventilator shafts leading upward from openings at the floor of the room remove gasoline vapor in all kinds of weather?

No. In clear weather, the circulation of air will ordinarily be enough to carry the gasoline vapor with it, but in very damp, foggy weather, there will generally be no circulation in the ventilators and the vapor of gasoline will remain at the floor.

[300]—What is the only sure method of preventing the collection of gasoline vapor in a garage?

To ventilate it thoroughly with a forced draft, drawn out through openings in or near the floor. The ventilation may be forced either by a fan or steam coil.

[301]—When gasoline vapor is present in a closed room in moderate quantities where is the greatest danger of fire?

At or near the floor.

[302]—What are some of the possible sources of ignition of gasoline vapor in a garage?

The spark at the trembler of an induction coil; a "flash" at the timer; a flash at the brushes of a magneto or electric generator on the automobile; the exhaust when there are any cracks or openings in the pipe connections near the engine; sparks blown from the exhaust openings; the exhaust when muffler explosions occur; skidding of iron-shod wheels on a cement floor, or even on a wooden floor with nails in the boards or with sand covering them; the spark from a nail in the heel of a shoe striking a cement floor, or from a metal tool dropped on the floor.

[303]—From what source is gasoline vapor apt to come in a garage?

From a leaky carbureter, gasoline tank or a pipe connection. The carbureter frequently starts flooding when the car is standing in the garage, and corrosion of the tank, eating away of the solder, etc., sometimes open the tank, so as to allow considerable of the contents to run out.

[304]—What are some of the precautions that should be taken to prevent fire in a garage?

Above all it should be well ventilated. Gasoline should be turned off at the automobile tank valve; only incandescent lights with keyless sockets should be used for examining the car; all electric switches, key sockets, etc., placed high in the room. Never strike a match or use a candle or lamp to examine an automobile containing gasoline in a garage.

[305]—When a small fire is burning over liquid gasoline on the floor, how can it possibly be extinguished?

By putting sand or earth on it with a side throw across the floor. By smothering it with a wet blanket thrown over it.

[306]—What danger to life may arise from running an internal combustion engine in a closed room?

Asphyxiation by the exhaust gases, especially in heavy, damp weather. Much care should be taken to avoid this, since there is no warning odor, and fainting may occur before one realizes the danger.

Letters from Subscribers

THIS DEPARTMENT IS DEVOTED TO THE ANSWERING OF LETTERS FROM SUBSCRIBERS ON ANY SUBJECT RELATED TO THE RUNNING OF AUTOMOBILES

Remedy for Carbureter Jet Trouble

Editor The Automobile:

[2,439]—Could you help me to solve a difficulty I have with my carbureter and give me some advice as to the best method of overcoming it? The carbureter fitted to my car is of the single-jet type, and the air is admitted through a sleeve which opens with the opening of the throttle. The consumption being excessive, I closed the jet slightly; but then I got blowing back, and with the outrushing air there came a quantity of gasoline, which seems to me to show that it was not vaporizing properly. I opened the jet as it was before, and now there is always a lot of black smoke exuding from the exhaust pipe.

Newark, N. J. Subscriber.

Your trouble seems to be caused, as you say, by the gasoline not vaporizing, as is the case where there is no air valve to work in accordance with the suction and speed of the motor. In order to deliver sufficient gasoline with one jet the size of the hole has to be from one to two millimeters—that is, about 1-25th to 1-16th inch in diameter. At slow speeds the suction is insufficient to cause the stream from the jet to break up in small particles, as it does at high velocities, and you are taking almost crude gasoline into the cylinders, with just sufficient air to form a combustible mixture. Have a jet made similar to A or C in Fig. 2. A will do for a motor up to 5-inch bore, but for a larger motor the mushroom-top type will be better. B in Fig. 2 shows your jet as it is at present, and comparison with the other shows how the holes should be drilled.

Curious About the Properties of Gasoline

Editor The Automobile:

[2,440]—I would like to ask through your columns "Letters Answered and Discussed" if naphtha is suitable for use in automobiles. I have heard of some people using it in stationary gas engines with apparent good results, and it is about two cents cheaper here. If it will operate fairly well in automobiles, what are the disadvantages, or advantages, if any? As a subscriber to your valuable journal I would be glad to have you give a small treatise on distillation or production of gasoline and similar products, the advantages and disadvantages of their use.

Booneville, Miss. L. D. Rinehart.

The hydrocarbons of which automobile gasoline is made belong in the range including butane, pentane, hexane, heptane, octane, nonane and decane. Hexane is apparently the most desirable, the formula for which is C_6H_{14}. The molecular weight of hexane is 86. In actual practice automobile gasoline is made up of varying proportions of pentane, hexane, heptane and octane. The three naphthas are represented in this mixture to some extent, and it is believed that the proportions are varied from time to time over a considerable range. In addition to all the variables as above indicated there is the further fact that hydrocarbon fuels have different characteristics, depending upon the geological source of supply. Under such conditions it is difficult to see how any information can be given you such as will be of any great value, unless you go into the detailed study of the fuel problem and at great length.

Relief for Cold Feet Sufferers

Editor The Automobile:

[2,441]—While driving in the cold weather I suffer very much with the cold. I have fitted my car with side-doors and a curved shield and notice a considerable improvement, but after an hour or so my feet become numbed and I can hardly feel the pedals. I manage to keep my hands warm with a good pair of gloves lined with wool, and would be all right if I could keep my feet warm. As I do most of my own driving this is very annoying. I would be very grateful if you can give me any suggestion by which I may overcome it.

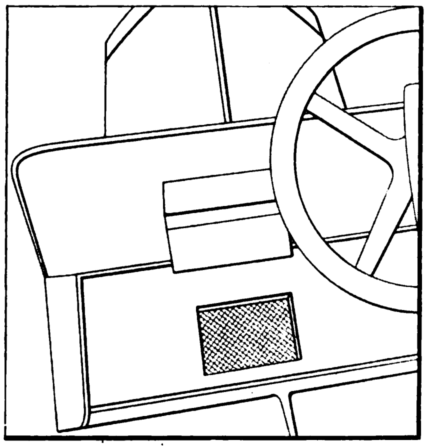


Fig. 1—Showing trap door open to allow hot air to pass

E. A. T.

Montreal.

We should suggest your fitting a trap-door in the floor boards of your car as shown in Fig. 1, with a hinged lid that can be opened at will. The hot air that in the ordinary way passes out from the pan can be directed through this opening and will be found very beneficial in cold weather. When the motor is turning fast, however, the draft may be too strong and the baffle plate shown in Fig. 6 can be fitted. The hot air will rise and warm the feet and legs of the occupants of the front seats. To prevent any oil finding its way through, a fine wire gauze screen should be fitted. It is an inexpensive matter to fit, and if it becomes too warm the trapdoor may be closed.

A Very Troublesome Repair Undertaking

Editor The Automobile:

[2,442]—The spring clips on my rear axle work loose. They have been repaired once by the maker by reaming the holes and riveting with large rivets. Kindly suggest a way of repairing that will prevent their working loose. Sketch shows the clip with spring hung below axle. There are no radius rods or torque rod on the car. To remove clips from axle would necessitate the removal of brake drums, which are in perfect condition. Clarence A. Davis.

Quechee, Vt.

Referring to the illustration Fig. 5 it is there suggested that a set-screw be used if the thickness of the wall W1 will permit, and it is also pointed out that a pad of oak tanned leather (sole leather) be placed under the bracket so that when the U-bolts U1 and U2 are clamped up the leather will be compressed, to prevent further creeping. It is just possible that the U-bolts are made of soft iron and too small of section to withstand the strain. If so, put in a heavier set.

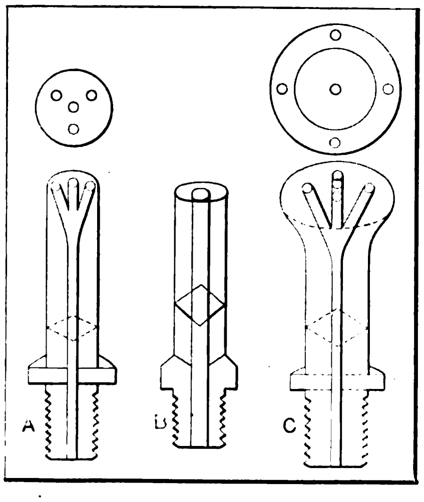


Fig. 2—Different methods of drilling jet to increase evaporation

Easy Method of Increasing Clearance

Editor The Automobile:

[2,443]—I wish to raise the clearance of my car, as at the present moment there is a space of but 6 inches between the ground and the pan, and I fear that some day I shall strike something in the road, such as a stone, and damage the flywheel and crankshaft. I have thought of fitting larger wheels, but the makers do not recommend this, as they say the car is geared high enough already and it will mean altering the two bevel wheels. Is there any other means of overcoming the difficulty?

Frankfort, Ky. L. James.

The method we should suggest fitting wooden or fiber blocks under the springs, between them and the axles, in the method shown in Figs. 3 and 4. The thickness of these blocks depends upon the clearance required, and for ordinary purposes eight inches would suffice, although for some parts where the roads are bad and the wheels sink into ruts 10 inches is not too much. The grain of the wood should run lengthwise with the springs. Oak should not be used owing to the tannic acid it contains. Red fiber has been used recently with success, and this material would be preferable if it can be obtained in the required thickness.

Desires the Addresses of Makers of Coil Springs

Editor The Automobile:

[2,444]—I am a reader of your weekly devoted to automobiles, and would like to learn what companies make coil springs. As I am getting out a new shock absorber, I would be very thankful for the information.

Could you tell me the tensile strength a spring 1 inch (spiral) would have to be to support a weight of 800 pounds?

Would it be possible to get a spring that size strong enough?

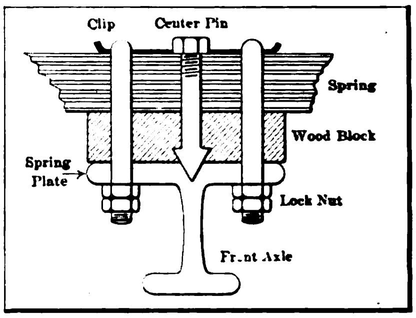


Fig. 3—Showing method of fixing block between springs and front axle to increase clearance under pan

Walter H. Church.

Lee, Mass.

A spring capable of supporting a weight of 800 pounds should be made of 3-8-in. diameter round steel wire, wound in a coil 1 1-2 inches in diameter, counting 10 complete turns. A 1-inch diameter spring with 10 complete turns would only carry 392 pounds were it made of 1-4-inch diameter round wire.

Steel wire used for this purpose must have a modulus of elasticity for shearing of 10,660,000. This quality of steel wire for use in making springs is readily obtainable on the open market, and the dimensions of springs as above will support the weights given, but any increase in weight beyond the amount stated for each spring will overload it. For exact information in further relation to this matter consult The Automobile of August 12, 1909, opening on page 269.

Tires Are Whitened to Give a Smart Appearance

Editor The Automobile:

[2,445]—will you kindly tell me why pipe-claying of tires is done and if it has any injurious effect on the tires?

Keswick, Va. L. Pugh.

As to "claying" tires after they are washed, using tepid water and castile soap, there is just as much sense and utility in making the tires look smart as there is in blacking one's boots for the same purpose. There is no possible danger attached to this process, unless the pipe-clay is so profusely applied as to conceal the surface wounds in the treads of the tires, whereas they should be repaired before the pipe-clay is applied.

A Fierce Struggle with the Lubricating Problem

Editor The Automobile:

[2,446]—You may have had articles in your magazine which would answer the question that has occurred to us, but, if so, we have not seen a direct answer and would therefore be greatly indebted to you for same.

What is it in lubricating oil that makes the carbon in the cylinders? Is there any laboratory or other practical method of making a test other than by using it in one's car to find the per cent. of what makes carbon in any given oil?

A salesman offers oil which he guarantees practically free from carbon. Is there any way to prove this other than by trying it, and if gasoline produces more or less carbon would it not be a better test to try the oil in some other way so that one could tell whether it was the oil or the gasoline which was producing the carbon, and how much of each? We are referring wholly to cylinder oil, of course.

Detroit, Mich. A Subscriber.

It is highly improbable that the proper amount of good lubricating oil used in the cylinders of a motor will produce carbon trouble. In every case that we have examined with sufficient minuteness to know what we are talking about, the carbon formations were quite clearly traced to poor mixture, due in some cases to inferior carbureters, but in nearly every instance to bad adjustments.

Trouble with Inner Tubes

Editor The Automobile:

[2,447]—I have had a great deal of trouble with my inner tubes. They break on the side next to the rim, making a slit from two to eight inches long in a straight line. Do you know of anything that will prevent it? It is not done by blowouts of the casings or anything cutting through the casing from the outside.

Wm. Jenson.

Brigham City, Utah.

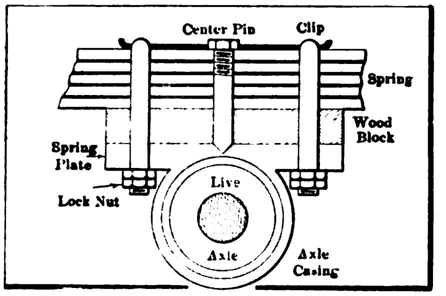


Fig. 4—Method of fixing block under rear axle springs

As a doctor cannot diagnose the patient's complaint without knowing all the symptoms and the age of the individual, and whether male or female, so with anyone trying to give another advice the giver should be in possession of all the facts. First, you do not say whether you have quick detachable or clincher rims fitted to your car, or even the size of tire. The first thing that suggests itself to us is that the sizes of the outer casings and the tubes are not the same, which in itself will cause trouble. Again, we have heard of indifferent tires going this way owing to the poor quality of the rubber and the softness of the bead. The principal cause, however, is rot, caused by water finding its way between the cover and the case at the bead, which will produce the trouble you complain of. A strip of fine canvas vulcanized on the tube on the part affected might cure it, or a piece of canvas solutioned on the edge of the bead will make it more water-tight, as when the bead is drawn together there will be less room for the water to penetrate. If security bolts are used, always see that these are kept tight and the tires pumped up to the proper pressure.

Wishes to Apply Principle of the Davy Lamp

Editor The Automobile:

[2,448]—So many automobiles get afire from back-firing through the carbureter that I would like to know whether or not a fine wire screen placed in the intake manifold between the carbureter and the motor will prevent this back-firing. It is my idea that a fine mesh copper screen so placed will work precisely as it does in a miner's safety lamp as invented by Sir Humphry Davy. What do you think? W. A. Bates.

Mansfield, Pa.

In the first place there will be no back-firing at all unless the manifold is too big for the motor. The reason why the mixture takes fire in the intake manifold is because the speed of flow of the mixture is lower than the rate of flame travel in the mixture. These undesirable relations will be at once upset if the manifold is reduced in area, thereby increasing the speed of flow of the mixture in the direction of the combustion chamber sufficiently to overcome the speed of flame travel in the molecular structure of the mixture. It is not believed that a fine wire screen, which is nothing but an obstruction, should be placed in the manifold. It is only a matter of a short time when an obstruction such as this will wax up, and then the mixture between this obstruction and the combustion chamber will surely take fire, and the screen will be blown from its anchorage down into the carbureter, where it is not welcome.

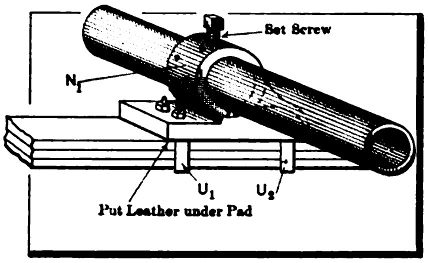


Fig. 5—Sketch of a spring perch which is giving trouble in practice

Automobiles in a Bad State of Repair

Editor The Automobile:

[2,449]—I have a 4-cylinder, air-cooled motor in my car, which is very serviceable, but lacks power and speed; that is, the motor will turn over 22 miles an hour whether going down a hill or on the level. It doesn't seem capable of turning over fast enough, and yet it has not the power to be geared higher, being geared 3 1-2 to 1. It is a 30-horsepower motor. I have ground the valves, tested them with gasoline to see that they do not leak and put in new valve gaskets. Could you please help me by answering in your columns, as I am a satisfied subscriber. Robert Kelly.

Hartford, Conn.

Time the motor. Substitute a magneto for the worn-out battery ignition system, or if a magneto is on the car, find out if it is any good—test it. Examine the carbureter; you are either not using enough fuel to obtain more power or the fuel is going to waste due to poor ignition, bad compression or lack of ability of the carbureter to produce a homogeneous mixture having the right proportion of air. Finally, go over all the bearings and find out which of them are serving as brakes rather than for their intended purposes.

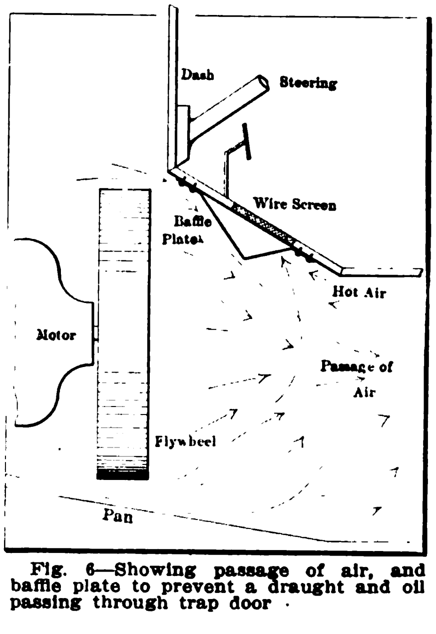


Fig. 6—Showing passage of air, and baffle plate to prevent a draught and oil passing through trap door

Don'ts for the Autoist

AN ASSORTMENT OF INJUNCTIONS COVERING A VARIETY OF SUBJECTS, SOME PERSONAL, MORE IMPERSONAL, BUT ALL PERTINENT

Don't let the wheels go to rack; if they are loose at the miter and cannot be tightened, remove the hub flanges and pack the space, then put back the flange and tighten up on the hub bolts.

Don't drive a hundred miles at the rate of 60 miles per hour to attend a convention of experts for the discussion of how to prevent dust.

Don't experiment with alcohol as a fuel, and finding that it is not efficacious in a low-compression motor, drink it in disgust.

Don't run away with the idea that gasoline is being used for fuel in automobile motors just because you order benzine by that name.

Don't forget that the way to make sales is to give a man just what he asks for; when you order (automobile) gasoline, you get it; you go away pleased, despite the fact that what you do get is benzine for the most part.

Don't stay up nights inventing a carbureter to burn kerosene oil; there are a large number of them in service to-day; automobile gasoline is a compound of a number of "fractions" including kerosene.

Don't put your feet up against the finished back of the front seat. Supposing you don't own the car?

Don't start out for a ride in a friend's automobile garbed in a peek-a-boo waist and a glad smile; if it starts to snow you will have to come home in his overcoat.

Don't accept an invitation to ride in a friend's automobile and stand upon the varnished tool box just because it occupies a place of convenience on the running-board; there remains enough room for good-sized feet on the same board.

Don't accept an invitation to ride and then volunteer to crank the motor; you might get your head kicked off.

Don't tinker with anything that you don't understand; think of tickling the fetlocks of an army mule.

Don't confess your sins to the chauffeur; he is not sworn to secrecy.

Don't parade the family skeleton anyway; let the wired bones disintegrate and mingle with the dust of ages.

Don't go around collecting family skeletons; the blame things store badly.

Don't be grieved if there are things that you do not understand; the longest list is in the keeping of the wisest man.

Don't destroy your standing among your friends by suspecting their motives; you may not be big enough to attract their notice.

Don't stop at a farmer's house and flash a dollar when you ask him to trot out a glass of milk; he might not have less than an "eagle" with which to make the change.

Don't be arrogant in any event; you are not so much just because you borrow an automobile to ride in.

Don't acquire the hallucination that you have the right to litter up the tonneau of your neighbor's automobile just because he is not the possessor of enough land to make you use a telescope.

Don't play poker with a mercerizer and then suddenly discover that the tires on your automobile are too costly.

Don't use kerosene oil as a cooling medium, although it has some virtue for that purpose.

Don't look at your troubles through a magnifying glass; just meet them face to face.

Don't forget that the child with a lost doll is in a hopeless state of dispair.

Don't see things with the eyes of the fellow who just lost the favor of a pink-cheeked maiden.

Don't be a "symptomite"; doctors feed on such vermin.

Don't forget that the pessimist looks through one end of the telescope and the optimist squints through the other and that both of them are in bad; use a cold, critical eye and a little refrigerated judgment and the end will be satisfactory.

Don't see your automobile as the fellow who just lost his job looks at the world.

Don't scan the horizon through the tear-dimmed eyes of the small boy whose mamma would not take him to the circus

Don't underestimate trouble; it is always real, but it is never so much in earnest that it can resist real earnest effort.

Don't trade the real for the imaginary—you might better have a horse dealer as an agent, and let him act for you.

Don't serve in the capacity of a lean-to; architecturally no great edifice is so incumbered.

Don't scatter the faculties; use a choke-bore mental gun; aim at the heart of the object.

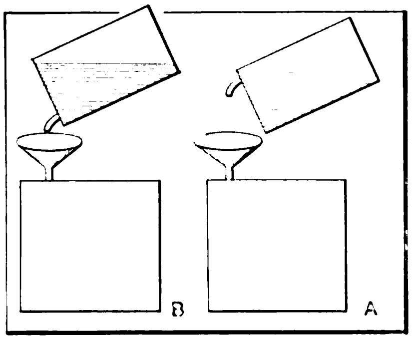
Don't overlook the fact that the lovely flower with its short life performs a great service; it becomes substance for the mighty oak.

Pouring Without Spilling

There Are Two Ways of Pouring Liquid From a Can with One Vent, the Right and the Wrong

ONE has to knock things into people's heads with a sledge hammer sometimes and after you have told them once the correct way to do a thing they will persist in reverting to the old way if they are not watched. A chauffeur was pouring some gasoline the other day in his tank through a small vent in the manner indicated in the illustration B with the result that the liquid spluttered and gurgled, part going in the tank and about the same amount going on the ground. Imagine the effect had some one come along just then and thrown a match down anywhere near, for by this time the gasoline had formed a small stream about twelve feet long in the gutter. If the can is held in the manner shown in A, the can will be emptied sooner and without the loss of a single drop, as by this means the air has a chance of entering the tank over the gasoline flow and taking the place of the vacuum formed by the exit of the liquid.

The chauffeur was shown how to pour the gasoline properly but his only reply was, "Oh, I know all about that stunt, if it does not all go in the tank this way, at any rate it goes in quicker. I don't pay for the gas." The consumption of the particular car will not be increased and a man who does things of this description will be equally careless about the rest of the car. If the car were to catch fire he would probably say, "Let it burn."



B—Wrong way to pour gasoline. A—The right way

It Stands to Reason

SHORT PARAGRAPHS DEALING WITH MATTERS WHICH SHOULD APPEAL TO THE REASON, TO SERVE AS REMINDERS OF DUTIES TO BE PERFORMED

That making a living is one of the main concerns; the new automobile becomes a nuisance if it interferes with the process.

That the man who thinks that he must hobnob with royalty in order to progress has another think coming to him.

That the man who purchases an automobile to help him climb to social eminence must have a poor opinion of society.

That the society which bars a man out until he invests in a car is not worth a hang.

That it is not expensive to own a modest automobile unless it rolls the owner up to a gambling hell.

That the tire bill is mere chicken feed in comparison with two hours of "observatory" practice before the bar of injustice of some remote roadhouse to which the automobile is too frequently rolled.

That many a man's happiness has been wrecked by the sweet-running qualities of a well-made automobile misdirected.

That the first thousand dollars should be invested in a bank for savings, the second thousand should be planted down on a home, and the third thousand may then well go to purchase an automobile.

That a man of brains and small means can easily extend his earning capacity if he purchases and uses an automobile, having a care to put it to good use.

That the world does not look down on the man who does not try to imitate. Moreover, a real ape is Nature's handiwork, but an imitation ape is the recipient of every man's most choice brand of contempt.

That it is no crime to generously disagree with the methods of those who use a 13-inch searchlight on the deck of a runabout; it puts them in the "glare" of sound public opinion.

That a "horn" on the automobile ceases to be of utility after the chauffeur spills a "horn" into his stomach.

That the chauffeur is not the only person who deals in horns somewhat too promiscuously.

That the word promiscuous relates to horns as well as kissing, with equal force.

That the very happiness which is sought after on a promiscuous basis is lost in the shuffle.

That warning signals are not musical manifestations.

That the warning may come too late, be a musical lull, or deceive the unlucky pedestrian into the belief that he is passing a boiler shop, which he will not think to get out of the way for.

That the man who matches a glaring red necktie with a cream-colored pair of trousers must be prevented from using a 50,000 candle-power headlight, a 45-caliber horn, and a speedometer that is blind below 55 miles per hour.

That smoke is a sign of waste, both of gasoline and of lubricating oil; it pays handsomely to comply with the smoke ordinances.

That the enforcement of the law in relation to smoke is desirable, because it compels respect for the rights of others from those who have no respect for economy.

That a man who cannot be reached through his pocketbook is beyond coaxing—give him the letter of the law.

That leniency is a term which can only be applied in regulating the affairs of the considerate and the intelligent.

That the police force should not accept Thanksgiving turkeys from unknown givers; perhaps some taxicab concerns are looking for special privileges; what the public demands is good service.

That the automobile industry should shake off the public crib bread line that is putrifying a fester in its fattest part.

That appropriateness should be studied, not only in the automobile, but in its equipment, use, and to the avoidance of its abuse..

That the Callan law, regulating automobiles in New York State, is the instrument of immature thought from the taxpayers point of view, and the device of deliberation from the standpoint of those who feed at the public crib.

That a public institution ceases to be one as soon as it is conducted for private gain.

That a private gain plant, if it puts on a public benefit front, is perpetrating a fraud.

That the automobilists of the Empire State will have to fight for emancipation in the long run.

That corrupt leaders will invariably deliver the goods to the wrong address.

That in union there is strength, but the grave danger lies in the advantage it affords to the corrupt leader.

That water in the gasoline is like a sore thumb; it hits against everything, and hurts.

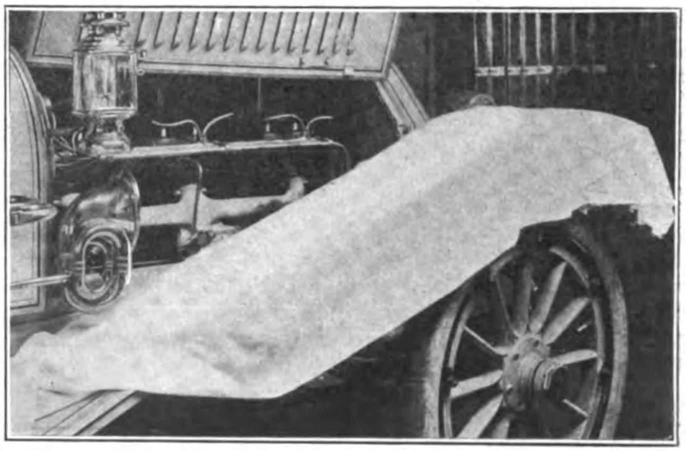
That the best way to get rid of water is to take it out of the gasoline before the same is dumped into the tank.

That spark plugs have to be taken out of the cylinders and cleaned at regular intervals if the ignition system is to be kept up to a fitting standard.

Preserving Paint

To Prevent Scratching, a Cloth Should Be Laid Over Parts Against Which Coat Buttons May Rub

PAINT is applied to the metal parts of the automobile in layers that are worked into one another, each coat being allowed to dry before the next is applied, the whole forming a homogeneous mass that is liable to damage, and should some sharp instrument strike it the paint will chip off, leaving the metal bare. Rust creeps in and rots a good deal of the paint around the original bruise. Whenever an adjustment or repair is to be made to the engine the mudguards can be protected by laying cloth over them, as shown in the illustration. If a blow has to be struck on bolts that have been painted, some soft material, such as leather or a rag, should be interposed to protect the paint. The paintwork on the car is subjected to sufficient bad treatment in washing, and in order to retain a good appearance it is necessary to resort to these little helps.



How to preserve the painted surfaces when adjusting or repairing

Cantor Lectures on Motors

PROFESSOR W. WATSON, D.SC., F.R.S., DELIVERED A SERIES OF LECTURES ON THE GASOLINE MOTOR, OF WHICH THIS IS THE SEVENTH INSTALLMENT—BY PERMISSION OF THE ROYAL SOCIETY OF ARTS

I NOW propose to deal with the relation between the work done by a petrol engine and the amount of energy with which the engine is supplied in the form of fuel. The ratio of the work performed in a given time to the energy supplied in that time is called the efficiency.

When considering the efficiency I shall take the indicated horsepower as a measure of the work done by the engine, and in this way avoid the consideration of the losses due to friction in the engine itself. These losses vary considerably with the make of engine, and even with a particular engine, depend in a great measure on the condition of the lubrication.

In order to determine the amount of energy supplied to the engine in the fuel we require to measure the weight of fuel consumed, and also the quantity of heat which can be developed by burning unit weight. The quantity of heat developed by burning unit weight of fuel is called the calorific value of the fuel. A piece of apparatus I have used for the investigation of the calorific value of petrols is shown in section in Fig. 28. The petrol under examination is contained in a glass bulb, N, of known volume, and flows through the capillary tube, G H, to the jet, A. The air enters the bulb, N, through a fine tube, which terminates near the bottom of the bulb, and hence the head of liquid which causes the flow through the capillary tube. G H, remains constant, and thus, since the temperature of the tube, G H, is maintained constant by means of a water jacket, the rate at which the petrol flows from the jet, A, is quite uniform. The drops of petrol, as they fall from A, strike a series of discs of wire gauge contained in the tube, B, this tube being heated by a steam jacket. A stream of air is driven in at the tube, C, and this air vaporizes the petrol, the mixture passing through the tube, D, to a Bunsen burner, E, where the mixture is burnt. The burner, E, is inside a Boys' gas calorimeter, and the heat developed by the flame is absorbed by a stream of water, which circulates through a long coil of tube, so that when the products of combustion finally escape into the air they have been cooled down to atmospheric temperature. The stream of water passing through the calorimeter is kept constant, and the temperature of the water is noted as it enters and leaves. When the constant state has had time to be set up, the increase in temperature of the water will be constant, and if we measure the quantity of water which flows through the calorimeter during the time the known volume of petrol contained in the bulb, N, is being burnt, we can calculate, from the weight of water and the increase in temperature, the heat developed, that is, we can obtain the calorific value of the fuel. During the time required for the constant state to be set up the flame is fed with petrol supplied from the bulb, M, a threeway cock, K, being suitably turned, and it is only when this constant state is reached, *i.e.*, when the thermometers in the calorimeter come to a steady reading, that by turning the cock, K, the petrol is allowed to flow out from the bulb, N. When the surface of the petrol reaches a graduation just above the bulb, N, the water flowing through the instrument is turned into a measuring vessel, the collection of the water being stopped as soon as the level of the petrol reaches a second graduation just below the bulb. Any water produced by the combustion of the petrol, and condensed in the calorimeter, is collected and measured, since an allowance has to be made on account of its latent heat which has been communicated to the water flowing through the calorimeter. In this way we obtain the calorific value of the fuel without counting the heat which would be obtained by condensing the steam produced by the combustion, *i.e.*, what is called the lower calorific value. Since, in the engine, the steam produced by the combustion of the petrol is never condensed to liquid in the cylinder, we are justified in using this lower calorific value.

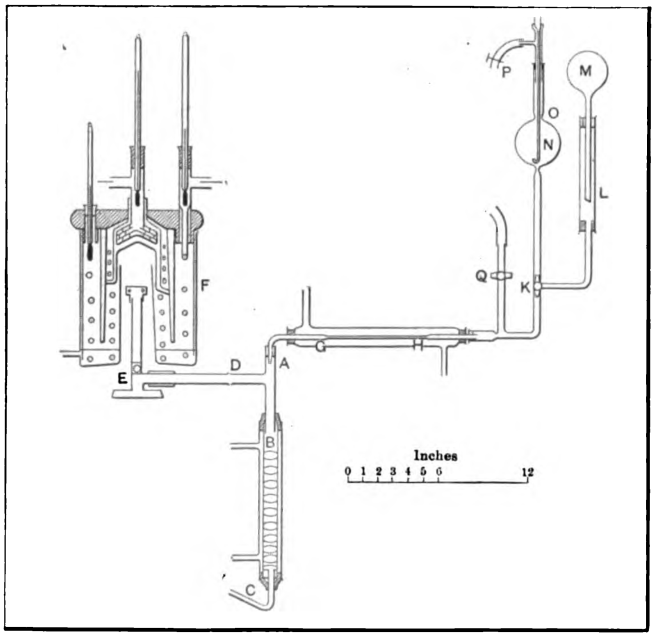


Fig. 28—Apparatus for determining the calorific value of petrols

The calorific values of a number of commercial petrols are shown in the following table:

CALORIFIC VALUES (LOWER)

Petrol	Density at 15° C.	Calorific Value (Lower) Calories per grm.	Calories per c.c. at 15° C.	B. T. U. per lb.	B. T. U. per gall. at 15° C.
Bowley's special	.684	10,660	7,290	19.190	131,500
Carless	.704	10,420	7,340	18,760	132,300
Express	.707	10,020	7,080	18,040	127,600
Ross	.714	10,370	7,400	18,670	133,600
Pratt	.719	10,340	7,430	18,610	134,100
Carburine	.720	10,380	7,470	18,680	135,000
Shell (ordinary)	.721	10,400	7,500	18,720	135,300
Dynol	.725	10,290	7,460	18,520	134,600
Simcar Benzol	.762	9,490	7,230	17,080	130,400
.760 Shell	.767	10,140	7,780	18,250	140,300
Coaline	.846	9,270	7,840	16,690	141,500
Pentane	.630	10,230	6,450	18,410	116,300
Hexane	.680	10,480	7,090	18,770	127,900
Heptane	.736	10,400	7,650	18,720	138,100

It will be observed that, on the whole, the calorific value per unit of weight decreases as the density of the petrol increases. As, however, it is usual to purchase petrol by volume, the calorific value per unit volume is of interest. In this case it will be noticed that the values for the different petrols differ very little, so that from the point of view of the heat which can be obtained by burning a given volume of petrol there is practically nothing to choose between the various kinds given in the table.

Coming now to the question of efficiency, the first thing to consider is the effect of the compression of the charge, before ignition, on the efficiency. That such compression will give increased efficiency we can at once see from the following simple argument. Suppose we have a cubic foot of gas contained in a vessel at atmospheric pressure and a temperature of 0° C. and that we supply sufficient heat to the gas, say by burning, to raise the temperature to 273° C. Owing to the rise in temperature, since the volume is kept constant, the pressure will be doubled, because for every degree the temperature is raised the pressure will be increased by 1-273 of its original value. Since the original pressure was atmospheric, namely 15 pounds to the square inch, the final pressure will be 30 pounds to the square inch. Next, let us start with the same quantity of gas, but compressed to a pressure of 100 pounds per square inch, the temperature being again 0° C. If now we supply the same amount of heat as before, since the quantity of gas is the same, the rise in temperature is the same, viz., 273°. Hence, since for each degree rise of temperature the pressure increases by 1-273 of its original value, the final pressure will be double the initial pressure, namely, 200 pounds per square inch. Hence we see that if the gas which we have been considering were contained in the cylinder of an engine, while, if there were no previous compression, the maximum pressure exerted on the piston would be 30 pounds per square inch, when the gas is compressed to 100 pounds per square inch, before firing, the maximum pressure would be 200 pounds per square inch, and this greatly increased pressure would be obtained with exactly the same supply of heat, say by burning the same quantity of petrol vapor. Of course work has to be done to compress the gas in the latter case, but, even allowing for this work, there is a large gain, as will be seen from a study of Fig. 29. Here what happens in the two cases is shown by means of indicator diagrams, the gas being supposed enclosed in the cylinder of an engine, the walls of which are absolutely impervious to heat, so that the gas loses no heat by conduction and radiation to the walls and piston.

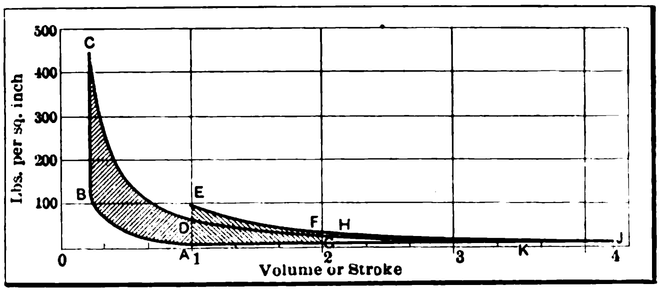


Fig. 29—Indicator diagrams showing how the temperature increases with the increase of compression

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If the front wheels wobble at high speed, go slower.

Practical Repairing

DISCUSSING THE OVERHAULING AND REPAIRING OF MOTORS, VALVE TIMING, REAMING MAGNETO SHAFT BUSH AND RUNNING MOTOR IN BY BELT ON FLYWHEEL

TO thoroughly overhaul a motor every part must be gone over *seriatim*, nut for nut and bolt for bolt, without leaving anything to chance, although they look all right and have no evident signs of wear. Just because a part is not pitted is no reason that it is not worn, and several experienced repairmen make it a rule to carefully calibrate parts that are polished, more than others, as there has evidently been a great amount of friction at that part of the machinery and consequently it should be a perfect fit. If micrometer calipers are not at hand, oil should be washed out of bearing surfaces to find the exact amount of play. The viscosity of the oil often prevents an accurate gauging of slackness, as the parts do not leave each other freely; and when contact on the opposite side is made, the cushioning effect of the oil is often mistaken for a good fit. This should be borne in mind when scraping bearings and reaming out bushes. In order to find whether a connecting rod has any play, or which one it is that knocks, the oil in the bearing can be expelled by using a gasoline gun; then, taking the rod in one hand and the piston in the other after the cylinders have been removed, lift the whole up and down in a vertical plane without side-sway, and if there is any looseness at all the bearing requires tightening. Presuming this to have been done, the bearings, that are made of some antifriction metal, should be a good fit—so good that they are on the tight side, making it slightly difficult to turn the crankshaft by the flywheel. If reference is made to Fig. 3, it will be seen that a six-cylinder motor that has had its bearings scraped and, incidentally, the cylinders lapped, is fitted to a block, B2, with the cylinders, C1, below. The flywheel, F1, is being driven by a belt, B1, turning the crankshaft at a speed approximating 350 revolutions per minute, and the operator is feeding the bearings and cylinders with oil every few minutes. This illustration was taken at the Knickerbocker Garage, where every motor that is thoroughly overhauled is subjected to this treatment. It finishes off the bearings and brings out any defects, as the white metal with continual running molds itself to the crankshaft. A slight inequality in scraping will make the bearing feel tight to the touch, but after running some time, and when the roughness has been smoothed off, the holding bolts will stand half a turn with advantage. In the position indicated in the illustration this can easily be accomplished. If machinery is not avail-

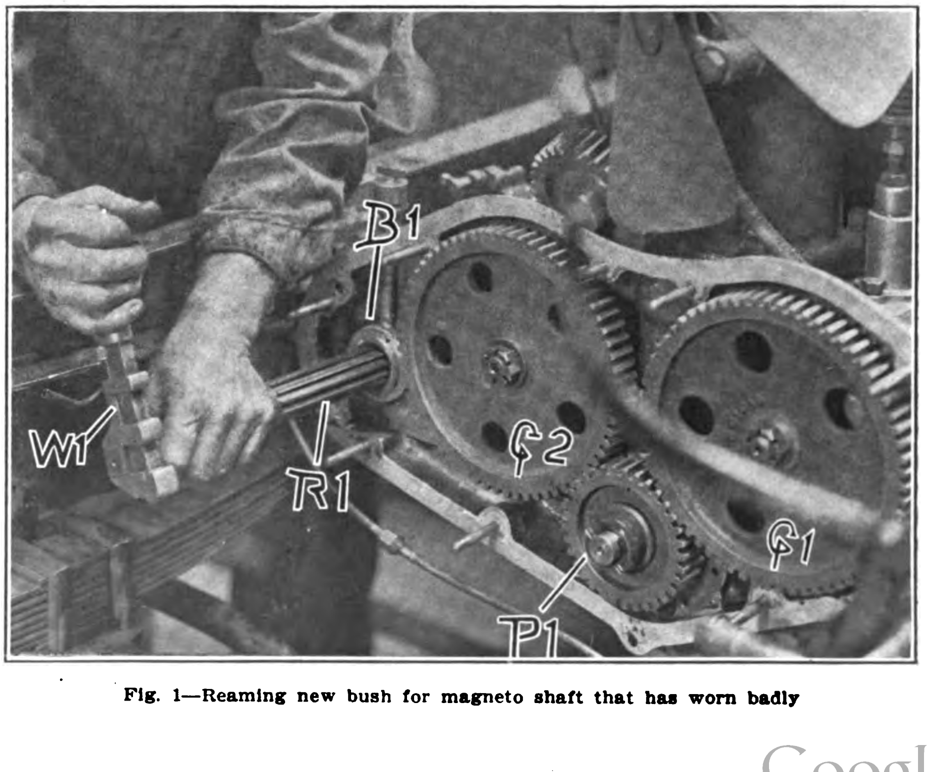

Fig. 1—Reaming new bush for magneto shaft that has worn badly

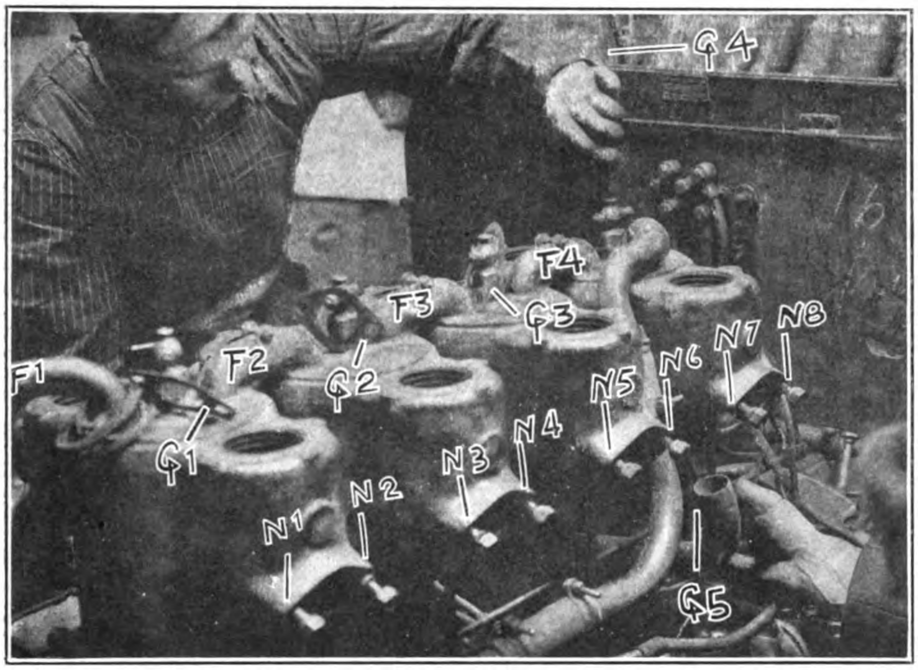

Fig. 2—Testing timing of motor, and showing how all fittings should be placed where they belong

able for this means of driving, the engine can be fixed on a stand or in the frame and run, but the results cannot be expected to be as good as by the other way. Supposing the crank to be stiff, the principal difficulty to overcome is the starting under power. Once this has been accomplished the motor should be filled to about 1 inch higher than its proper level with clean oil and allowed to run for five minutes; then stop it for ten minutes to cool off; start again and run for a quarter of an hour or a little less, and stop for a like period. The water may have become hot through the car standing still, and if it is not possible to connect a cold water supply into circuit, drain out part of the water in the radiator and replenish with cold. For obvious reasons this operation must be carried out slowly so as not to allow the cylinders to cool off too quickly. The running and stopping should be continued for about 12 hours, adding oil from time to time to keep it up to the before indicated level. Should the plugs foul up at, say, 300 to 400 revolutions, the rings are not a proper fit; they should prevent the oil passing into the combustion chamber. Valves require grinding more often than bearings require scraping, or, at any rate, they should if the bearings are made of the proper material. There are two points to remember in grinding a valve. One is that it cannot be hurried unless a cut is taken off the seat, which can be done with some of the tools recently put on the market. The other is that if something is taken off the top, the bottom will drop a trifle and require adjustment to compensate for this. Fig. 4 shows two men working on an engine at the same time; the one on the left using a screwdriver, S1, to grind the valves in, while the man on the right is using a scraping tool, S11, to remove the carbon from the piston heads. One does not interfere with the work of the other and the operation is performed twice as quickly. This photograph was taken at Messrs. S. B. Bowman & Co.'s workshop on an Apperson car, for which they are agents. Fig. 2 shows the method of timing an engine whose flywheel is not marked. A gauging rod, G4, is passed through the petcock and the operator on the right is watching the rise of the valve push rod, at the same time determining the amount of clearance between this and the valve stem with a feeler gauge that cannot be seen in the illustration. The best way to easily find the parts of a car that has been dismantled and be sure to put the right one back where it belongs is to replace the nuts on the bolts where they belong, as N1, N2, N3, N4, N5, N6, N7, N8, and the exhaust gaskets, G1, G2, G3 on the respective cylinders. Parts that cannot be replaced, such as manifolds and piping, should be carefully stored in a box on the side of the car, and it is advisable to have a lid fitted to such boxes, in which to place removed fittings, so that any one working on another car cannot borrow them. There are as many good intentions in the garage as anywhere else, but the unfortunate mechanic who loses parts or tools has to go along a very narrow road to find them, especially if they have found a new location in another man's tool box. Two tools that should be in constant use while dismantling a car are a hammer and center punch. Before removing a fixture that there is the slightest likelihood of being replaced wrong, put a center-punch mark on it, and in the case of bolts of the same size the nut should be punched as well. Take, for example, the four holding down bolts for the motor. One may be slightly shorter than the other to miss a certain fitting; it sometimes occurs that three have been fitted and when the fourth has to be placed it is too long and the others have to be removed to find the right one for the right hole; or, again, the nut may have to be thinner or smaller for the particular requirements. In some makes of cars a system of numbering parts, such as above indicated, is carried out when the car is erected, and whenever the car has to be taken apart a considerable amount of time is saved.

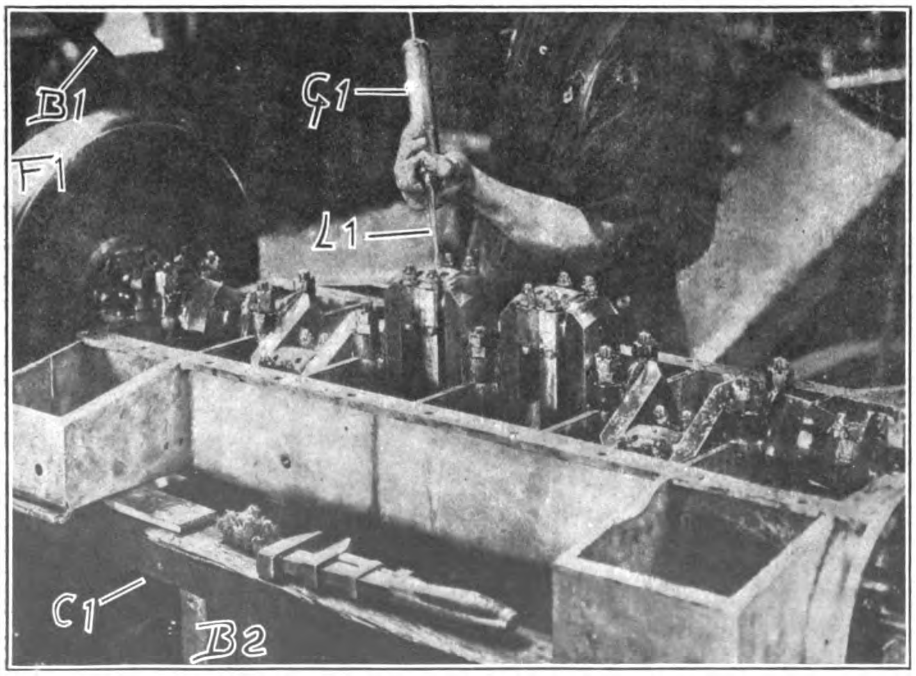

Fig. 3—Running engine inverted from machine shaft with belt after scraping bearings and lapping cylinders

Noisy timing gears can sometimes be quieted by fitting bushes for the magneto and pump shafts to permit the gear wheels on them to be more or less in mesh, as the case may require; they will hum if they are imbedded too much or not enough. A worn bush that allows the shaft to play will cause the gear to mesh improperly, and the way to overcome the trouble is to turn a new bush so that it will require driving into the aluminum casing. This contracts the inside diameter, and it will probably be found necessary to ream the bearing hole out, which operation is shown in Fig. 1. If the original meshing was not enough or too much, the hole should be drilled slightly eccentric to the outside diameter and so inserted that the shaft takes a new center. This may necessitate altering the pump or magneto setting on their respective bases, which can usually be effected by slotting the holes through which the holding-down bolts pass with a rat-tail file. There is no necessity to alter the height, it being only a matter of lateral setting.

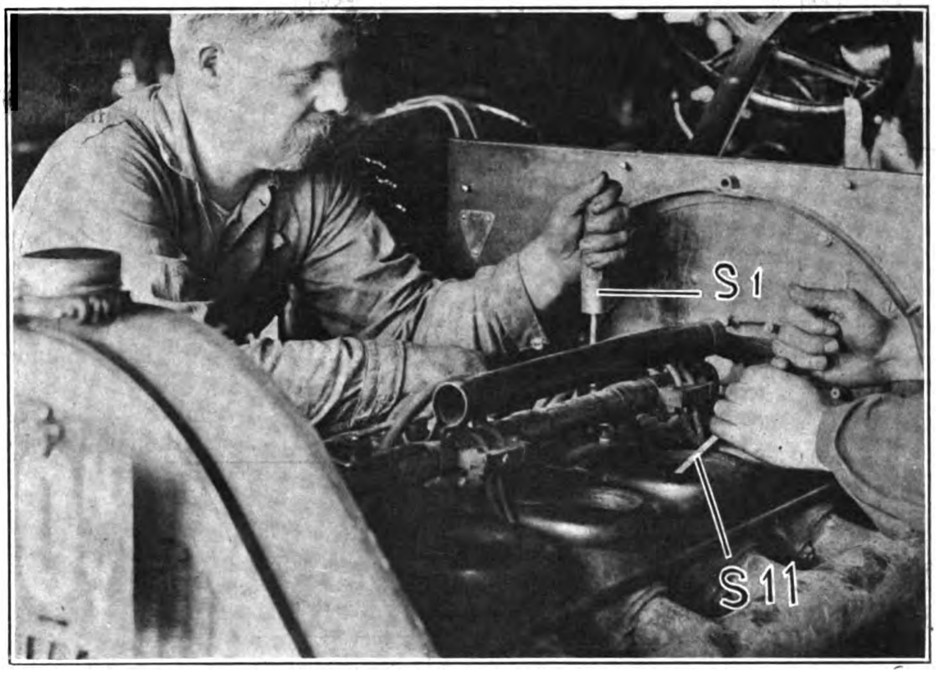

Fig. 4—A frequent operation—grinding valves and scraping out carbon

A Purchaser's Quandary—"I am a subscriber of The Automobile and would like to ask you the following question:

"I am contemplating the purchase of a car next Spring, but am at a loss to know how to decide as to the most desirable car. Some have the transmission in front, others have it a unit with the rear axle. Will you give me an opinion as to the most desirable arrangement, also the advantages of both arrangements.

"L. M. Monroe."

Many communications come to the editorial office, all of which are substantially of this tenor, and a discussion of this important matter should be of unusual interest to the many. Who but the users of automobiles, those who have made their selections and by actual experience have the result at their fingers' end, are best qualified to tell the real story? The columns of The Automobile are open to all who may care to relate their experience for the purpose of helping the "prospective" in his quandary.

Thrown in for Good Measure—The auctioneer waved his arms akimbo in front of an automobile.

"What am I offered for this 1902 model Scalawag automobile? It has one cylinder in good order, a carbureter that is buoyed up by a float, a pair of wish-bones on the front axles, a differentiating gear which is guaranteed to keep one rear wheel locked if the other rotates, and a thousand and one other points of unusual interest to busy the man who is mechanically inclined."

"Four dollars," said a dried-up old veteran of a hundred hard-fought road struggles.

"It is yours," the auctioneer cheerfully responded. Turning to his assistant, he added: "Give the gentleman those volumes of 1902 agricultural reports to read between times."

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, MEETINGS AND OTHER EVENTS

Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 11-12	New York, Annual Meeting, Society of Automobile Engineers.
Jan. 14-28	Philadelphia, Annual Show, Philadelphia Licensed Automobile Dealers' Association, First and Third Regiment Armories.
Jan. 16-21	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A.L.A.M.
Jan. 16-21	Detroit, Mich., Tenth Annual Show, Detroit Automobile Dealers' Association, Wayne Pavilion.
Jan. 28-Feb. 4	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-11	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Feb. 18-25	Minneapolis, Minn., Annual Show, Minneapolis Automobile Show Association, National Guard Armory.
Feb. 18-25	Brooklyn, N. Y., Annual Show, Brooklyn Motor Vehicle Dealers' Association, 23d Regt. Armory.
Feb. 18-25	Binghamton, N. Y., Second Annual Show, Binghamton Automobile Club and Chamber of Commerce, State Armory.
Feb. 18-25	Newark, N. J., Fourth Annual Show, New Jersey Automobile Exhibition Co.
Feb. 24-27	New Orleans, La., Annual Show, New Orleans Automobile Club.
Feb. 25-Mar. 4	Toronto, Ont., Automobile Show, Ontario Motor League.
Feb. 27-Mar. 4	Kansas City, Mo., Fifth Annual Show, Kansas City Automobile Dealers' Association, Convention Hall.
Mar. 4-11	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.
Mar. 14-18	Denver, Col., Annual Automobile Show, Management Motor Field, Colorado Auditorium.
Mar. 18-25	Pittsburg, Annual Show, Pittsburg Auto Show Association (Inc.), Exposition Hall.
Mar. 25-Apr. 1	Buffalo, N. Y., Fourth Power Boat and Sportsmen's Show, Sixty-fifth Regiment Arsenal, Buffalo Launch Club.
Mar. 25-Apr. 8	Pittsburg, Fifth Annual Show, Duquesne Garden, First Week, Pleasure Cars; Second Week, Commercial Trucks. Automobile Dealers' Association of Pittsburg, Inc.
Apr. 1-8	Montreal, Can., Automobile and Motor Boat Show, Automobile and Aero Club of Canada.

THE AUTOMOBILE

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THE cardinal principle in railroading is to first know that you are right and then go ahead; the same principle fits fairly well in every other walk. Quoting verbatim the letter of a valued subscriber for the purpose of illustration, it is pointed out that the Editor of THE AUTOMOBILE either disregarded the above principle or the subscriber overlooked the fact that, being an honest driver of an automobile, it is not his duty to defend the class of chauffeurs who are not satisfied with their employ and their stipend, and who take commissions for the purpose of patching out. The subscriber says: "Being a paid auto driver, I thought from your editorials that I was an undesirable subscriber. I am glad such is not the case because I value your paper very much. Your Editor, being a theorist, is not to blame for what he don't know, and some of his tire religion is on a par with his advice on skidding a few years ago. His experience with chauffeurs is evidently bounded by the North and the East rivers between the Battery and Harlem, because in this part of the State are to be found some drivers who are both able and honest.—Carl A. Johnson."

THE AUTOMOBILE compliments itself upon having a subscriber of such sound judgment and sterling worth. It is quite proper that a reader of discrimination should accept the doctrines that are agreeable to his understanding, and reject those that do not appeal to him. It is highly improbable that the Editor's views of four years ago on the question of skidding were as good as they ought to be, but the fact remains that dishonest chauffeurs, of which it is believed there are only a few, are as a scar on the landscape, and those in the class with our chiding subscriber can scarcely afford to take umbrage at our poor attempt to help them maintain the purity and intelligence of the company they keep. As a further venture in a field that seems to be studded with uncertainties, it is suggested that the driver whose intelligence will permit him to absorb the part of a magazine that appeals to him as beneficial, and who has valuable ideas on the subject of skidding, should put high on his list of the duties to be performed a reminder of the fact that upwards of 400,000 automobilists are in need of just the information of which his store-house seems to have a surfeit. It is admitted by everyone that automobiles do skid betimes, and the question is, How is this undesirable performance to be prevented?

* * *

STILL another subscriber of THE AUTOMOBILE, one, however, whose judgment shows up poorly by comparison, writes as follows: "Please discontinue THE AUTOMOBILE. I do not use my car during the Winter." It is not the purpose here to maintain that this subscriber displayed bad judgment in the mere discontinuance of the paper. No editor can hope to please every member of an ever-expanding family, but there are other considerations from the subscriber's point of view. Supposing that this subscriber's investment amounts to $3,000, and let it be assumed that he proposes to lay up his car for three months; he will be out of pocket as a result the sum of $45, which is 6 per cent. interest on $3,000 for three months, and $225 more, which is 30 per cent. depreciation of the investment, and he will fail to appreciate the reasons for this rather high depreciation of his investment during the Winter hibernation of his car because he cannot see his way clear to pay 75 cents, which is all it would cost him to continue his subscription for the few months of the year involved, during which time, were he to spend ten minutes per week, he would learn of twenty reasons why depreciation is a thief in the night, and the owner of the automobile is the victim.

* * *

TAKING a vacation is the excuse offered for one of the readers of THE AUTOMOBILE, who states that he proposes to store his car and forget all about automobiling, and all matters regarding it. There are many angles to a vacation; some go to the mountains in the Summer time, where they accumulate a surfeit of ozone, others cross the Western Ocean, perhaps because they believe that the *mal der mer* which they will undoubtedly have is a cure-all; then, there is the staid citizen who sends his wife to the country; but however free the interesting methods are of complication, it remains to observe that putting the automobile out of commission, with a view to taking a vacation, is like carrying money around in a pocket with a hole in it. During the period when the automobilist is resting the automobile will be accumulating a quota of rust, and it will suffer from neglect, so that it will be in far worse shape at the expiration of this vacation than it would be were it left in commission, and the automobilist's vacation, so-called, will be nothing more or less than the piling up of cost and the destroying of his greatest source of pleasure and recreation, while he lies back in fancied security.

News Section

HAPPENINGS OF THE WEEK IN VARIOUS SECTIONS OF THE COUNTRY AS GATHERED BY THE 84 SPECIAL WRITERS AND CORRESPONDENTS OF "THE AUTOMOBILE"

Government Buys French Automobiles for Use in the Philippines—List of Exhibitors at the A. L. A. M. Show—Portland, Ore., Opens the Yearly Round of Exhibitions; Other Show News—Hooper President of the A. A. A. —Secretary Wilson Reports on National Highways—News of Maker and Dealer in Many Fields—Peeps Through Auto Goggles at Foreign Lands—Brief Trade News From All Over the Country.

United States Buys French Automobiles!

ACCORDING to announcement made by Mr. Lascaris, manager of the American branch of the De Dion-Bouton Company, shipment has been made direct from the factory of the De Dion-Bouton Co. at Puteaux, France, to Manila, P. I., of the cars purchased last September by the Bureau of Insular Affairs of the War Department on the recommendation of Mr. W. Greene, Director of Public Works in the Philippine Islands.

This shipment comprises three 8-cylinder, 50 horsepower cars for mail and passenger service. Four 40-horsepower trucks. One double-decker 34-passenger auto-bus, a duplicate of the auto-buses used by the Fifth Avenue Coach Co. on Fifth avenue, N. Y., and four trailers of two tons each carrying capacity.

The 8-cylinder cars are fitted with a stock 8-cylinder model, V-shaped, of 90 millimeter bore by 120 millimeter stroke. They are fitted with a new 8-cylinder Bosch magneto, instead of with two magnetos, as in all the 1910, 8-cylinder De Dion-Bouton cars.

The shape of the radiator and hood has been modified as shown in the illustration, to afford a bigger cooling surface and larger water carrying capacity.

The service brake on these cars, which acts direct on the propeller shaft, is water cooled in the usual way. In addition to the regular brakes every one of these cars is provided with brake shoes acting direct on the tires on the rear wheels and actuated by a third lever in the middle of the floor board on the left of the driver.

The omnibus and the trucks are provided with a 4-cylinder, cast separate, motor of 120 millimeter bore by 130 stroke; high-tension Bosch magneto, and except for the radiators and hoods, which are of the same design as those used on the 8-cylinder cars, the construction of these vehicles does not differ from the usual De Dion-Bouton cars.

In reply to telegraphic inquiry, THE AUTOMOBILE received the following wires from General Leonard Wood and General Edwards:

Washington, D. C., Dec. 7, 1910.
Editor, THE AUTOMOBILE,
239 W. 39th St., New York:

United States Army has not purchased any De Dion-Bouton Automobiles for military use in Philippine Islands.
LEONARD WOOD, Chief of Staff.

Washington, D. C., Dec. 7, 1910.
Editor, THE AUTOMOBILE,
239 W. 39th St., New York:

Our advices are that eight De Dion automobiles were purchased by the Philippine Government for use in the Philippines. No advices as to shipment.
EDWARDS.

Type of De Dion-Bouton automobiles purchased by the United States Government for insular service

Reeves Quizzes Velie Officials

General Manager Alfred Reeves, of the A. L. A. M., and legal representatives of that organization paid a visit to the plant of the Velie Motor Vehicle Company at Moline, Ill., last week. The purpose of the visit was to examine the Velie officials with regard to the allegations of the bill filed by them in the Wisconsin courts, charging the A. L. A. M. with conspiracy to ruin the business of the complainant company. The complainant asks for heavy damages.

One of the points considered by the attorneys was the statement of the Velie Company that through the action of the A. L. A. M. the Velie cars have been barred from racing. According to Mr. Reeves this contention was disproven by the examination. At best the case is still several months away from court and in the meantime depositions will be taken in various parts of the country.

Chicago Motor Club Election

CHICAGO, ILL., Dec. 7—The following officers were elected to conduct the affairs of the Chicago Motor Club for 1911 at the annual meeting held last night: President, David D. Beecroft; first vice-president, Thomas J. Hay; second vice-president, Henry Paulman; secretary, N. H. Van Sicklen, Jr.; treasurer, Chas. E. Gregory. Directors, C. G. Sinsabaugh, F. E. Edwards, J. P. Frisby, W. J. Zucker, John H. Kelly. Auditing Committee, L. L. Halle, L. R. Campbell, Louis Geyler.

The meeting was one of the greatest in the history of the club, 249 votes out of total membership of 500 being polled. The election was one of the most hotly contested in the history of the club.

Imposing List of Exhibitors at Garden Show

EXHIBITORS to the number of 387 make up the imposing list of those who will show during the first week of the Eleventh Annual National Automobile Show at Madison Square Garden, which opens January 7. Of this number, 67 will exhibit complete cars while 320 are to be displays of parts and accessories.

Never in the history of the A. L. A. M. has such a collection of exhibits been assembled and the Garden itself has been increased in capacity by 22,600 feet over its capacity of last year. The total amount of space is slightly over 100,000 square feet.

As is shown in the accompanying diagrams, the space to be occupied by each manufacturer and each exhibitor of parts and accessories has been arranged according to definite plan. The bulk of the standard cars will be shown on the main floor, Elevated Platform, Balcony and Exhibition Hall. The accessories are to be shown on the Elevated Platform, Balcony, Concert Hall, second tier and in room 7, in addition to the big basement.

During the first week nothing but pleasure cars and accessories will be featured, the show having been divided into two periods. In the final week, the trucks, delivery wagons, commercial cars of all sorts, electrics and other forms of motor vehicles will have their inning.

Preparations for the show are progressing rapidly and the management declares that the arrangements have been perfected to such a degree that it will require only a brief space of time to complete the decorations and to instal the exhibition spaces.

The program of extra entertainment has not yet been announced but the show committee is now busy securing a number of novel features that will be used to attract big crowds to inspect the cars and other exhibits.

Following is the complete list of those who will show during the first week of the event:

MAIN FLOOR.

1 F. B. Stearns Co.
2 E. R. Thomas Motor Co.
3 Olds Motor Works.
4 H. H. Franklin Mfg. Co.
5 Dayton Motor Car Co.
6 Oakland Motor Car Co.
7 Lozier Motor Co.
8 Elmore Mfg. Co.
9 Winton Motor Car Co.
10 Locomobile Co. of America.
11 Hudson Motor Car Co.
12 Mitchell-Lewis Motor Co.
13 Stevens-Duryea Co.
14 Packard Motor Car Co.
15 Buick Motor Co.
16 Cadillac Motor Car Co.
17 Willys-Overland Co.
18 Reo Motor Car Co.
19 Peerless Motor Car Co.
20 Pierce-Arrow Motor Car Co.
21 Chalmers Motor Co.
22 Maxwell-Briscoe Motor Co.
23 E. M. F. Co.

EXHIBITION HALL.

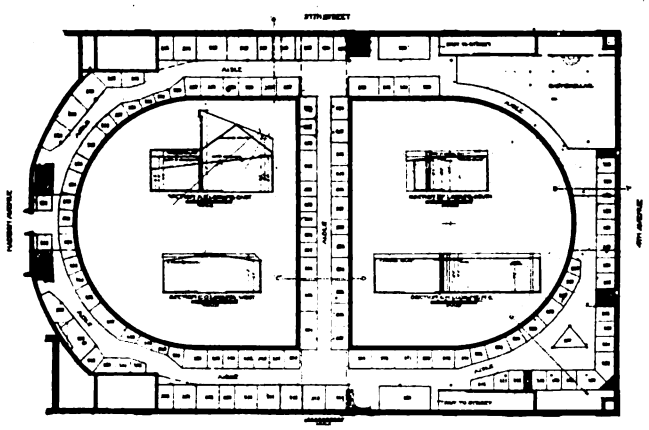
50 Daimler Import Co.
51 Mercer Automobile Co.
52 Moon Motor Car Co.
53 Simplex Motor Car Co.
54 Corbin Motor Vehicle Corp.
55 Nordyke & Marmon Co.

ELEVATED PLATFORM.

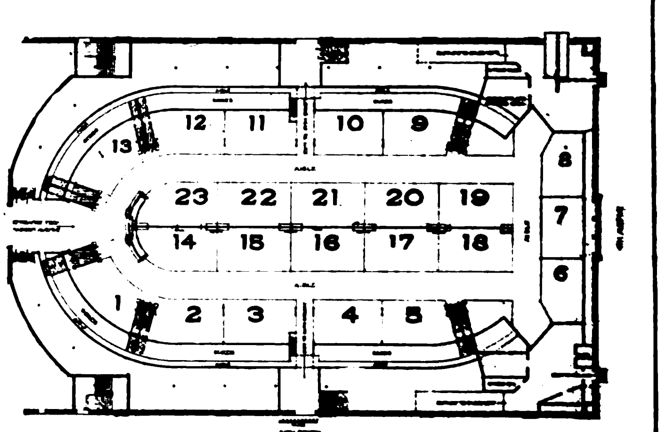
101 Knox Automobile Co.
102 American Motor Car Co.
103 Matheson Motor Car Co.
104 National Motor Veh. Co.
105 Selden Motor Veh. Co.
106 Buckeye Mfg. Co.
107 Moline Automobile Co.
108 Premier Motor Mfg. Co.
109 Pullman Motor Car Co.
110 The Pope Mfg. Co.
111 Jackson Automobile Co.
112 Brush Runabout Co.
113 Hotchkiss Import Co.
114 Haynes Automobile Co.
115 Royal Tourist Car Co.
116 Metzger Motor Car Co.
117 Autocar Company.
118 Columbia Motor Car Co.
119 American Locomotive Co.
120 The Garford Co.
121 Waltham Mfg. Co.
122 Goodyear Tire & Rub. Co.
123 The Whitney Mfg. Co.
124 The Veeder Mfg. Co.
125 The Hartford Rub. Wks. Co.
126 The Badger Brass Mfg. Co.
127 The B. F. Goodrich Co.
128 The Diamond Rubber Co.
129 C. F. Splitdorf.
130 Gray & Davis.
131 G & J Tire Co.
132 Morgan & Wright.
133 National Carbon Co.
134 Light Mfg. & Foundry Co.
135 Baldwin Chain & Mfg. Co.
136 Phineas Jones & Co.
137 A. O. Smith Co.
138 National Tube Co.
139 Diamond Chain & Mfg. Co.
140 The Jones Speedometer Co.
141 N. Y. & N. J. Lubricants Co.
142 C. A. Mezger, Inc.
143 Weed Chain Tire Grip Co.
144 Continental Rubber Wks.
145 Wheeler & Schebler.
146 Pennsylvania Rubber Co.
147 Remy Electric Co.
148 Consolidated Rub. Tire Co.
149 Randall-Faichney Co.
150 The U. S. Lgt & Heat'g Co.
151 Republic Rubber Co.
152 The Conn. T. & E. Co., Inc.
153 The Chandler Co.
154 Columbia Nut & Bolt Co., Inc.
155 Coes Wrench Co.
156 Hartford Suspension Co.
157 Edmunds & Jones Mfg. Co.
157a Adam Cooks Sons.
158 Morrison-Ricker Mfg. Co.
159 J. H. Lehman Mfg. Co.
161 Chas. E. Miller.
162 A. W. Harris Oil Co.
163 Standard Roller Bearing Co.
164 The Firestone Tire & Rubber Co.
165 Oliver Mfg. Co.
166 The Timken Roller Bearing Co.
167 The Timken-Detroit Axle Co
168 Pittsfield Spark Coil Co.
169 Spicer Mfg. Co.
170 Brown-Lipe Gear Co.
171 Swinehart Tire & Rub. Co.
172 Warner Instrument Co.
173 J. H. Williams & Co.
174 Kokomo Electric Co.
175 Warner Gear Co.
176 The Standard Welding Co.
177 The Am. Ball Bearing Co.
178 The Fisk Rubber Co.
179 A. R. Mosler & Co.
180 Gabriel Horn Mfg. Co.
181 Castle Lamp Co.
182 Joseph Dixon Crucible Co.
183 Valentine & Co.
184 Heinze Electric Company.
185 Vacuum Oil Company.
186 Briscoe Mfg. Co.
187 Wm. Cramp & Sons Ship & Eng. Bldg. Co.
189 R. E. Dietz Co.
190 Herz & Co.
191 S. F. Bowser & Co., Inc.
192 The Pantasote Co.
193 Springfield Metal Body Co.

BALCONY.

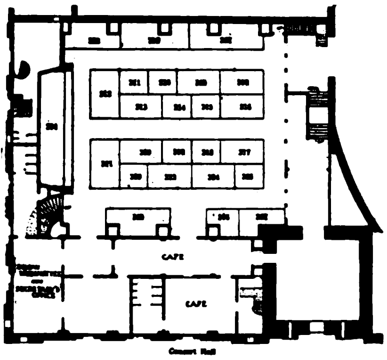
201 Inter-State Automobile Co.
202 Ohio Motor Car Co.
203 Palmer & Singer Mfg. Co.
204 Kissel Motor Car Co.
205 Hupp Motor Car Co.
206 Chadwick Engineering Wks.
207 Speedwell Motor Car Co.
208 Regal Motor Car Co.
209 W. H. McIntyre Co.
210 Marquette Motor Co.
212 Pierce Motor Co.
213 Flandrau Motor Car Co.
215 Midland Motor Co.
217 Courier Car Co.
218 Simplex Automobile Co.
219 Atlas Motor Car Co.
221 Cartercar Company.
222 Ajax-Grieb Rubber Co.
223 Columbia Lubricants Co. of New York.
224 Bosch Magneto Company.
225 Michelin Tire Company.
226 Lovell-McConnell Mfg. Co.
227 The Elect. Stor. Bat. Co.
228 Continental Caoutchouc Co.
229 Eisemann Magneto Co.
230 Stewart & Clark Mfg. Co.
231 Empire Tire Co.
232 Thermoid Rubber Co.
233 Vesta Accumulator Co.
234 New Departure Mfg. Co.
235 Link-Belt Company.
236 The Hoffecker Company.
237 Lebanon Steel Casting Co.
239 Apple Electric Co.
240 The Turner Brass Wks.
241 Auto Improvement Co.
242 American Ever Ready Co.
243 Stromberg Mot. Devices Co.
244 Muncie Gear Works.
245 Gemmer Mfg. Co.
246 Excelsior Motor & Mfg. Co.
247 Warner Mfg. Co.
248 The Motz Clincher Tire & Rubber Co.
249 Miller Rubber Co.
250 Livingston Rad. & Mfg. Co.
251 The Star Rubber Co.
252 The Royal Equipment Co.
253 Driggs-Seabury Ord. Corp.
254 The Cleveland Speed Indicator Co.
255 H. W. Johns-Manville Co.
256 The Stein Double Cushion Tire Co.
257 Edison Storage Battery Co.
258 J. Ellwood Lee Co.
259 Cooks Standard Tool Co.
260 George A. Haws.
261 The Homo Co. of America.
262 E. B. Van Wagner Mfg. Co.
263 The Seamless Rubber Co.
264 R. E. Hardy Co.
265 L. C. Chase & Co.
266 National Coil Co.
267 J. H. Sager Co.
268 Auburn Auto Pump Co.
269 Briggs & Stratton Co.

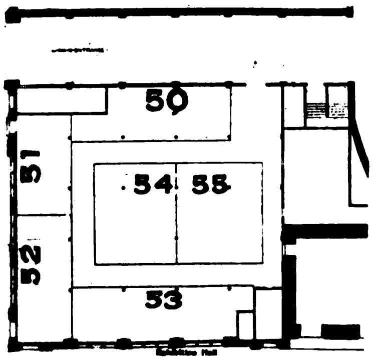


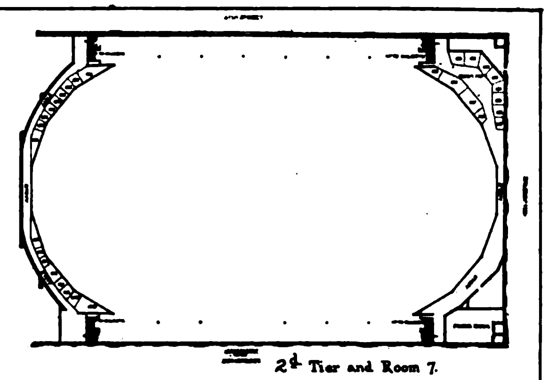
Basement



Main Floor






2d Tier and Room 7.

270 C. A. Shaler Co.
271 C. Cowles & Co.
272 The Gilbert Mfg. Co.
273 The Nocra Mfg. Co.
274 The Globe Machine & Stamping Co.
275 Leather Tire Goods Co.
276 The Carpenter Steel Co.
277 Witherbee Igniter Co.
278 Batavia Rubber Co.
279 Manufacturers Foundry Co.
281 Atwater-Kent Mfg. Wks.
282 The McCue Co.
283 Parker Motor Co.
284 Muncie Wheel Co.
285 Crucible Steel Co. of Amer.
286 Standard Thermometer Co.
287 Isaac G. Johnson & Co.
288 Russell Motor Axle Co.
291 Briggs Mfg. Co.
292 Stevens Mfg. Co.
293 Orlando W. Young.
294 Kellogg Mfg. Co.
295 Newark Rivet Works.

CONCERT HALL.

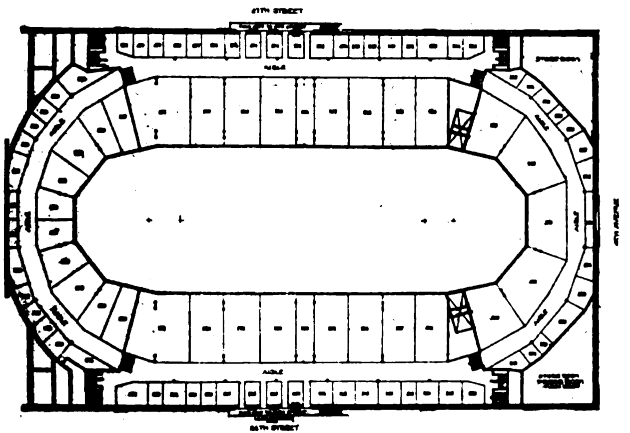
301 The Sprague Umbrella Co.
302 Hayes Manufacturing Co.
303 Havoline Oil Co.
304 The Hess-Bright Mfg. Co.
305 Rands Mfg. Co.
307 Marburg Bros.
308 Sparks-Withington Co.
309 Frost Gear & Tool Machine Co.
310 The Willard Storage Battery Co.
311 Reichenback Laboratories Co.
312 Vanadium Metals Co.
313 Dover Stamping and Mfg. Co.
314 Western Tool & Forge Co.
315 Troy Auto Specialties Co.
316 The White & Bagley Co.
317 The Sireno Company.
318 Atlantic Refining Co.
320 The United Steel Co.
321 Vanadium Sales Co.
322 The Century Rub. Trad. Co.
323 Howard Demountable Rim Co.
324 North & Judd Mfg. Co.
325 McCord Mfg. Co.

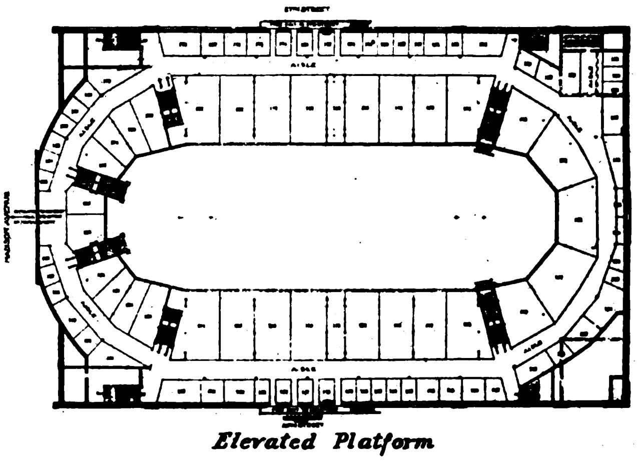
2D TIER AND ROOM 7.

400 Doehler Die-Casting Co.
401 The Wright Wrench & Forging Co.
402 Motor Parts Co.
403 Penfield Shock Absorber Co.
404 Culver Stearns Mfg. Co.
405 Best Ignition Equipment Co.
406 The Ashland Mfg. Co.
407 L. V. Flechter & Co.
408 Rutherford Rubber Co.
409 A. U. Campbell.
409a F. H. Kelsey & Co.
410 H. A. Elliott.
411 Hazen-Brown Co.
412 Philadelphia Steel & Forge Co.
414 Universal Tire Protect. Co.
415 International Metal Pol. Co.
415a The J. Alexander Mfg. Co.
415b Calmon Asbestos & Rubber Wks.
416 Broga Automatic Fast. Co.
417 Metal Stamping Co.
418 Rushmore Dynamo Works.
419 E. M. Benford.
420 C. A. Wiley Co.
421 Voorhees Rubber Mfg. Co.
422 Baker Sales Co.
423 Automobile Tire Co.
424 Randolph & Co.
425 Motor Specialties Co.
426 Reinhold Noflux Aluminum Solder Co.

BASEMENT.

500 New York Sporting Goods Co.
501 Merchant & Evans Co.
502 Newmastic Tire Co.
503 Keystone Steel Casting Co.
504 Class Journal Co., (Automobile).
505 Class Journal Co. (Motor Age).
506 The Electric Speedometer & Dynammeter Mfg. Co.
507 Hydraulic Oil Storage Co
509 Kilgore Mfg. Co.
510 Garage Equipment Mfg. Co.
511 Dorian Remountable Rim Co.
512 The R. M. Hollingshead Co.
513 Gieszler Bros. Stor. Bat. Co.
514 C. F. Ernsts Sons.
515 Wyckoff Lumber & Mfg. Co.
516 Gyrex Mfg. Co.
517 Hopewell Bros.
518 North East Electric Co.
519 W. E. Pruden Hardware Co.
520 Stevens & Co.
521 The Phila. Grease Mfg. Co.
522 Ideal Wind Shield Co.
523 Vehicle Apron & Hood Co.
524 L. Sonneborn Sons, Inc
525 Rupert C. King.
526 Fegley Tire Chain Co.
528 H. D. Smith Co.
529 Kein Starter Co.
530 Union Auto Specialties Co.
531 G. B. Lambert.
532 Hofacker Mfg. & Supply Co.
533 Novelty Mfg. Co.
534 Bliven & Carrington, Inc.
535 Delcampe Welding Co.
537 Wm. E. Pratt Mfg. Co.
538 Auto Wind Shield Co.
539 Fedders Mfg. Works.
540 Randerson Auto Parts Co.
541 The Perfection Spring Co.
542 Detroit Motor Car Sup. Co.
543 Star Starter Company.
543a The Lefever Arms Co.
544 Wayne Oil Tank & Pump Co.
545 Joseph Tracy.
546 Ernst Flentje.
547 N. B. Arnold.
548 The Troy Carriage Sun Shade Co.
549 Ajax Trunk & Sample Case Co.
550 Post & Lester Co.
551 Motor Print Co.
552 Motor Vehicle Pub. Co.
553 Gotham Alum. Solder Co
553a Luce Mfg. Co.
554 John T. Stanley.
555 Motor.
556 Julius King Optical Co.
557 Jas. L. Gibney & Bro.
558 The Horseless Age.
559 Fred Robinson.
560 The H. M. S. Auto Sw. Co.
561 Motor World.
562 The Motor Car Equip. Co.
563 The Standard Metal Wk. Co.
564 Peter A. Frasse & Co.
565 Wm. P. Miller's Sons.
566 P. Reilly & Son.
567 Atlas Chain Co.
568 Nightingale Whistle Mfg. Co.
569 H. H. Franklin Mfg. Co. (Die-Casting Dept.)
570 The Walter H. Foster Co.
571 Findeisen & Kropf Mfg. Co.
572 The Brown Co.
573 Ward Leonard Electric Co.
574 New York Coil Co., Inc.
575 B. & L. Auto Lamp Co.
576 Jeffery Dewitt Co.
577 El Arco Radiator Co.
578 Meteor Gas Co. of N. Y.
579 Universal Rim Co.
580 Elite Mfg. Co.
581 K. & W. Manufacturing Co.
582 C-M-B Wrench Co.
583 Hibbard Engineering Co.
584 Barthel, Daly & Miller.
585 S. Hoffnung & Co., Ltd.
586 J. S. Bretz Co.
587 The Simms Magneto Co.
588 Couch & Seeley Co.
589 Nonpareil Horn Mfg. Co.
590 The Lutz-Lockwood Mfg. Co.
591 U. S. McAdamite Metal Co.
592 Gus Balzer.
593 New England Automobile Journal.
594 Elliott Auto-Lighter Co.
595 Harry A. Allers & Co.
596 Automobile Topics.
597 The A-Z Company.
598 Simonds Mfg. Co.
599 Thos. Prosser & Son.
600 Chilton Co.
601 International Engineering Co.
602 Chas. O. Tingley & Co.
603 Frank H. Cross Distributing Co.
604 Chas. J. Downing.
605 The Eagle Co.
606 A. J. Myers, Inc.
607 The Harrison Radiator Co.
608 Tuttle Motor Co.
609 Westen Mfg. Co.
610 Clayton Air Compressor Works.
611 Shawmut Tire Company.
612 Keystone Lubricating Co.
613 L. J. Mutty Co.
614 The S. B. R. Specialty Co.
615 R. I. V. Co.
616 B. M. Asch.
617 Sheldon Axle Co.
618 Automobile Supply Mfg. Co.
619 Star Speedometer Co.
620 Valve Seating Tool Co.
621 Polson Mfg. Co.
622 Alfred C. Stewart Machine Works.
623 The Allen Auto Specialty Co.
624 K-W Ignition Co.
625 Cox Brass Mfg. Co.
627 Champion Ignition Co.


Balcony


Elevated Platform

FIRST SHOW

SAN FRANCISCO, Nov. 29—In a forest of evergreen the Oakland Automobile Dealers' Association last week held probably the most artistic as well as one of the most successful automobile shows that ever took place in the West. The exhibition was held in the great oval skating rink at Idora Park, in Oakland, which for the occasion had been transformed into a wilderness of redwood.

The show contained about 175 cars, representing practically every manufacturer doing business on the Coast. The cash value of the cars placed on the floor was a trifle over $250,000. The machines displayed ranged from the baby runabout, selling for $450, to the $8,000 limousine and the 5-ton motor truck.

In addition to the endurance run a motor truck contest was held under the supervision of United States Army officers. It was the first contest of the kind ever held in this part of the country. The conditions were severe, as the cars were required to carry their full scheduled load of dead weight from San Francisco to Oakland around the southern arm of San Francisco bay, an even 100 miles. They were allowed 8 hours and 15 minutes to make the trip and were required to maintain an average speed of 12½ miles an hour. Accompanying each car was a representative of the regular army, who kept an official record of the amount of gasoline and oil consumed and made notes of all details of the trip. All the cars completed the circuit and five reached Oakland with perfect scores. The Cartercar, which did not make a perfect score, covered the distance in an hour and a half less than the time allowed and was penalized for arriving ahead of time. The cars that made perfect scores with the cost per ton-mile for the 100-mile trip were as follows: Gramm, 1.23c.; Frayer-Miller, 1.36c.; Autocar, 1.46c.; White, 1.53c.; Hart-Kraft, 6c. The other cars in the contest, all of which made almost perfect scores, were the Avery, Rapid and the Brush car.

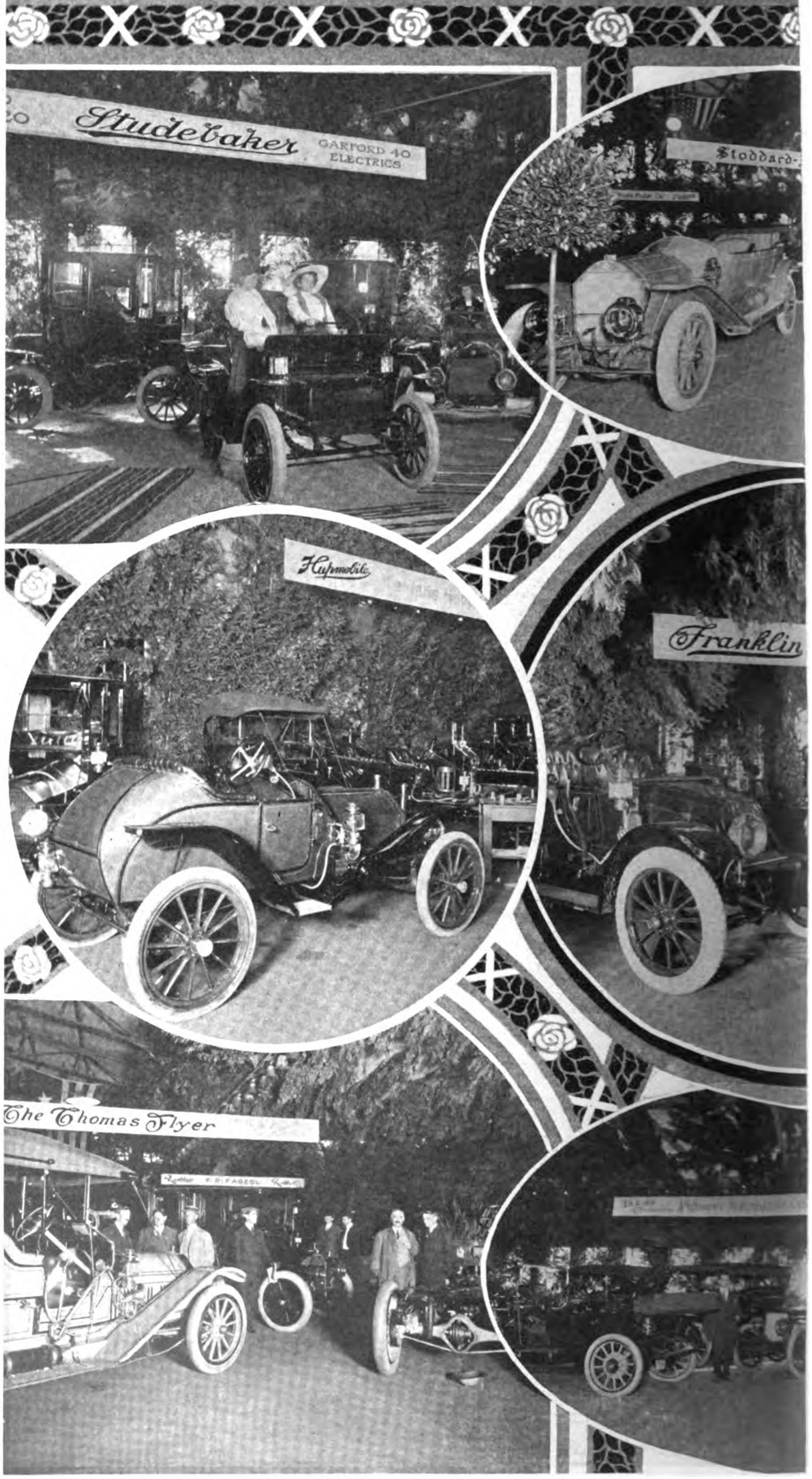
Although the gasoline cars naturally occupied most of the space and received the most attention at the show, the electrics came in for considerable notice.

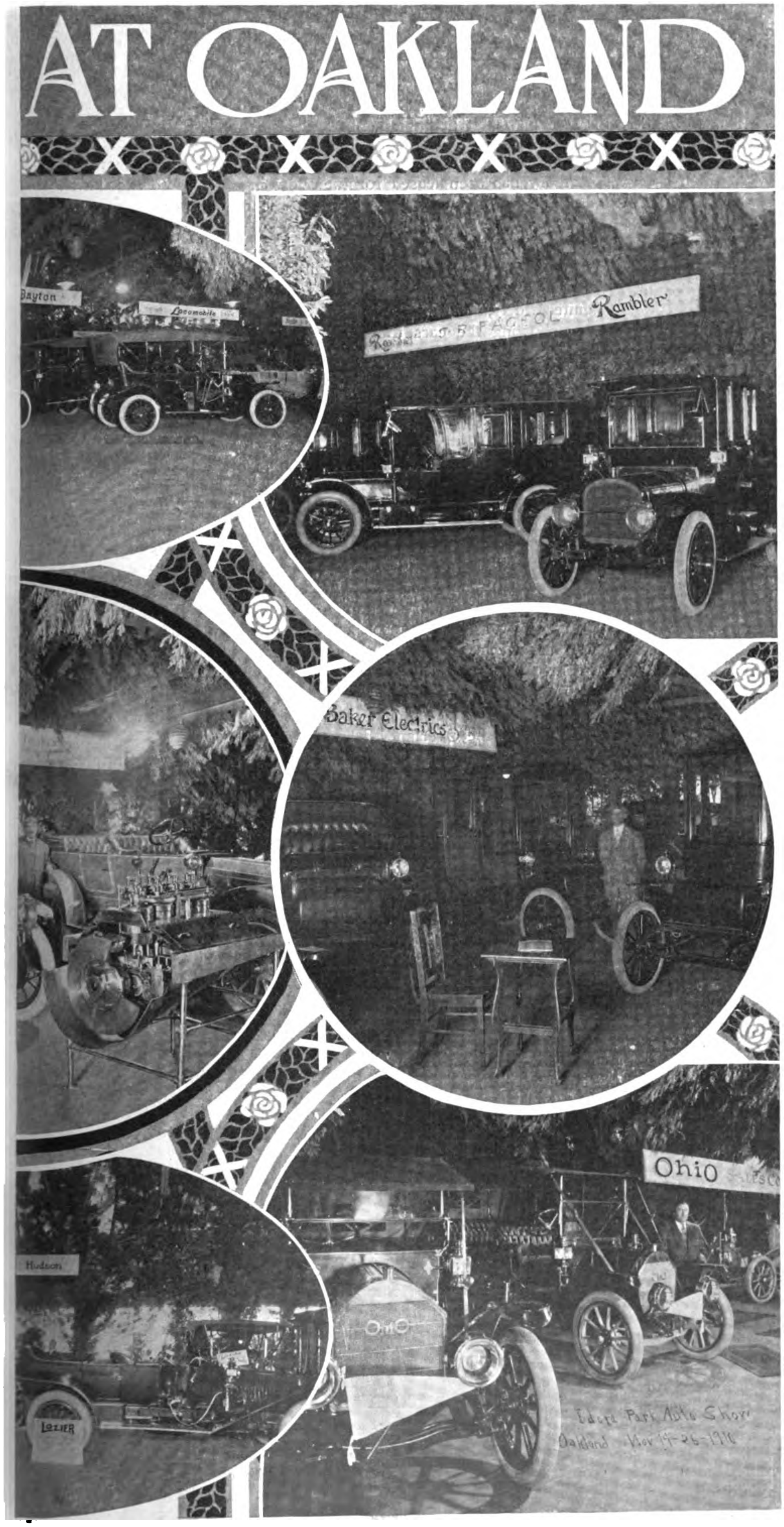
One of the features of the show was the display of stripped and polished chassis. The Peerless, Rambler, Haynes and Thomas stripped cars made a fine showing.

Among the big exhibitors at the show was the Pioneer Automobile Company, in whose booth the models of the Lozier, Chalmers and Hudson were found. The exhibit ranged from the little Hudson roadster to the big Lozier torpedo. The Hudson touring car and the new Chalmers "30" and "40" attracted much attention.

The exhibit of the Winton Motor Carriage Company consisted of "sixes" only, although there were various types of bodies among the cars shown. The new Winton pony tonneau was notable in this section.

In the center of the hall was the exhibit of the Stoddard-Dayton Motor Company.





While there were eight models of this car in the exhibit, ranging from a "30" roadster to a 50 horsepower limousine, the car that attracted the most attention was the five-passenger touring car which was recently placed on the San Francisco market.

H. O. Harrison Company used 2,000 feet of floor space for the display of the Peerless and Everitt cars. The largest area of floor space of any exhibit at the show was taken for the use of the Rambler.

The Mitchell exhibited, besides the standard four-cylinder, five-passenger touring cars, a complete line of the larger cars, including a big six-cylinder close-coupled touring car. All of the new touring cars displayed were of the fore-door type.

The Franklin exhibit attracted much attention because of the new type of hood.

The Studebaker Company displayed a complete line of E-M-F, Studebaker and Flanders cars. Among the other exhibits particularly worthy of mention were those of the Locomobile, with its powerful new six-cylinder model, the Elmore two cycle, the little Hupmobile, both roadster and touring car, the Pope-Hartford, four-cylinder model, the Haynes, Ohio, Baker Electric, the Regal, the Maxwell and Columbia, the Corbin, the Knox and the Ford and Velie.

One of the most attractive and complete displays was that in which the Thomas Flyer was shown. This line has always been popular on the Coast and from the time the doors of the show were opened until the last day the Thomas exhibit was thronged.

One of the chief features of this exhibit was a stripped and polished chassis in which the big engine was in full operation to illustrate its silence in working and its mechanical precision.

The line displayed consisted of six complete cars, including a seven-passenger, fore-door standard touring car, limousine, runabout, close-coupled body and a big 6-40 flyabout in pearl gray.

There were the usual exhibits of magnetos and accessories.

Following is the list of cars exhibited:

Gasoline pleasure vehicles—Alco, Apperson, Autocar, Black Crow, Buick, Cadillac, Case, Chalmers, Corbin, Columbus, Crawford, Cunningham, Columbia, E-M-F, Empire, Everitt, Flanders, Ford, Franklin, Great Western, Haynes, Hudson, Hupmobile, Imperial, Inter-State, International, Kissel-Kar, Krit, Knox, Jackson, Locomobile, Lozier, Marmon, Matheson, Marion, McFarlan, Maxwell, Mercer, Michigan, Mitchell, Moon, Oakland, Ohio, Oldsmobile, Overland, Palmer-Singer, Peerless, Pope-Hartford, Regal, Rambler, Renault, Reo, Stoddard-Dayton, Studebaker, Thomas Flyer, Winton, Velie.

Commercial Trucks—Alco, Buick, Babb-Carter, Frayer-Miller, Gramm, Grabowsky, Hart-Kraft.

Electric Pleasure Cars—Babcock, Baker, Columbus, Detroit, Firestone, Ideal, Rauch-Lang, Woods.

News Notes of the Coming Automobile Shows

PITTSBURG, Dec. 5—The Fifth Annual Pittsburg Show will be held in Duquesne Garden from March 25 for two weeks, instead of the usual single week. The show committee consists of the following: W. N. Murray, Standard Automobile Co.; Robert P. McCurdy, McCurdy-May Co.; Frank D. Saupp, Hiland Auto Co.; and A. X. Phelan.

Among the companies signed up so far are the following: Chicago-Staver, Pittsburgh-Interstate, Atlas, Lozier, Pittsburg-Mitchell, Stoddard-Dayton, Marmon, Winton, Woods Electric, Peerless, Maxwell, Columbus, Pierce-Arrow, Franklin, R. & L. Electric, Pope-Hartford, Stevens-Duryea, Elmore, Marion Flyer, White Steamer, White Gasoline cars, Packard, Buick, Baker Electric, Pittsburgh-Chalmers, Michigan, E. J. Thompson, L. Glesenkamp Company, and the Locomobile, Hudson, Jackson, Cadillac and Stearns. With this array of cars the exhibition promises to be by long odds the most comprehensive ever held in this city.

The independents, who will show in the Exposition building, are also active and the prospects are favorable for fine exhibits of motor trucks, in addition to the lines of pleasure cars displayed at both shows.

Twin Cities to Hold Exhibitions

Minneapolis, Minn., Dec. 5—While no time has been set for the drawing of space at the 1911 Minneapolis automobile show, the association under whose auspices the exhibit is to be held is arranging for blueprints of spaces, and it is expected that dealers will be given opportunity to "draw their lot" within a short time. The big display will be held at the Armory, the same building that has housed those held in former years, during the week of Feb. 18 to 25. To arouse interest in the motor business and to stimulate buying, the St. Paul motor car dealers are to have their first show this winter, and it is to be purely a local exhibition, except that Minneapolis companies having branches and agencies in St. Paul will make showings.

At a meeting on Wednesday night Harry E. Pence, president of the Minneapolis Automobile Show Association, made an address at a meeting of the St. Paul dealers. The show, which is to be in the Auditorium, will be held Jan. 25-28.

Brooklyn Exhibition Now Assured

Brooklyn, Dec. 5—Brooklyn's automobile show was assured at a recent meeting of the Brooklyn Motor Vehicle Dealers' Association when the Twenty-third Regiment Armory was secured in which to hold the show during the week ending February 25. The association is laying plans for a large and interesting show.

Novel Reciprocal Advertising Scheme

The management of the Eleventh National Automobile Show, which will be held at the Madison Square Garden, January 7 to 21, 1911, has designed and had printed a neat little sticker, which will be furnished in quantities to all exhibitors, who, by attaching them to the backs of all their correspondence from now until show time, may thus remind their clientele that they will be represented at the big exhibition.

Quaker Show in Two Armories

Philadelphia, Pa., Dec. 5—Manager J. H. Beck, of the coming automobile show, has announced that the First Regiment Armory has been leased for the show in addition to the Third Regiment Armory, which had been secured earlier in the season. The show will be held the week of January 14.

This action on the part of the Licensed Dealers' Association was rendered necessary on account of the great pressure to get space on behalf of exhibitors. The two armories are separated quite widely, and in order to equalize the advantages of both for showing the cars the management has arranged to divide the tickets of admission into two coupons, one good for admission at one armory and the other for the other section.

A line of sightseeing automobiles will be run between the two shows during the exhibition to accommodate the patrons.

St. Louis Show Makes Progress

St. Louis, Mo., Dec. 5—Plans are now under way for an automobile show in St. Louis in February, in spite of the action of the Automobile Dealers' and Manufacturers' Association in voting against the project. The association gave as a reason that there was no place in St. Louis large enough adequately to house the exhibit. The management of the Coliseum, where the show was held in 1909, platted the building and then made the announcement that an automobile show would be held there Feb. 13 to 18, immediately after the close of the Chicago display. It is now declared that twenty firms have applied for space, and the management says space has been allotted to the agencies for the Overland, Speedwell, Regal, Reo, Fal, Waverley Electric, Kissel Kar, Henry, Victor, Stearns, Kline, Simplex, Marmon, Haynes, Cole, Velie and Ohio Electric.

More Trucks for Chicago Show

Chicago, Dec. 5—Among the latest additions to the list of trucks that will be exhibited at the annual show are the following: Willys-Overland, Reliance, Peerless, Atlas, Mercury, Dayton, Stearns and Schmitt. The Gramm will not show and neither will the Harder or the Randolph. The Gramm has been announced as among the trucks that will be exhibited at the Palace show in New York, and the Harder and the Randolph could not be prepared in time for the show, according to the statements of officials of the N. A. A. M.

The Falcar will be shown among the pleasure vehicles, despite reports that its makers are signed up for space in another show.

Independents to Organize

According to official announcement an organization of independent motor car manufacturers is projected. A meeting has been called for next week, when it is expected that a large number of unlicensed companies will be represented. The first step in order after organization will be to take over the management of the automobile show that will be held at the Grand Central Palace from December 31 to January 7. It is announced that in addition to this object the organization, which is to be known as the National Association of Motor Car Manufacturers, will promote shows in several of the larger cities.

Paris Automobile Show Opens

Paris, Dec. 5.—The Paris Salon, more complete than ever before and exhibiting the latest refinements in French motor car construction, opened Saturday and will be conducted until December 18.

Successful Three-Day Show in Peoria

Peoria, Ill., Dec. 5—The Peoria Auto Show, which has just closed an exceedingly successful three days, marks an epoch in the history of the motor car business in Peoria. It has proven to the satisfaction of the most skeptical that Peoria occupies an important place in the realm of motordom and that the motor car is a very important factor in Peoria business life.

Originating in the fertile brain of R. E. Lawrence, Peoria's veteran motor car enthusiast, and largely financed and managed by his able hand, the show has been made a marked success, never equaled by anything in the West in a town of this size. Mr. Lawrence did not receive a penny for his share of the receipts, but very generously gave his entire share to the Automobile Dealers' Association, which just recently sprang into existence. The purpose of this organization is to further the interests of the automobile trade in this city by gathering the various dealers together at stated intervals and talking over the vital points of the trade here.

There were over 150 cars on the floor of the Coliseum on the opening day of the exhibition and many more came in on the morning of the second day. This is an excellent showing and has never been equaled in a city of this size. Many exhibitors who have no established agencies here took advantage of the opportunity thus afforded to establish regular places of sale here. There are in Peoria over thirty dealers selling over 100 different makes of cars, and this factor alone is a very important one in the business life of the city.

The paid admissions on the second day of the exhibition numbered over 5,000, which sets a record of attendance in a town of only 70,000 inhabitants. The actual labor of boosting the attendance, apportioning the places to the various dealers and attending to the advertising and general business management was carried out by Mr. A. H. Whigam, who has had a great deal of experience in the motor car business.

The Peoria Automobile Show will, in all probability, be an annual event in Peoria motor circles and if the first attempt of the kind is any criterion there is no doubt that those held in the future will be more successful than those of any other city in the Middle West.

A. H. Whigam, with Manager R. E. Lawrence, has completed arrangements for a show to be held in Springfield during the Christmas holidays. Sixteen of the Peoria exhibitors have signified their intention of participating. Mr. Whigam left Peoria Monday for Springfield to look over the plans for the exhibition, which will be held in the armory.

Worcester Dealers Plan Show

Worcester, Mass., Dec. 5—According to the present plans of members of the Worcester Licensed Automobile Dealers' Association, Worcester will have its first automobile show during the month of February in the new Auditorium building recently completed. The success of the association's open-air exhibition of motor cars at the New England fair this summer proved so successful that it was voted at a recent meeting to hold an annual automobile show and invite manufacturers to exhibit.

Promises of support indicate that the show will be on a scale commensurate with the association's early efforts.

Armories for Canadian Show

Toronto, Dec. 5—The Canadian Government has granted permission to use the armories in Toronto for the National Automobile Show to be held under the auspices of Ontario Motor League from February 25 to March 4.

The building will be elaborately decorated from a military standpoint, and an effort will be made to show the uses of automobiles, motor cycles and commercial vehicles for military purposes.

The manager is E. M. Wilcox.

Portola Race on January 2

San Francisco, Dec. 7—Under the name of the Panama Pacific Road Race, in deference to San Francisco's fight to capture the Panama Exposition in 1915, the oft-postponed Portola Road Race will be held over the San Leandro course on Monday, January 2, under the auspices of the Oakland Automobile Dealers' Association and the Portola Racing Association. The contest will be under the immediate management of Dick Ferris, who successfully conducted the Santa Monica road race on Thanksgiving day, and Walter B. Fawcett of Oakland. The course has been cut down to one-half the distance of the 1909 contest, being practically a parallelogram of 10.923 miles.

Entry blanks are now out and according to advices received the race will bring together many drivers of national fame. Among those counted to take part in events are National racing team, Marmon (Dawson), Marquette-Buick, Lozier, Pope Hartford, Apperson and Fiat. Three races are scheduled. The first event for light cars will be run in divisions and the first division will be for cars of less than 230 cubic meters displacement; second division will be for cars of the 231 to 300 class, distance 100 miles. The second event will be at 152 miles for cars of 300 to 600 cubic inches displacement and may prove one of most important heavy car races of the season. The third event will be a free-for-all, at 207 miles.

Mitchell and Velie Tie for Honors

San Francisco, Dec. 5.—The first forty-eight hour endurance run ever held in this State was conducted under the direction of the Oakland Automobile Dealers' Association. Of the eleven gasoline cars that were entered only two—the Mitchell and the Velie—came through with perfect scores. The one electric car —a Columbus—which was entered under separate rules, came up to every requirement. The cars finished as follows:

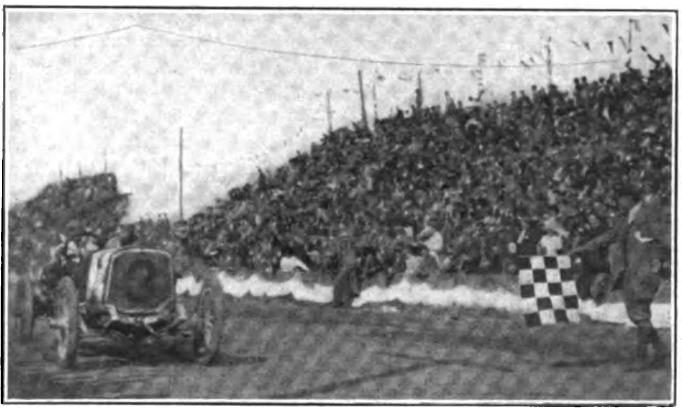
Mitchell, perfect score; Velie, perfect score; Corbin, 3 points; Winton, 4 points; White, 5 points; Maxwell, 17 points; Buick, 18 points; Ford, 361 points; Moon, 762 points; Cartercar, 2,320 points; Reo, withdrawn.

The contest was held over what is known as the San Leandro triangle, in Alameda County, across the bay from San Francisco. The course is 54.6 miles in length and the cars were required to make 24 laps, with two side trips to Idora Park, a total distance for the 48 hours of about 1,347 miles.

Elgin to Stage Stock Car Races

Chicago, Dec. 5.—Assurance that Elgin again will be the scene of a series of National Stock chassis races has been received by the Chicago Motor Club, when it was learned that the Contest Board had agreed to sanction the events.

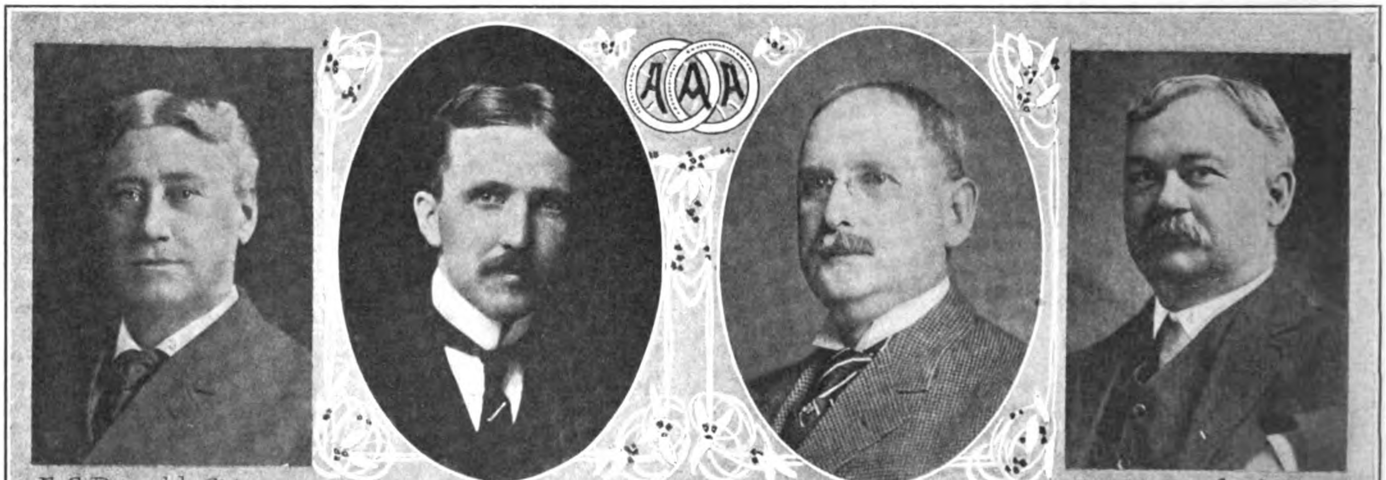
There will be two days of racing; the first for light cars and the second the 300-mile grind for big cars, which carries with it the stock car championship for the Elgin trophy.



Lozier car that broke American road race record in Santa Monica double event

Robert P. Hooper, of Pennsylvania, President A. A. A.

AT the ninth annual meeting of the A. A. A., just concluded in New York City, the report of the nominating committee, of which C. H. Gillette served as chairman, was accepted, resulting in the election of Robert P. Hooper, of Pennsylvania, president; Frank M. Joyce, of Minnesota, first vice-president; F. C. Donald, of Illinois, second vice-president; C. L. Bonifield, of Ohio, third vice-president; F. G. Webb, of New York, fourth vice-president; F. L. Baker, of California, fifth vice-president; John N. Brooks, of Connecticut, secretary; H. A. Bonnell, of New Jersey, treasurer; and the executive committee is composed of: A. G. Batchelder, of New Jersey, chairman; Lewis R. Speare, of Massachusetts; A. H. Knoll, New York; J. P. Coghlin, Massachusetts; Frank G. Webb, New York; A. D. Converse, Massachusetts; H. L. Vail, Ohio; C. H. Robinson, Connecticut; M. C. Moore, Wisconsin; J. P. Walker, California; John Bancroft, Delaware; F. C. Betty, Georgia; Ralph W. Smith, Colorado; E. C. Smith, Vermont; David Beecroft, Illinois; Stedman Bent, Pennsylvania; C. H. Gillette, Connecticut; J. H. Edwards, New Jersey; Paul C. Wolff, Pennsylvania; Edwin S. George, Michigan; H. M. Rowe, Maryland; James T. Drought, Wisconsin; C. A. Quigley, Utah; S. D. Capen, Missouri; Sam T. Atkinson, Virginia; H. L. Gordon, Ohio; Charles M. Doe, Rhode Island; F. E. Edwards, Illinois; A. E. Lerche, Massachusetts; S. M. Miles, of the National Association of Automobile Manufacturers, and Alfred Reeves, General Manager of the A. L. A. M.



F. C. Donald, *Chicago*, Second Vice President

Robert P. Hooper, *Philadelphia*, President

Col. Frank M. Joyce, *Minneapolis*, First Vice President

Dr. C. L. Bonifield, *Cincinnati*, Third Vice President

The new president upon taking the chair announced that Howard Longstreth, of the Philadelphia A. C., would succeed Powell Evans, of the same club, in the capacity of chairman of the Touring Information Board. The hold-overs are: George C. Diehl for Good Roads; Charles Thaddeus Terry, Legislation; and Robert Bruce, Touring Information.

It will be understood that none of these elections or changes will have any effect whatever upon the status of Chairman S. M. Butler, of the Contest Board, whose work, involving the supervision of contests, is conducted independent of other A. A. A. activities.

Among those who participated in the meeting were the committees which reported progress along their respective lines, including John Bancroft, Delaware; F. E. Edwards, Illinois; Doctor H. M. Rowe, Maryland; A. D. Converse, Massachusetts; Edwin S. George, Michigan; Col. F. M. Joyce, Minnesota; J. H. Edwards, New Jersey; F. G. Webb, New York; H. L. Vail, Ohio; Paul Wolff, Pennsylvania; John N. Brooks, Connecticut; Sam P. Atkinson, Virginia; M. C. Moore, Wisconsin; and S. S. Ballard, Vermont.

L. I. A. C. Marks Tenth Milestone

BROOKLYN, Dec. 7—Ten years of active life have been passed by the Long Island Automobile Club, and the tenth anniversary of the formation of the club was fittingly marked to-night at the headquarters of the organization, 920 Union Street. There was an elaborate dinner, an interesting program and the annual election.

Among the speakers were Judge Luke D. Stapleton, Thomas Peters, Edward M. Bassett, the Rev. D. J. Hickey, Allan C. Alderman, retiring president, and William C. Schimpf, the leading candidate for presidency in the organization. The following ticket was submitted by the nominating committee: William C. Schimpf, president; Henry H. Price, M., D., vice-president; Charles Herrmann, secretary, and C. H. Galt, treasurer. Board of Governors, class of 1912, W. P. Richardson, Herbert G. Andrews and Edward Ashford.

The club was the second automobile organization to be formed in the United States. To-day it is rated high as a factor in motordom in its field and throughout the State of New York. Its garage is most complete from every standpoint.

Club Hears About Gasoline

HARTFORD, Dec. 5—The first of a series of semi-monthly winter meetings of the Automobile Club of Hartford was held at the club rooms on Trumbull Street Friday evening. E. W. Marshall, of New York, gave a talk on gasoline and performed a number of interesting experiments. At the next meeting, which is to be held two weeks hence, Herman F. Cuntz, patent attorney of the A. L. A. M., will tell all about the Selden patent.

Willimantic Club Elects New Officials

WILLIMANTIC, Dec. 5—The annual meeting of the Willimantic Automobile Club was held in the rooms of the Board of Trade Thursday evening and the following officers were elected for the ensuing year: President, George A. Bartlett; vice-president, Walter B. Knight; secretary, Harry Cotter; treasurer, Edward J. Tryon; board of governors, above named officers and E. R. Chesbrough, E. T. Bugbee and F. L. Powell.

Wilson Reports on National Highways

WASHINGTON, D. C., Dec. 5—"By reason of a rather remarkable combination of conditions, the immediate present may be considered the most important period in the history of road improvement in the United States," says Secretary of Agriculture Wilson in his annual report to President Taft. "The old systems of road administration, involving the principle of extreme localization, are fast breaking up, and new systems, involving the principle of centralization, are taking their place. Road administration is, therefore, in a transitional or formative stage, and it is of the utmost importance that the movement be directed along right lines.

"It is a curious coincidence that the introduction of the motor vehicle at about the time when these changes in administration began has brought about traffic conditions which have necessitated an equally radical departure from old methods of construction and maintenance. It will thus be seen that the entire subject of road improvement, involving administration, construction and maintenance, is passing through an exceedingly important period, in which the educational and scientific work of this branch of the service should prove of the greatest value.

"During the past year the office of public roads has continued giving instruction in the methods of road building peculiarly adapted to each locality. This instruction has been given through the medium of object-lesson roads built at local expense under the supervision of an engineer from the office. The advisory work of the office during the year covered a wide field relating to construction of various types of roads, surveys, use of convicts in road work, bridge construction, maintenance, use of the split-log drag, road materials, effect of motor vehicles on roads, the issuance of bonds for road improvement, the drainage of roads, and other work along similar lines.

"The office is assembling reliable data as to the progress of road improvement in the United States and the relation of roads to agriculture. Through an organization composed of special agents in all parts of the United States, the office will soon be in a position to receive prompt reports of progress along all lines. This information will be disseminated in such a way that the work in the various States can be so correlated and coordinated as to minimize the duplication which is now so much in evidence. In the routine testing and examination of road materials great progress has been made along established lines.

"The need for better culverts and bridges for our public highways is becoming evident, both from the point of economy and safety for the public. Information on this subject in suitable form has been in the past and still remains fragmentary and scattered. Detailed information is now being collected.

"During the past year the work of the office relative to the investigation of the problems of dust prevention and road preservation has advanced rapidly. Routine tests or analyses of bituminous road materials made in the laboratories during the past year were more than double the number made during the preceding year. A number of these examinations were made in conjunction with the experimental field work of the office. Through its laboratory work the office has been able to offer valuable advice in regard to specifications for bituminous road binders, and in many instances to frame such specifications upon request of various public-service bodies. A number of the State highway commissions have profited by this opportunity."

A. S. C. E. to Discuss Roads

Road Construction and Maintenance will be the topic for discussion at special meetings scheduled in connection with the annual meeting of the American Society of Civil Engineers which will convene January 18 at 220 West Fifty-seventh street, New York City. The annual meeting will occupy two days, but after it is finished, three special meetings will be held January 20 and 21.

A representative attendance is assured and the subject, which is of vital importance, will be treated from all sides by speakers who have made it an intimate study.

Kentucky Seeks Good Roads Law

LOUISVILLE, KY., Dec. 5—Important steps looking to a system of good roads for Kentucky were taken at the recent meeting of the Kentucky Good Roads Association.

A law was drafted in synopsis form for submission to the Legislature, providing for a State Highway Commission; a 5-cent tax to be levied upon each $100 valuation of assessable property; a county tax for the maintenance of new roads and highways after completion and a definite provision for the State to pay a maximum of 50 per cent. of the cost of the construction.

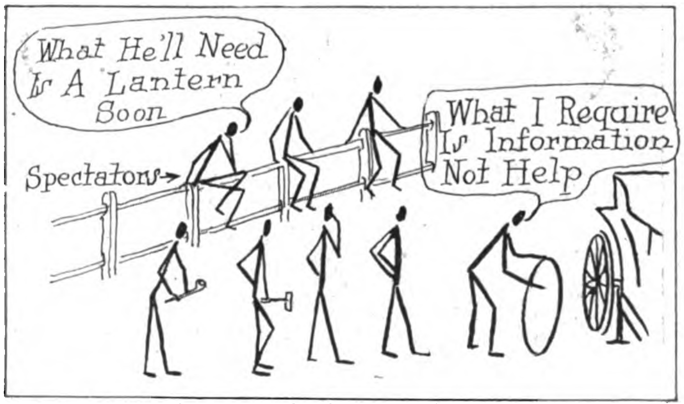
This draft will be submitted to the Good Roads Congress that meets here this month and a bill will be framed after approved by that body.

N. Y. Dealers' Run Decided

A. R. Pardington, referee in the recent two-day endurance run of the New York Automobile Trade Association, filed his long-deferred report on the event late yesterday afternoon. The reason for the delay was the fact that only nine of the entrants who completed the run had filed stock car certificates covering the models entered. This, together with the fact that entries were received right up to the night before the start, prevented a technical examination of the cars, as provided in the rules governing Group 1 endurance runs. It was determined to conduct the affair anyway under Group 4 rules, which do not require a technical examination.

After the run was completed it was discovered that certificates were lacking in a majority of the entries and in order to find a basis upon which to distribute the advertised prizes it was necessary to gain the consent of all the competing entrants to waive their right of protest on that score. This was done and the winners, according to Referee Pardington's report, are as follows: Class A, Division 1A, Ford, number 1; Division 2A, Hudson, number 4; Division 3A, touring cars, Maxwell, 10; runabouts, Pullman, 7; Division 4A, touring cars, Haynes, 14; Division 5A, touring, Corbin, 21; runabouts, Pullman, 18; Division 6A, touring, Oldsmobile, 26; runabouts, Matheson, 27.

Chairman Butler, of the Contest Board, severely criticised those responsible for the mix-up, but no action was taken to disqualify the event.



Plenty of help—but it don't go on

News of Maker and Dealer in Many Fields

THE formal opening of the new premises of the United Motor New York Company, at 7 West Sixty-first street, in the United States Motor Company building, on Saturday evening last, was one of the significant events of the week.

There was an unusually large gathering of guests, whose attention was about equally divided between the new models of Maxwell and Columbia cars and the excellent manner in which the United Motor New York Company is equipped to take care of its customers, under the management of Col. K. C. Pardee.

The new salesrooms were artistically decorated and the lights that gleamed from the finely finished bodies made a spectacle closely resembling a section of a great automobile show. An orchestra enlivened matters during the evening, and a caterer contributed further to the entertainment of the guests.

There were exhibited models of Columbia gasoline cars, Mark 48 and 85; two Columbia electrics, a victoria phaeton and a brougham, and all the Maxwell 1911 line.

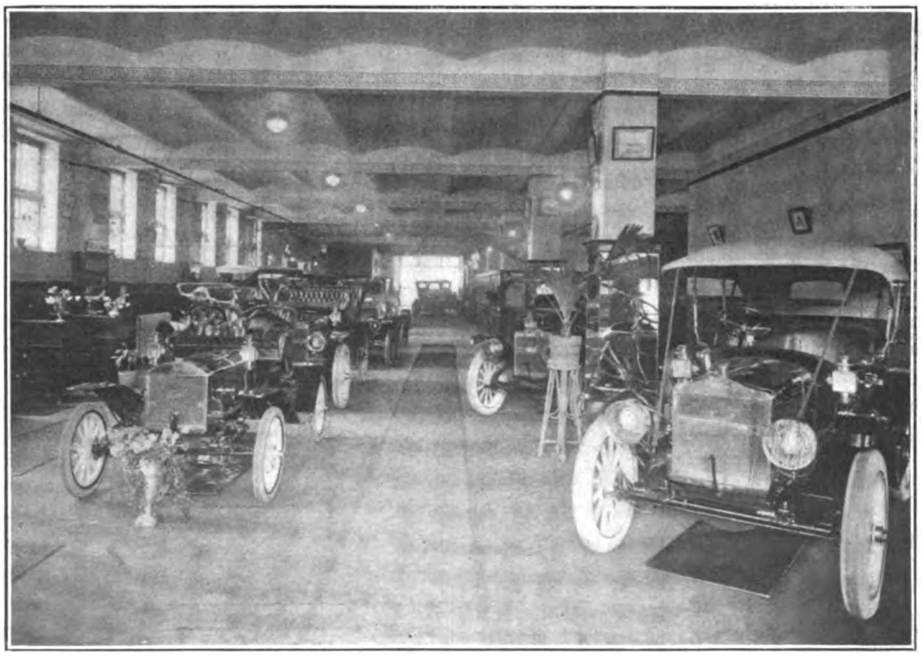
Truck Contest Body Forming

Temporary organization has been effected of a body that will be known as the Commercial Vehicle Trade Association, which is being formed for the purpose of conducting truck contests. James A. Hemstreet was named as temporary chairman, with E. A. Levy as secretary.

The committee on rules and by-laws, which was charged with the preparation of a constitution, was named as follows: C. E. Stone, F. B. Porter, R. F. Alcutt and G. Hartman. E. L. Ferguson, now in charge of the transcontinental trip of an Ohio car, was nominated as chairman of the contest committee. Another meeting has been called for this week.

Fine Home for Haynes in Syracuse

SYRACUSE, N. Y., Dec. 5—Upon a site that was formerly a professional ball park, and which for the past year has been a city dumping ground, is being erected what is claimed to be one of the most modern and up-to-date fireproof garages yet built in the State for the Haynes line. The building has a frontage of 125 feet on Taylor Street and 38 feet on South Clinton Street. The showroom, fronting toward South Salina Street, will be 37 by 36 feet in dimensions. This showroom front is but 150 feet from South Salina Street, the main business artery of the city.



United Motor New York Company's new Columbia salesroom in United States Motor Company Building, 7 West 61st St., opened Saturday, December 3

Gibney Goes to London, Paris and Berlin

Mr. John L. Gibney, of the firm of Jas. L. Gibney & Bro., Philadelphia and New York, sailed from New York on the S.S. *Mauretania,* Nov. 30, to attend the Paris Automobile Show.

The Gibney Co. have extensive connections abroad, where the Gibney Elek-Trick Vulcanizer is well and favorably shown.

While in Europe Mr. Gibney expects to visit London, Berlin and other European capitals in connection with their export business, which has grown to very large proportions.

Corbin to Make One Cheaper Model

Following the trend that has been apparent in some manufacturing quarters, the Corbin Motor Vehicle Corporation has determined to put out one cheaper car in 1911. This model will be identical in all particulars with the other models, save for the fact that the wheelbase will be shorter, with a corresponding lightening of the car, and the price will be materially lower.

Merger Planned for Ohio Electric

TOLEDO, O., Dec. 5—Negotiations are pending which if successfully concluded will give Toledo one of the largest electric carriage plants in the country. The plan proposes to merge the Ohio Electric Car Company with the Milburn Wagon Works, and committees of the two companies have been working on the proposition for some time. The Milburn Company has a capital of $700,000 and is engaged in the manufacture of farm wagons, buggies and automobile bodies. The Ohio Electric Car Company was organized about two years ago with a capital of $75,000, which was later on increased to $150,000. Its officers are: President, A. M. Chesborough; vice-president, R. R. Lee; treasurer, James Brown Bell; secretary, F. D. Suydam, Jr., and general manager, H. P. Dodge. Heretofore the Milburn Company has manufactured the bodies for the cars turned out by the Ohio Electric, its motors and other parts being made in other plants. It is now planned to have the new company make all of the parts used in the car. If the merger is not successfully concluded the Ohio Electric will expand and will build a new plant of its own in the near future.

Stuyvesant Plans Outlined

CLEVELAND, O., Dec. 5—The Gaeth Automobile Company has been purchased by the Stuyvesant Motor Car Company, and after the cars on hand have been sold the Gaeth will appear with several refinements. The Gaeth motor will be retained, but the frame of the car as well as the body will be lowered. The price will be reduced to $3,200 and $3,000.

The Stuyvesant Company will manufacture the Stuyvesant Six and will establish agencies throughout the United States for both lines.

The Stuyvesant Six is built with six cylinders cast en bloc. The motor is 4½ by 6 and intake, exhaust, water manifolds and oil lines are cast integral. The car has a wheel base of 130 inches.

The large plant formerly occupied by the Warren Electric Company at Sandusky, O., has been purchased, giving the company 140,000 square feet of floor space. The Stuyvesant Six will be made there. The officers of the company are: President, F. E. Stiverson; vice-president, C. J. Castle; secretary and treasurer, A. C. Newton.

Chalmers Salesmen in Convention

Detroit, Dec. 5—Sales representatives of the Chalmers Motor Company assembled in annual convention last Monday, remaining in session for four days. The attendance was over 150, including dealers and salesmen from all over the continent, with a sprinkling from more distant places.

The convention opened with a trip through the plant of the Chalmers Company. The remainder of the convention was devoted to business sessions, both morning and afternoon.

It proved to be the consensus of opinion among the men who are dealing directly with the automobile buying public, that the industry was never on a better basis. The reports of a slump and panicky anticipations of a general crash in the industry found no support among the Chalmers dealers.

C. C. Hildebrand, assistant general manager for the company, acted as chairman of the convention.

Among the principal speakers were Mr. Chalmers, on "The Future of the Automobile Industry" and "Selling Chalmers Cars;" Mr. Lee Counselman, vice-president of the company, gave the "History of the Chalmers Company and Chalmers Cars;" George W. Dunham, consulting engineer, on "The Construction of Chalmers Cars;" Carl H. Page of New York, on "The Future of the Automobile Dealer;" Charles E. Whitten of Boston, on "The Advantage of Taking Care of Users;" James Levy of Chicago, on "Selling and Delivering Cars in Winter;" H. W. Ford, on "Chalmers Advertising;" George W. Hipple of Philadelphia, on "The Instruction of Automobile Salesmen;" George Grant of Detroit, on "The Arrangement of Salesrooms." The other speakers were W. S. Keeler, Kansas City; S. S. Primm, St. Louis; J. H. McDuffee, Denver; H. H. Taylor, Hutchinson, Kan.; E. A. Gilmore, Boston; J. S. Swindemann, Toledo; George Paddock, Newark, and H. L. Keats, Portland, Ore.

The convention closed Thursday night with a banquet to the dealers and guests of the Chalmers Motor Co. Two hundred and twenty-five sat at table.

The following is a list of the Chalmers dealers who attended the convention: W. H. Woods, C. C. Sturtz, George W. Woods, E. C. Sawyer, Floyd W. Northcutt, Arthur Stanley Zell, Charles E. Whitten, E. A. Gilmore, Mason B. Hatch, Ferdinand Sheagren, F. H. Trego, E. B. Finch, A. B. Gibbes, F. J. Gibbes, A. B. Whitney, I. P. Madden, R. P. Atkinson, S. B. Featherston, D. I. Hoch, James Levy, J. E. Warren, J. H. Ratliffe, C. Arbogast, Charles M. Kelso, Benjamin H. Ooley, W. L. Mason, George D. Grant, Charles A. Grant, William A. Ryan, J. H. McDuffee, Forrest Holmes, William G. Holmes, Asa W. La France, Coleman T. La France, J. E. Fields, L. A. Cooper, W. S. Farrant, Harry Unwin, A. C. Burton, Robert L. Montgomery, E. C. Irvin, A. E. Stitt, H. H. Taylor, S. W. Elston, Lloyd S. Johnson, Mr. Mallard, T. G. Burkhardt, V. L. Young, A. L. Blake, W. S. Keeler, John A. Nelson, W. S. Boone, C. M. Marshall, George A. Jamison, Frank C. Neuman, Charles E. Hathorn, F. S. Weir, H. I. Martin, E. J. Phelps, Joseph J. Barclay, F. L. Caulkins, H. A. Peterson, Charles H. Durheim, A. H. Dorsey, G. G. Quimly, L. D. Robertson, W. G. Hirsig, A. C. Pollard, Wilbur A. Maynard, George Paddock, Edward J. Thurber, John Weigel, Jr., Walter L. Garside, Carl H. Page, W. W. Burke. George Stowe, Mr. Sammis, Mr. Downer, W. M. Quimby, Mr. Rose, Mr. Hibbard, George Conlon, Joseph Bell, C. Moller, H. E. Frederickson, M. F. McCoole, E. A. Fordon, Mr. Villari, H. L. Keats, D. A. Harrington, R. G. Kennedy, F. R. Cook, John Van Benschoten, M. E. Parott, George W. Hipple, Arthur J. Mills, A. A. Mills, T. C. Nichols, T. P. Blain, Lee A. Folger, E. S. Youse, E. P. Brinegar, O. W. Hatcher, J. H. Valentine, Harold Conrad, Heath Gregory, H. T. Herbele, L. H. Smith, B. A. Burtiss, S. S. Primm, H. A. Wetmore, J. G. Swindeman, W. S. Hubbell, T. C. Ferguson, A. Cotching, Edeson A. Perkins, F. A. Close, A. H. Westcott, G. W. Donaldson, F. C. Sibbald, F. H. Bryant, G. H. Schollenberger, M. H. Schollenberger, M. H. Wood, M. E. Wood, E. R. Kiess, R. H. Milnor, J. S. Harrington, Joseph Speidel, R. H. Anderson, I. Van Baelin, Charles S. Snyder, W. Cannon, E. A. Beecher, Charles Chalmers, H. L. Johnson, T. A. Crisman, E. L. Anthony, J. C. Lewis, F. J. Collingwood, C. A. Baird, W. L. Mason, R. B. Jacobs, Harry Woolaver, O. La France, J. H. Martin, Harry Pyke, W. B. Westcott, J. W. Ball, H. C. Droge, C. W. Landers.

Banquet of First Annual Convention of Chalmers dealers at Hotel Pontchartrain, Detroit, Dec. 1, 1910

Peeps Through Auto Goggles at Distant Lands

SCOTLAND has her preference in the matter of automobiles and is not backward in expressing her mind. Generally speaking, the automobile that she prefers is one of about 20-horsepower, which retails at from $1,500 to $2,000. Motor cars larger and more powerful are found there, but the 20-horsepower machine has the preference. French automobiles had a fair sale in Scotland a few years ago; but blood is thicker than wine and as soon as the British manufacturers showed an inclination to improve their cars, the home-made product began to get a grip on the Scotchman. Besides, the reduced price of the English machine has a good bit to do with it. Sentiment, too, must not be forgotten. It plays an important part in the deal, inasmuch as the cry of "Great Britain for her sons, be they English, Scotch or Welsh," is growing daily through the land.

While it is true that American dealers are quoting prices lower than those for British-made cars of the same power and type now being offered in the British market, "it is to be feared that these moderate prices will not by themselves help much in securing a market here, for it is generally believed that the British-made cars are sold as low as possible consistent with good workmanship and material and it is the firm belief of practically everybody in this country that automobiles can be made much cheaper in this country than anywhere else. When an automobile is offered at a price considerably lower than that of a British-made machine of the same power and type, the customer will very likely be slightly skeptical as to its quality and durability and it is very unlikely that he can be convinced otherwise, especially if business is sought only through the medium of correspondence and the sending of catalogues and price lists." There is but one way to introduce foreign-made automobiles successfully, in Great Britain, and that is by assigning a competent salesman to the localities which the foreign manufacturer wishes covered, with a number of cars which may be seen by dealers and other interested parties, in order that they may ascertain how the machines are made and judge for themselves what they are capable of doing. Yet in spite of all of the attractions, it is true that many people who have made up their minds to purchase automobiles much prefer to go up to London for them. It is also true that frequently they get a better bargain in the capital than they could have secured in the cities of the North. Although there are no fixed standard gauges for cars in Great Britain, the most common sizes range from 4 feet 2 inches to 4 feet 7 inches between the middle lines of the tires. There are 2,823 motor cars, 37 motor wagons and 797 motorcycles registered in the Dundee district of Scotland.

From Manchester comes the news that "the mode of procedure of certain American automobile salesmen is being severely criticised and it is suggested that the methods to be adopted by them in the near future will not appeal to the British public." Reference in this connection is made of "two schemes to which objection has been taken, viz., 'Every sixth purchaser of a car will have its essential parts renewed at the end of twelve months.' And, again, 'the purchaser who can show the biggest mileage for twelve months gets a new car.'" This form of advertising at once arouses suspicion in the mind of the intending English purchaser and it is hinted that the prospect for the cheap type of American car—which is no doubt alluded to—is by no means convincing.

British automobiles of the 1911 models show an increase in the number of cars, both in the matter of high and low power. Such of these as are fitted with four speeds, instead of three speeds, are very conspicuous. A noted growth in the use of the worm drive is reported, not only in the number of manufacturers who employ the worm drive, but also the number of cars of higher power thus fitted. An authority says that "semi-mechanical lubrication, that is, by pump-filling troughs beneath each big end continues to increase in favor, which also applies to the system of complete mechanical lubrication—forcing the oil under pressure through a hollow crankshaft." The high-tension magneto has, to all intents and purposes become universal relative to ignition. It is used on the smaller cars in its simplest form, while on the larger automobiles it is employed in the dual form to give easy starting. The fitting of the two entirely separate ignitions is becoming rarer and is now confined almost entirely to the more expensive and larger types of cars. There seems to be a leaning toward "tires fully up to their weight." The falling back to smaller tires with larger diameter wheels, with the idea that they would equal in wearing properties the thick tires and smaller wheels, is halted on the theory that it increases troubles with tires and expenses to a great degree at the same time that it reduces comfort.

A British maker is quoted as saying that the American car should sell well, and the newspaper in which the statement is published advises the home manufacturers to "standardize a given type of car and push it for all it is worth, as is done in the United States." It is said that while the automobile industry is in a flourishing condition in Great Britain, the cars cannot be produced so economically because of the greater productiveness of the American automobile manufactory, which enables it materially to reduce the cost. This being the case, it has been suggested that there will no doubt be a large shipment of American cars to the British market this season. To this end it is imperative that the American automobile manufacturers should send to England only thoroughly tested cars of proved character, that is, of a kind which will reflect credit upon the American automobile manufacturing industry as a whole.

In England the automobile is being made wide use of as a means of transportation during political campaigns; not solely for the purpose of carrying speakers from point to point, as is also done in America. But "special motor cars convey verbatim reports of Mr. Balfour's speech to the Home Secretary at Sheffield, enabling him to study the address on the train."

Comparatively little attention has been given to the electrically propelled vehicle in the United Kingdom. Every tendency in connection with the shaftless carriage over there has been along the lines of the gasoline motor.

Seventy-eight automobiles were imported into Siam last year, valued at $146,019. Only three of these machines were manufactured in the United States, and their aggregated value was $2,113.

Collier New Aero Chief

Robert J. Collier has been elected president of the National Council, the body which was formed to control in large measure the American aero clubs and organizations. The following executive committee was also named:

Arthur T. Atherholt, Pennsylvania; Cortlandt F. Bishop, representing the New England Aero Club; Robert J. Collier, Aero Club of America; James King Duffy, Aero Club of New Jersey; Dr. J. C. Eberhardt, Aero Club of Dayton; Clifford B. Harmon, Aero Club of America; George B. Harrison, Aero Club of California; Jerome H. Joyce, Aero Club of Baltimore; A. B. Lambert, Aero Club of St. Louis; George M. Myers, Aero Club of Kansas City; James E. Plew, Aero Club of Illinois; George A. Richardson, Intercollegiate Aeronautical Association; Allan A. Ryan, Aero Club of America, John M. Satterfield, Saratoga Springs Club, and Dr. A. F. Zahm, Washington (D.C.) Club.

The executive committee named as vice-chairmen Messrs. Clifford B. Harmon, George M. Myers, J. C. Eberhardt and Cortlandt F. Bishop; Secretary, Mr. James King Duffy; Treasurer, Colonel Jerome H. Joyce.

News in Brief from the East, West and South

RED OAK, IA., Dec. 5—Aleck Peterson has taken the agency for Buick cars and is erecting a large new garage.

PHILADELPHIA, Dec. 5—The local branch of the Michelin Tire Company has been removed to larger rooms at 1304-06 Race street.

INDIANAPOLIS, Dec. 5—G. O. Simons, formerly of the Dayton Motor Car Co., Dayton, O., has been appointed superintendent of the Parry Auto Co.

NEW BRITAIN, CONN., Dec. 5—L. M. Barnes has purchased the New Britain garage and intends to put in a full line of supplies and accessories.

JACKSONVILLE, FLA., Dec. 5—Joseph H. Walsh, 12 East Adams street, has secured the distributing agency for Firestone Tires and Demountable Rims.

BATH, N. Y., Dec. 5—C. B. Kirkham, general manager of the Kirkham Motor Mfg. Co., has resigned and has entered the manufacture of aeroplanes and aerial engines.

WHEELING, W. Va., Dec. 5—The Reppetto-Oakland Motor Car Company announces that it has secured the agency for the Oakland for Ohio and Marshal counties in West Virginia.

SYRACUSE, N. Y., Dec. 5—The Kerr-Doane Motor Company is about to move into its new garage at So. State and Cedar Streets. The building is 60 x 120 and is constructed of steel and tapestry brick.

HASTINGS, NEB., Dec. 5—E. A. Brandes, formerly of Jones & Brandes of this city, will handle Auburn cars for this territory this year, having signed a contract with the Omaha Automobile Company.

PHILADELPHIA, Dec. 5—The Swinehart Tire & Rubber Company, of Akron, Ohio, is moving into its new branch at 320 N. Broad Street, Philadelphia, Pa. Frank D. Wait is manager of the new branch.

OMAHA, Dec. 5—The officers of the Omaha Speedway Association have already started men to work on the one-mile dirt speedway, determined to make it one of the finest tracks in this section of the country.

HUDSON FALLS, N. Y., Dec. 5—Work has been commenced on a two-story brick garage for Smith & McCoy, distributers of the Maxwell, Columbia and White cars for Washington, Warren and Saratoga counties.

MILWAUKEE, WIS., Dec. 5—The Auto Supply Co. has just opened at 127 Second street and will handle a full line of accessories and supplies, dealing in the same exclusively. This company has taken the State agency for the Rayfield carbureter.

PHILADELPHIA, Dec. 5—H. E. Allmang, for many years connected with the sales force of the Autolight & Motor Supply Company, was recently appointed manager of the automobile accessory department of the Keim Supply Company, 1227 Market street.

SYRACUSE, N. Y., Dec. 5—T. E. Willis has taken over the agency of the Baker Electric, Selden, Oakland and Oldsmobile. The Central Auto Sales Company formerly handled these cars. Mr. Willis will conduct his business in a six-story garage at 628 Montgomery Street.

NEW YORK, Dec. 5—Vice-President J. I. Handley, of the United States Motor Company, has just returned to New York from an extended Western trip. He reports an optimistic situation relative to 1911 motor car sales and believes that the 1911 season is to be a record breaker.

TOLEDO, O., Dec. 5—The Rassel Motor Company was recently incorporated with a capital stock of $125,000 to do an automobile manufacturing business. The incorporators of this latest Toledo concern are Edward C. Rassel, Richard D. Longan, William E. Brown, Edwin Tait and Nicholas W. Rassel.

PHILADELPHIA, Dec. 5—Thomas H. Smart has been appointed district manager of the Willys-Overland Company, his territory embracing Virginia, West Virginia, Maryland, Delaware, North and South Carolina and the District of Columbia, with headquarters at Washington. George W. Bennett is assistant manager.

NEW YORK, Dec. 7—Fire in the offices of the Dorian Demountable Rim Co., in the Thoroughfare building, Monday, caused considerable loss and forced the company to remove to temporary offices at 225 West Fifty-seventh street. In about a week the company will move into its permanent offices at 1804 Broadway.

DETROIT, MICH., Dec. 5—C. W. Dickerson, formerly vice-president of the Columbia Trust Co., of Middletown, Conn., and at one time president of the Sterling Cycle Works, has become identified with the executive force of the Timken Detroit Axle Co., and has assumed the position of assistant treasurer.

INDIANAPOLIS, Dec. 5—The new Premier catalogue not only shows the Premier six-cylinder and four-cylinder cars in their various models, but also gives a number of photographs of the mechanical details, the illustrations of the chassis and partially assembled parts being especially interesting. It is elaborately and handsomely handled throughout.

NEWARK, N. J., Dec. 5—Remedial motor legislation embodying the resolutions adopted by the New Jersey Automobile and Motor Club have been whipped into legal shape by Vice-President Harry D. Bowman and will be thoroughly discussed and debated upon by the many motorists interested prior to their presentation to the next Legislature.

CLEVELAND, Dec. 5—The Regal branch opened an agency in Coshocton county this week. F. B. Thomas was appointed agent for the full Regal line. C. C. Crawford joined the sales force of the Studebaker Company during the past week. J. C. Anderson, E. 110th Street and Superior Avenue, has accepted the agency for a commercial line of motor vehicles.

TRENTON, Dec. 5—J. C. Matlack has been appointed secretary and general manager of the Ajax-Grieb Rubber Company. The executive offices are now located at 1777 Broadway, New York, with the factories at Trenton. By New Year's Day the New York offices will be moved to larger quarters across the street in the new Ehret Building.

BOSTON, Dec. 5—Under the new arrangement of the selling forces of the Jacobson-Brandow Company, the products of that company will be handled by the Pettingill-Andrews Company, Boston; J. Stewart Smith, New York; Horace C. Mills, Detroit, and by C. A. Mattison, assistant manager, Pittsfield, Mass. The Pettingill-Andrews Company until recently had the exclusive selling agency.

PORTLAND, ME., Dec. 5—The Mank-Stuart Motor Car Co., distributors of the Cadillac line, have taken over the former Portland Motor Mart, on Forest avenue opposite the Congress Square Hotel, and will improve and remodel it. The garage will be 270 by 130 feet and equipped with modern devices in every department. The company will carry a full line of high-grade parts and accessories.

BOSTON, Dec. 5—An agency for the Enger car has been opened in Boston with L. J. Coburn in charge. It is known as the Coburn Motor Sales Company. A. L. Bennet, special representative of the Westcott car, has been in Boston several days looking over the field with a view to placing an agency in the Hub. James A. Braden, of the Diamond Tire Company, has been inspecting the new building being erected in Boston for that company on Boylston Street.

BALTIMORE, MD., Dec. 5—Among the recent trade announcements in Baltimore, Md., are that the Lozier agency has been placed with Edwin Weischmann under the name of the Lozier Motor Car Company. The Moon car is being taken care of by the Cooper and Upton Company, while the Shaab Automobile Company, Stoddard-Dayton agents, are preparing to move into their new and more spacious quarters, opposite the present store, on Mount Royal Avenue, west of Maryland Avenue.

Among the Accessory Makers

THE NEIL WARNING SIGNAL LAMP; DIXIE AUTOMOBILE HORN; APCO RUBBER PEDAL COVERS; THE MUNCIE BRAKE DRUM

WARNING SIGNAL LAMP

The device shown in Figs. 1 and 4 consists of a combined signal and tail lamp in connection with a special forked bracket so made that it will carry both the lamp and number plate.

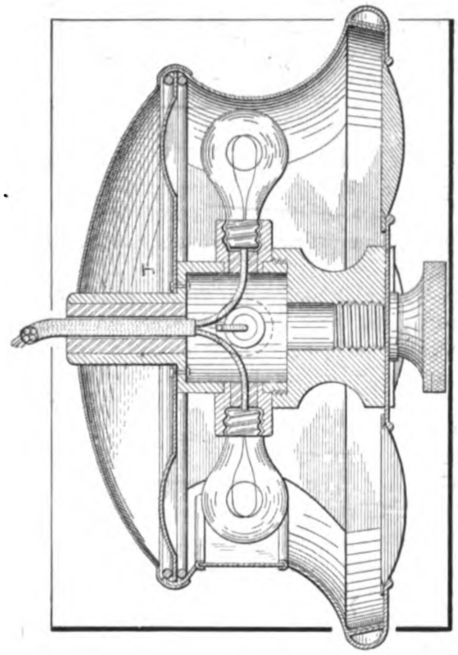


Fig. 1—Cross section of the warning signal lamp

The front or face of the lamp is fitted with four bullseyes, the upper one being green, the lower one red and the remaining two plain white. The upper three constitute the signal device, the lower one acting as the tail lamp or danger signal and also casting a white light through the glass covered aperture in the bottom of the lamp directly upon the number plate.

The signal device can be used either by day or night and at the front as well as the rear of a vehicle.

The system may be operated either by means of a switch located within the rim of the steering wheel or at any other convenient place desired, or automatically. The stop signal can also be operated automatically. The lamp is manufactured by Geo. E. Neil, of Cleveland, Ohio.

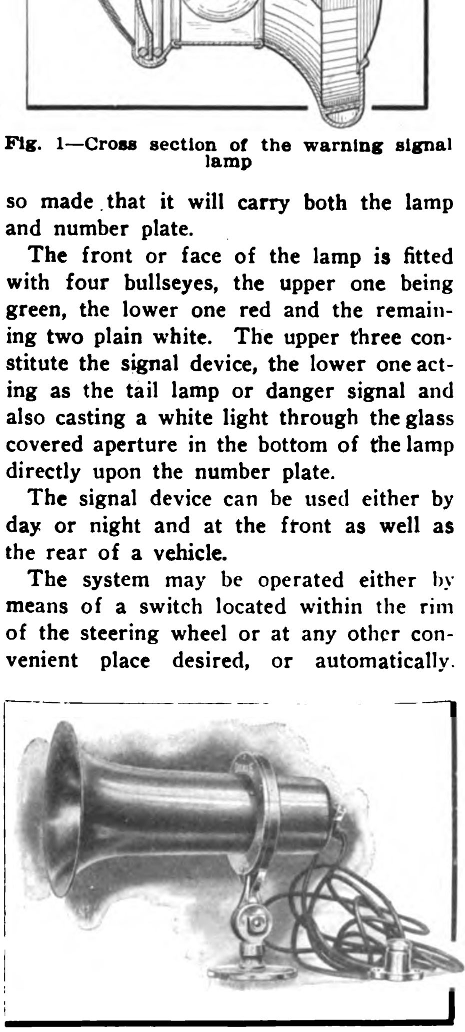


Fig. 2—Vibrating type electric horn

THE DIXIE AUTOMOBILE HORN

A new atuomobile horn, known as the "Dixie," is now on the market. It is designed to operate on a standard ignition set of four dry cells or a six-volt storage battery.

The "Dixie" is quick in action, being of the vibrating type, and substantially constructed. It makes enough noise to secure the right of way without depriving the inoffensive hearer of the power of locomotion. Either the elbow or steering wheel button is supplied complete with operating cable. An adusting screw in the rust-proof diaphragm gives a high or low tone, as desired.

The "Dixie" horn is manufactured by Edwards & Company and sold by all first-class supply houses and garages and by the Western Electric Company, 463 West St., New York City.

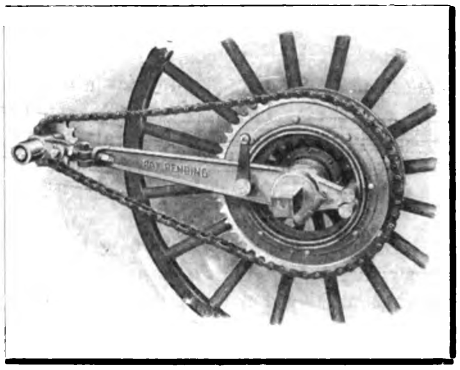


Fig. 3—Chain adjuster and brake drum

RUBBER PEDAL COVERS

To overcome the inconvenience caused by the pedals becoming slippery with wear and the likelihood of the feet slipping off, the Apco Pedal Grips should fill a long-felt need. They consist of rubber pads with bolts and nuts attached, as shown in Fig. 5, and are fitted to any pedal by drilling two holes. The rubber is corrugated and the surface is a cushion, the foot closing down on it with such a secure hold that there is no fear that if the brake pedal is pushed down hard the foot will slip off. The pedals are made by the American Pedal Co., of 1733 Broadway, New York City.

MUNCIE BRAKE DRUM SHOWN

Referring to Fig. 3, of the Muncie brake drum, attention is called to the improved form of design and the straightline effect which is known to give strength and so distribute the strains that rupture is not at all likely. This assembly shows one of the several in the line which is turned out by the Muncie Gear Works, of Muncie, Ind., and in this example it will be observed that the sprocket wheels are exactly spaced by a distance rod of the graduated I-section design, with means for altering the length between centers to compensate for any differences that may creep in during long service. The distance rod also passes across the center and serves as a support for the pull of the brakes when they are applied. Among the products of the company is a line of brakedrums, connecting-rods, adjustable chain-tighteners, and, in fine, everything that can be used to advantage in the assembling of automobiles. Concomitant with the other work is a line of bevel gears and pinions, they being made after the most approved fashion, and in the cutting of the teeth the matter of noise is given due consideration, it being recognized that this is the day of noiseless performance.

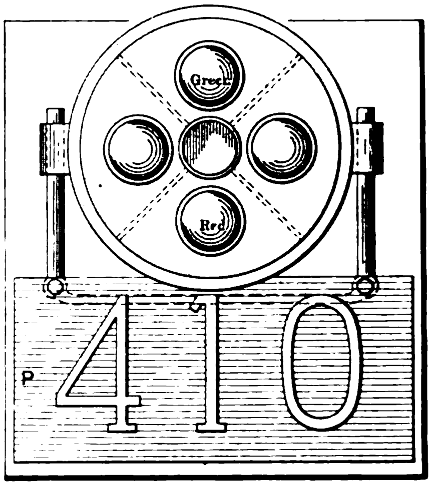


Fig. 4—Rear view of warning signal lamp

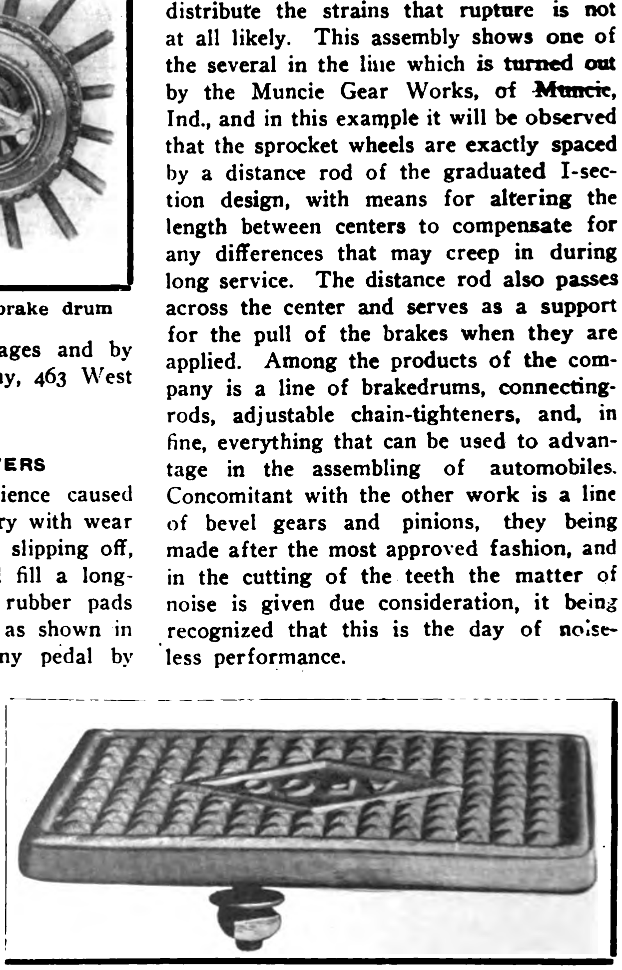


Fig. 5—The Apco non-slip pedal cover

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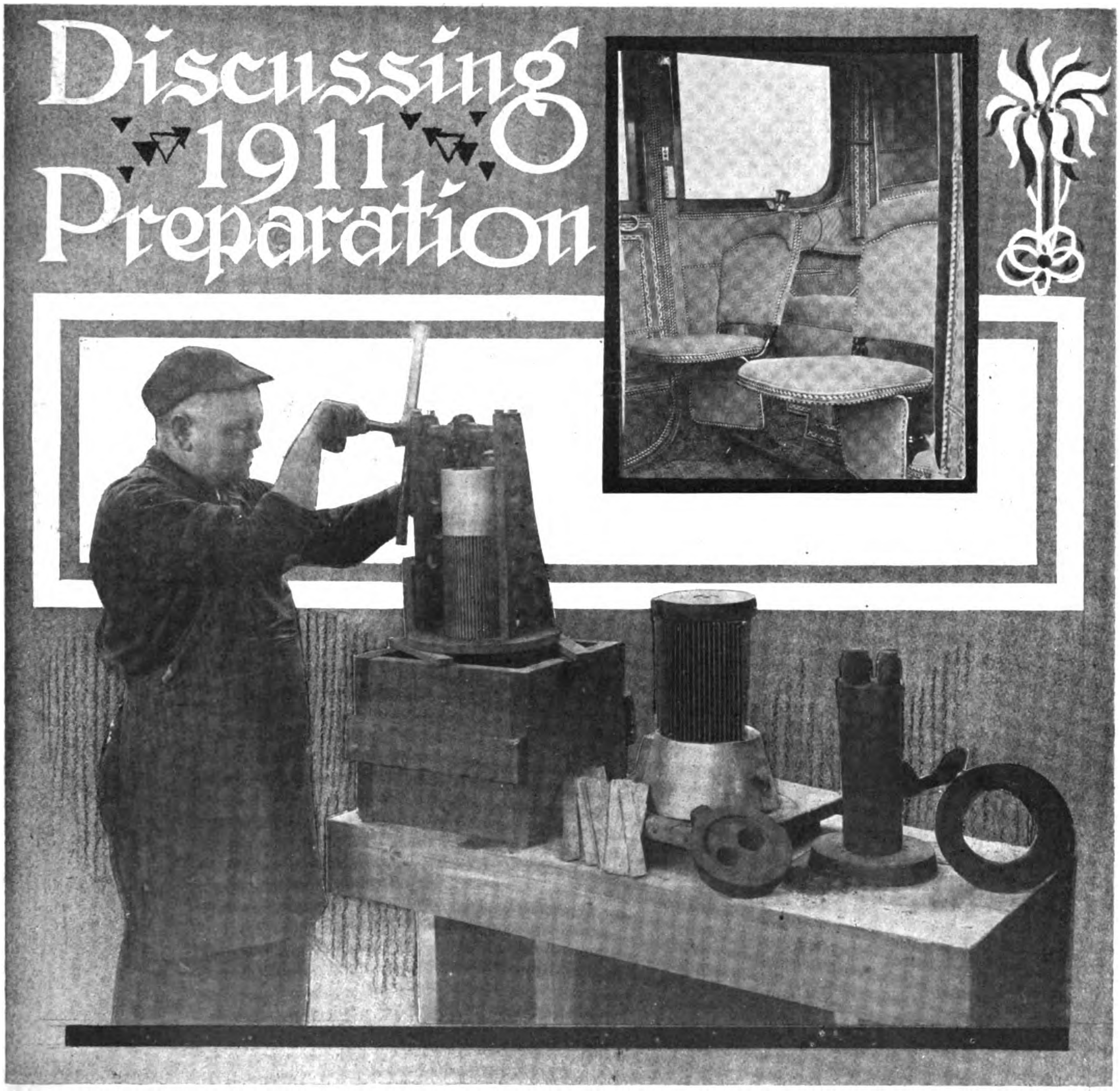
THE AUTOMOBILE

Discussing 1911 Preparation



HOW THE FRANKLIN CYLINDERS ARE MANIPULATED IN THE FOUNDRY TO WELD THE VENTILATING STRIPS TO THE CASTINGS—INTERIOR VIEW OF THE THOMAS-FLYER TOWNCAR BROUGHAM

CONTINUING the plan which has for its motive the idea of imparting to automobilists and those who may take a 1911 interest in the art, it will be the purpose here to present with brevity for the sake of clearness, the second series of the automobiles that will be placed on exhibition during the automobile show season. In order, however, to impart the information along broader lines, the occasion is taken to portray the methods in vogue in a couple of the plants devoted to the manufacture of automobiles, in order that the interested reader will have before him something of the preparation which has to be made before it can be said that automobiles will be on an interchangeable basis, which detail, however important it may be, is not to be appreciated when the user's effort is confined to a mere inspection of the finished product.

It is of course impossible to show in any one issue how all the automobiles are manufactured, nor is it the purpose to infer that the manufacturing is conducted in the several plants on a common basis. It would not be too much to state that there are distinct differences and that several schools of design are responsible for the various automobiles that are now being built for 1911 use. But this is not to say that the quality of the product will be better or worse, depending upon the school of design that is responsible for it; the point will be adequately illustrated by calling attention to the number of universities that are responsible for the education of the men who make their mark in the world. They seem to be endowed with reasoning power, skill, and scope, on a competitive basis as they are whittled out at the respective universities, and so it may be said of the automobiles; they serve their respective ends with a fidelity that is commendable, and the only chance the purchasers will take lies in the wisdom or lack of it that accompanies the selection.

The great question, then, will be to go to the shows dressed in a discriminating state of mind, nor will it be a question involving discrimination as between good and bad automobiles so much as it will be a question which will have for its foundation the putting of the cars into good or bad service. To be able to select the particular kind of car that will best perform in a given service requires that the individual making the selection shall first have a definite and clear idea of the service to be rendered, and then, by virtue of knowledge obtained beforehand, find the very automobile that will be conspicuously capable in that service. Indications point to the coming shows as being of unusual interest, and it is predicted that the display of cars will be wide and varied.

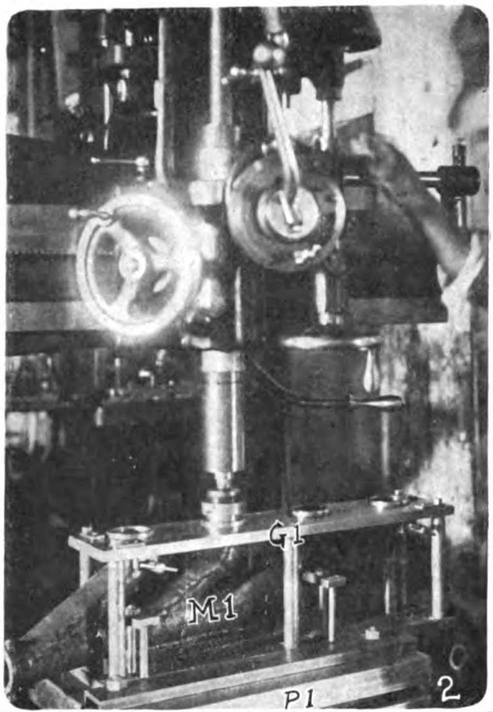


Fig. 2—In the Elmore Plant with a jigging fixture G1 holding the manifold M1 on the platen P1 of a special drill so arranged as to accurately finish the four faces of the manifold M1 at one time.

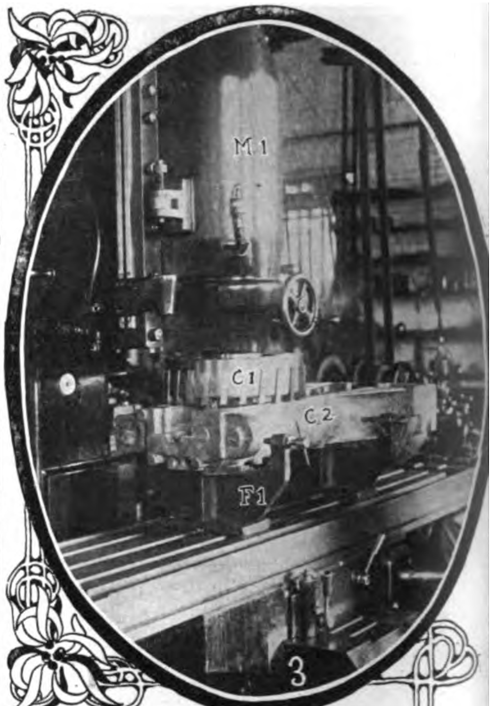


Fig. 3—In the Elmore Plant, showing a No. 4 Cincinnati Vertical Milling Machine M1 with a multiple cutter cat-head C1 facing off a crankcase C2, the latter being held in a fixture F1 with means for centering, adjusting, and holding the work.

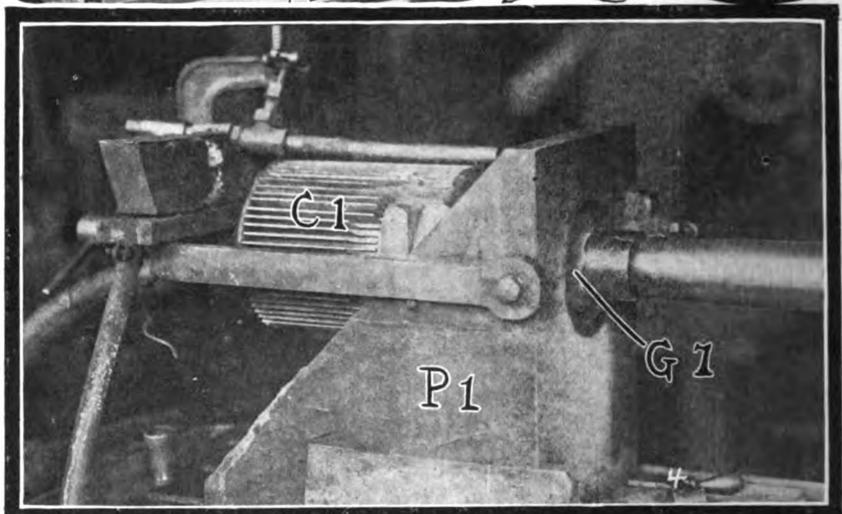


Fig. 4—In the Franklin Plant, showing the air-cooled cylinder C1 bolted to an angle plate P1 being finished by grinding G1, using a Heald type of grinder.

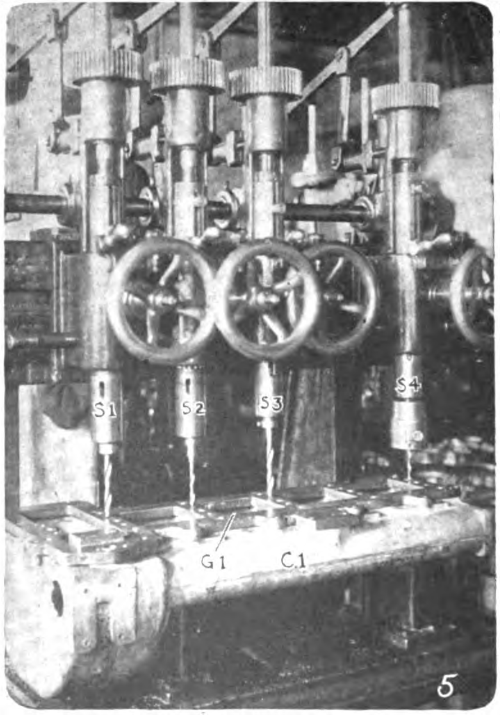


Fig. 5—In the Elmore Plant, showing a jig G1 on the crankcase C1, with spindles S1, S2, S3 and S4, of a multiple spindle drill so contrived as to reach all the holes as indicated in the platen.

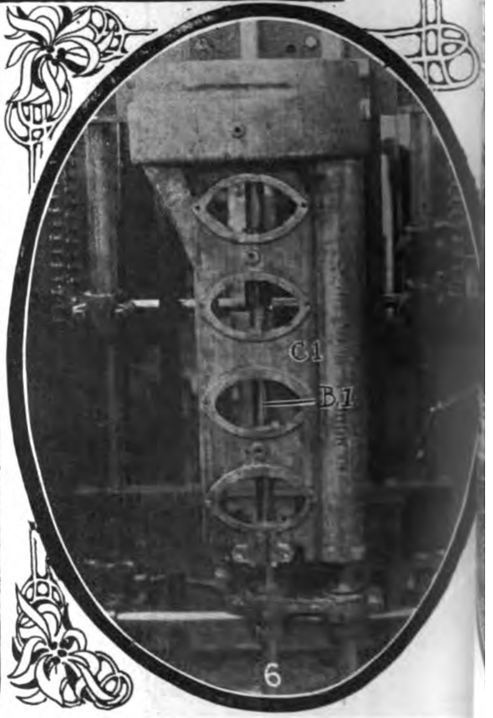
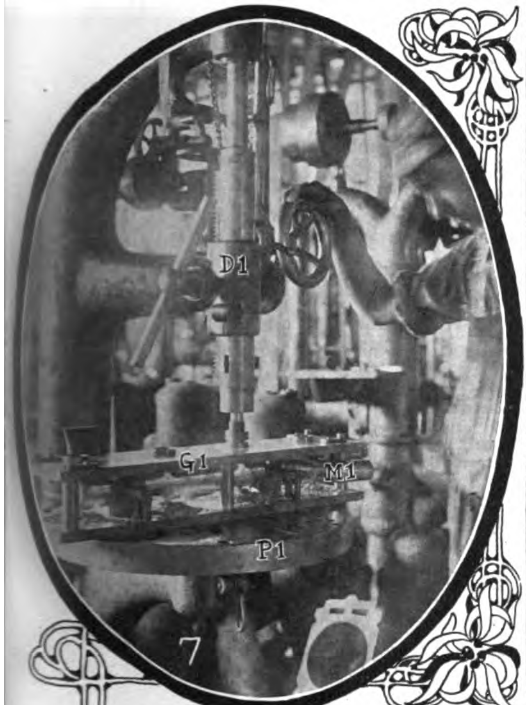


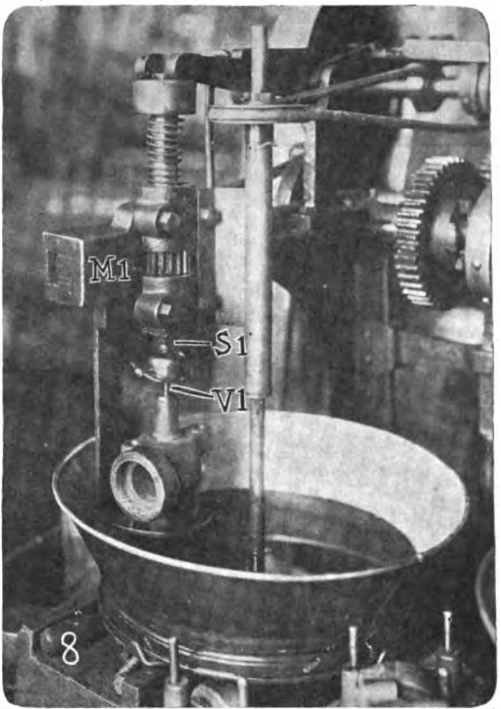
Fig. 6—In the Franklin Plant, showing a Gleason Planer G1 with its progressive cutter C1 planing the teeth on the gear G2. This is one of a complete battery of modern gear fashioning equipment used in this plant for producing noiseless performing gears from special types of gear steel.

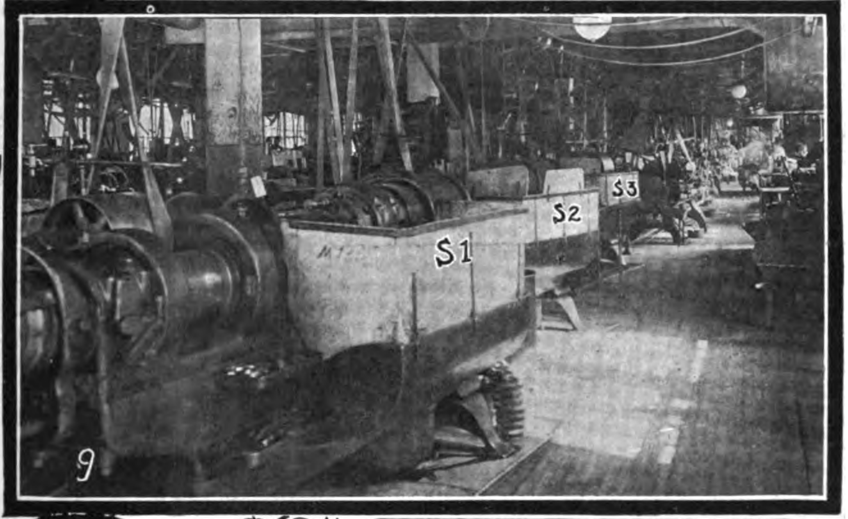
Fig. 7—In the Elmore Plant, presenting a drill press D1 using a fixture with a jig plate G1 on the platen P1 finishing a manifold M1 which under ordinary circumstances would be an extremely difficult piece to handle, but

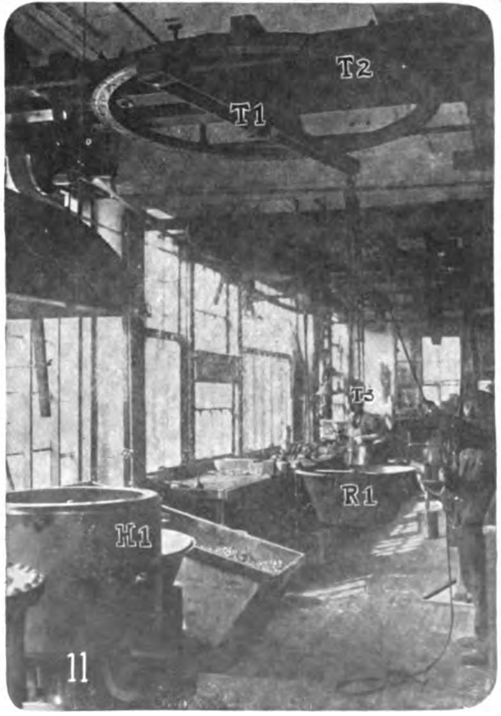
Thomas

Referring to Fig. 12 of the Model M 6-cylinder, water-cooled Thomas motor, the details of which are given in the accom-









panying tabulation, the carbureter C1 is supported by a separable neck N1 attached to the intake manifold M1, the latter having branches B1 and B2 in combination with the common feeder F1 resulting in the equal delivery of a fixed volume of well-proportioned mixture to the respective cylinders, this being one of the most important details in connection with six-cylinder work, and it has been found that this plan works out to the maximum of efficiency under practical conditions of service. The magneto M2 is located on a ledge L1 at the front end of the motor and is driven from a gear in the halftime housing H1 with a universal joint U1 intervening, so that the magneto, in addition to being flexibly mounted, may be removed at a moment's notice by undoing the wing nut N2, and in replacing the magneto there is no danger of throwing the same out of line or making a mistake. The general design of the motor is on a uniform basis with an eye to refinements of detail throughout, and in the installation in the chassis the same care is taken, including a well-contrived distributing box D1 for the high tension wires.

in this way the work is quickly and accurately done.

Fig. 8—In the Franklin Plant, showing one member of a special machine M1 fitted with a series of spindles S1 arranged for grinding in the valves V1 imparting precisely the same motion in the same way as when the valves are ground by an experienced man as a "bench" undertaking.

Fig. 9—In the Franklin Plant, showing shields S1, S2, S3, etc., fitted around all of the machine tools thus preventing oil and chips from strewing about the floor, and it is one of the features of this plant that the hardwood floor is scrubbed every night and is kept scrupulously clean, thus reducing the fire hazard enormously and adding to the efficiency of the workmen.

Fig. 10—In the Elmore Plant, showing a special vertical boring bar B1 in the crankcase C1, with an automatic feed boring all the main journal holes simultaneously.

Fig. 11—In the Franklin Plant, showing an overhead turntable T1 on a circular track T2, using a block and using a tackle T3 lifting the receptacle R1 which is full of oil-soaked chips in order to place it in the housing H1 of the centrifugal oil separator, showing how one laborer is enabled to separate the oil from all of the chips of the plant in a clean and efficacious way, thus indicating something of the plan for economy which has been worked out.

Referring to Fig. 23 of the universal joint used in the driving of the Thomas magneto, attention is called to the hardened and ground shaft S1 with the integral flange F1 and the mating flange M1 which, together with the accommodation piece P1, comprise the set. This arrangement affords an adequate degree of flexibility, renders the drive positive and secure, eliminating the ills that ordinarily come through the absence of flanging and the difficulty of keying in conjunction with relatively small shafts such as are in common use in magneto work.

Marathon

Referring to Fig. 13 of the Marathon motor, details of which are given in the accompanying tabulation, attention is called

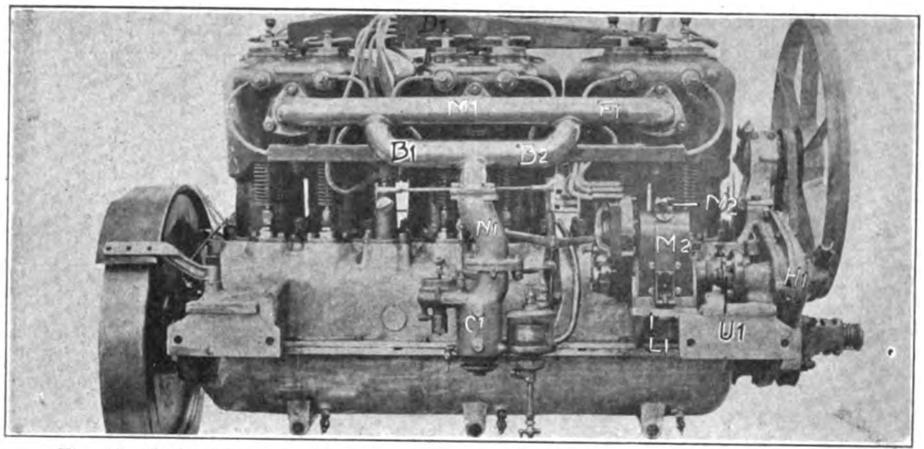


Fig. 12—Model M 6-cylinder Thomas motor showing the location of the magneto.

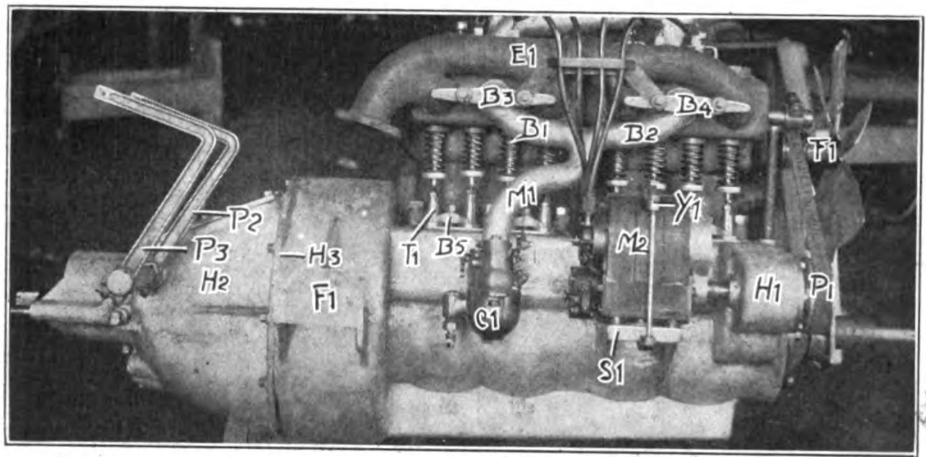


Fig. 13—Marathon motor showing a self-contained motor, magneto and carbureter

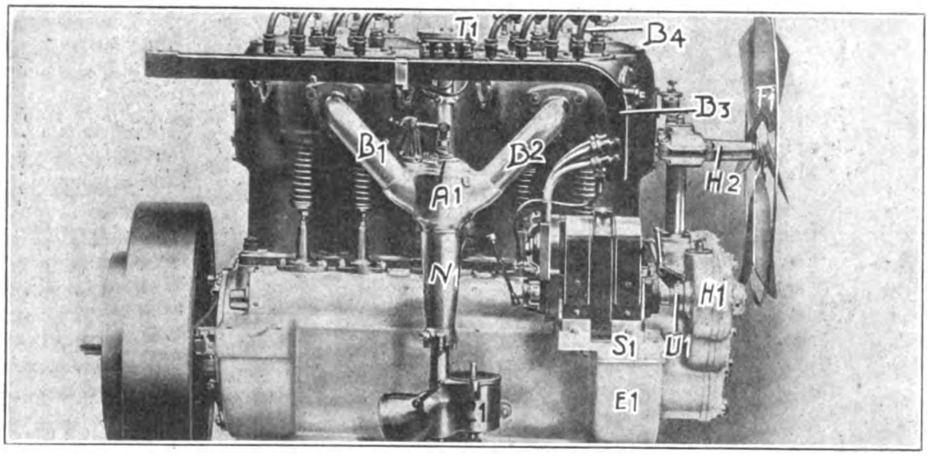


Fig. 14—Peerless motor construction, showing the location of the magneto

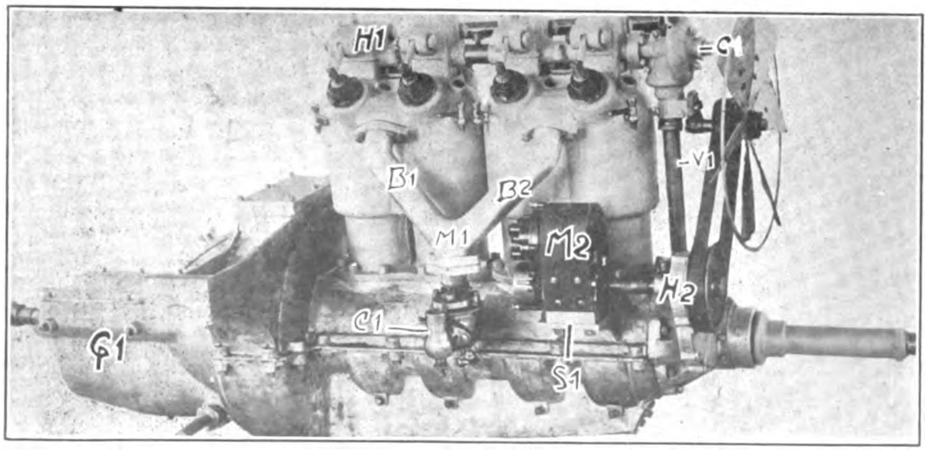


Fig. 15—Presenting the Jackson motor with overhead valve construction

to the carbureter C1 supported by an offset manifold M1, with branches B1 and B2, leading to the two pairs of cylinders and the exhaust manifold E1 which, in common with the intake manifold, are held in place by bridge pieces B3 and B4. The magneto M2 rests upon a shelf S1 and is held down by a yoke Y1, putting tension on a pair of bolts. The magneto is driven by a gear in the housing H1, and the same shaft extends through to the pulley belt P1, by means of which a fan F1 is driven. The motor is supported in front at a single point and is given rear support by the arm with its face F1 bolting to the chassis frame on each side.

The transmission gear is in the extension housing H2, the latter being flanged to the flywheel housing H3. The clutch is actuated by the pedal P2, and the service brake is actuated by the pedal P3. The cylinders of the T-type working 4-cycle water-cooled are substantially flanged to the crankcase, and the valve tappets T1 are held down by bridges B5.

Peerless

Referring to Fig. 14 of the Peerless 4-cylinder water-cooled motor, the details of which are given in the accompanying tabulation, the carbureter C1 of the Peerless make has a long neck N1 and a supplementary air valve A1, with branches B1 and B2 leading to the respective pairs of cylinders. The magneto M1 rests upon a shelf S1 and is driven by a shaft through a universal joint U1, taking power from a gear in the halftime housing H1. It is noteworthy that the magneto shaft is short and a quick detachable means of fastening is afforded. The timer T1 passes upon the left side of the motor to a point above the cylinders, so that it is in a get-at-able position, and the high tension leads from the magneto to the spark plug are distributed through a box B3; from this box branches B4 on the jackstrap plan make connection with the spark plugs. Among the other noteworthy features is the method of driving the fan F1 by a shaft in a housing H2, taking power by a system of gears, all of which are enclosed and dustproof. The oil pump is on the under side below the enlargement E1 in a position which is accessible for inspection or a more complete examination.

Jackson

Referring to Fig. 15 of the water-cooled Jackson motor, the details of which are more completely given in the accompanying tabulation, it will be observed that the carbureter C1 is supported by a manifold M1 with branches B1 and B2 connecting with the two pairs of cylinders, and attention is called to the fact that these branches extend almost down to the carbureter. Overhead valves are used in this motor with a camshaft C driven by a vertical shaft V1 and rockers in housings H1, of which there are four so arranged as to place the valves in an angular position with respect to the vertical, thus making the flow of gas into the combustion chamber as nearly direct as possible, and they are made of relatively large diameter, so that the depression losses are minimized. The magneto M2 is located on a shelf S1 and is driven by a shaft from a gear in the halftime housing H2, which shaft extends out to accommodate a shrouded pulley which serves as the driving member to actuate the flat-belted fan. The power plant is of the self-contained type, with a transmission gearcase G1 in integral relation with the housing for the flywheel.

Referring to Fig. 22 of the Jackson overhead camshaft construction, attention is called to the oil-tight housings H1 for the cam shaft C1, by means of which the overhead construction is rendered noiseless and satisfactory. The housing is split on the center line as shown at H2, and the various bearings are maintained in a state of profuse lubrication by a system of ducts and the methods contrived.

Moline

Referring to Fig. 16 of the Moline 4-cylinder water-cooled motor shown as it rests in the chassis, the carbureter is held in place by the manifold M1 with branches B1 and B2 passing up under the exhaust manifold E1, and the two manifolds are supported in place by bridge pieces B3 and B4. The magneto M1 is on the left side of the motor to the front and is driven by a shaft from a gear meshing with the halftime train in the oil-tight housing. The high tension timer T1 is on the left side front of the motor and the high tension wires are distributed to the respective spark plugs through a tube T2.

Haynes

Referring to Fig. 17 of the Haynes 4-cylinder water-cooled motor, the magneto M1 and the water-pump W1 are driven by a common shaft from a gear in the housing H1. The same shaft extends through to accommodate a shrouded pulley for the fan belt. The transmission on gearcase G1 is held in place by arms A1 on each side of the flywheel F1 integral with the crankcase C1.

Warren-Detroit

Referring to Fig. 18 of the Warren-Detroit 4-cylinder water-cooled motor of the block type, more complete details of which are given in the accompanying tabulation, it will be observed that the magneto M1 rests upon a finished face F1 of the rear motor support S1 and is driven by a shaft S2 in common with a water pump W1 through a universal joint U1 taking power through a gear in the oil-tight housing H1 of the halftime gears. The carbureter is located on the opposite side, and in this view the simplicity of the blocked casting is brought into prominence. The crankcase is split on the center line C1 and the

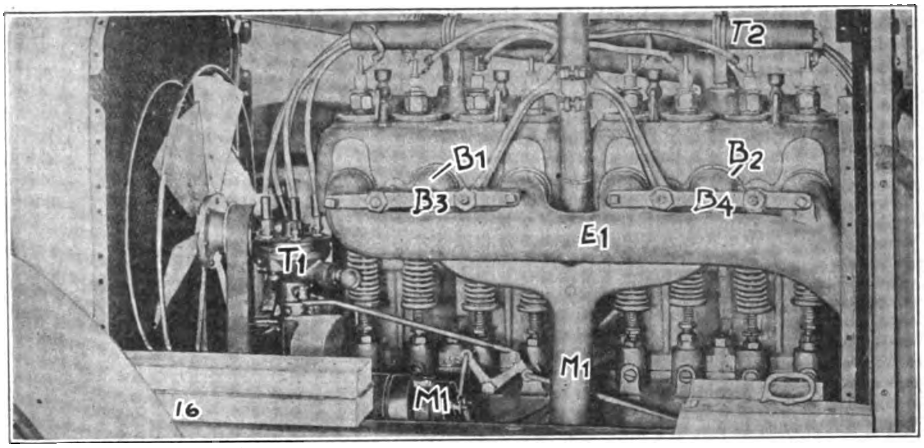


Fig. 16—Thirty-five horsepower Moline motor, magneto side, shown in chassis

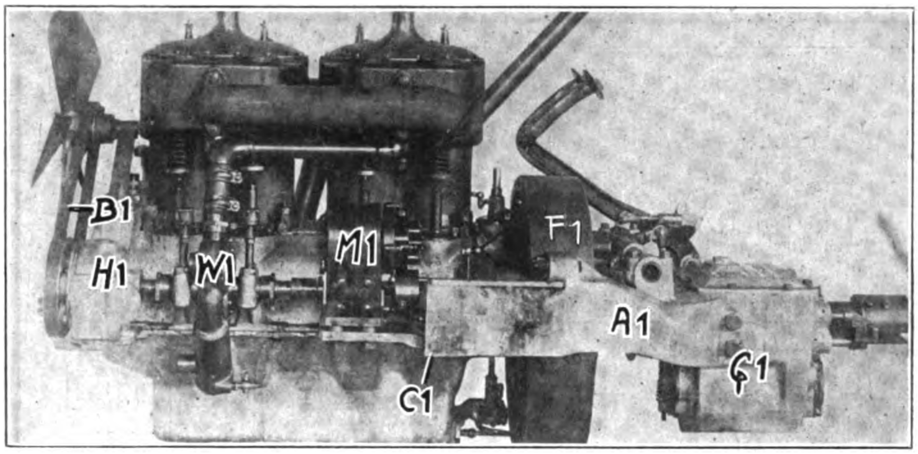


Fig. 17—Example of Haynes motor work along self-contained lines

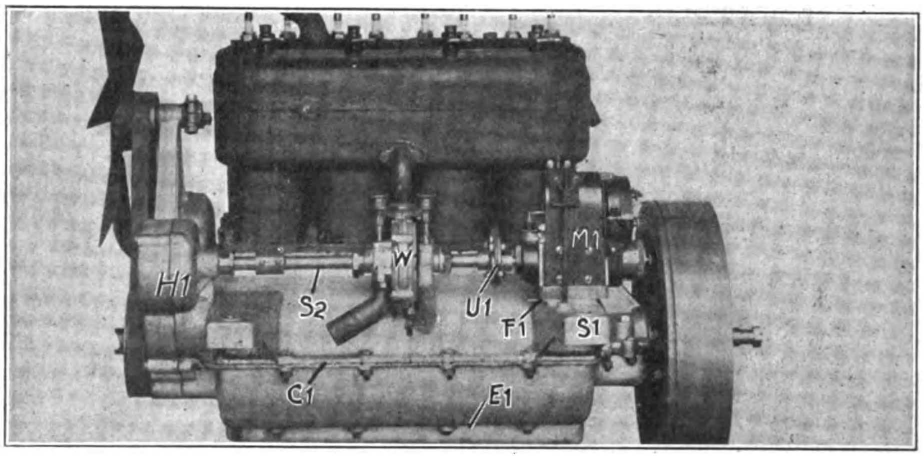


Fig. 18—Warren-Detroit motor, showing location of magneto and water pump

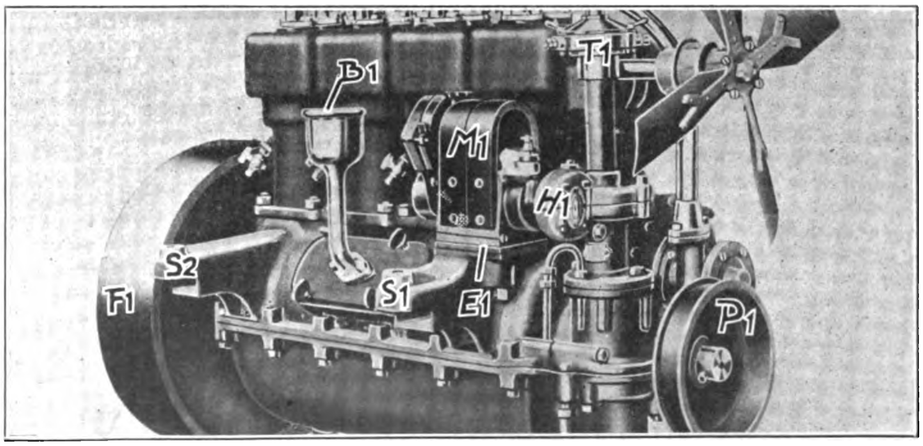
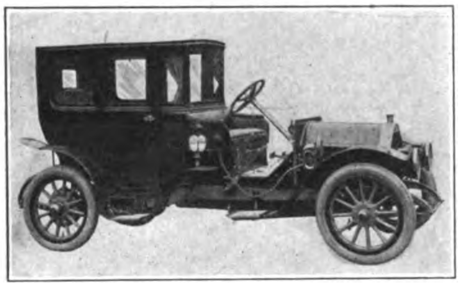
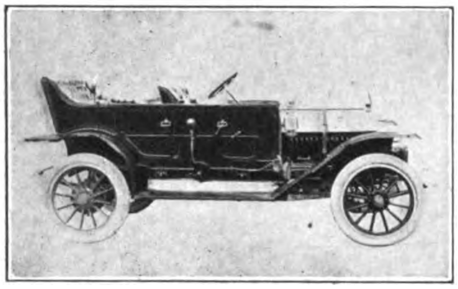


Fig. 19—Westcott motor, showing location of magneto and timer drive

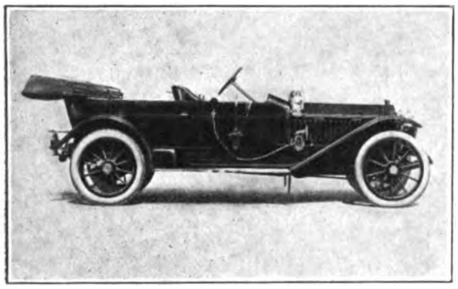
Specifications of the Princi



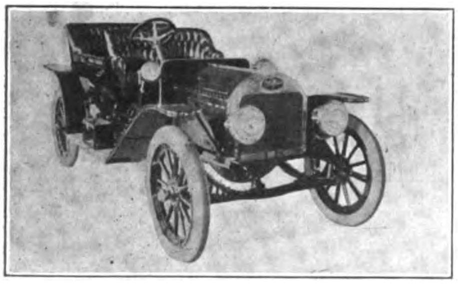
Thomas "Flyer," 4-28 town car brougham



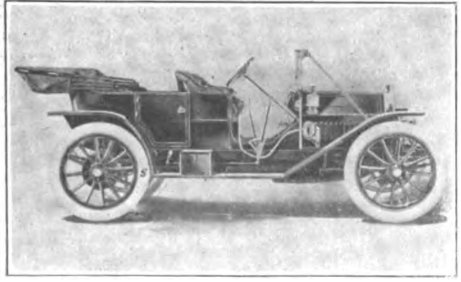
Jackson Model 41, fore-door touring car



Peerless torpedo type of touring car



Marathon Fire Chief type of touring car



Moline toy tonneau fully equipped

MAKE AND MODEL	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		Lubrication
			Type	Seats	Cyl.	Bore Inches	Stroke Inches	Cyl. Cast	Radiator	Pump	Magneto	Battery	
Marathon M	$1500	28.9	Tour'g..	5	4	4¼	4½	Pairs..	H'comb..	Syph'n	H. T...	Dry....	Splash..
Marathon N	1500	28.9	R'ster..	4	4	4¼	4½	Pairs..	H'comb..	Syph'n	H. T...	Dry....	Splash..
Jackson "51"	2200	36.1	Tour'g..	5	4	4¾	4¾	Single.	Cellular..	Syph'n	H. T...	Dry....	Pump..
Jackson "51"	2200	36.1	Tour'bt	4	4	4¾	4¾	Single.	Cellular..	Syph'n	H. T...	Dry....	Pump..
Jackson "41"	1700	32.4	Tour'g..	5	4	4½	4½	Pairs..	H'comb..	Syph'n	H. T...	Dry....	Pump..
Jackson "41"	1700	32.4	Tour'bt	4	4	4½	4½	Pairs..	H'comb..	Syph'n	H. T...	Dry....	Pump..
Jackson "38"	1650	30.6	Torp'o..	4	4	4⅜	4½	Pairs..	H'comb..	Syph'n	H. T...	Dry....	Pump..
Jackson "30"	1250	25.6	Tour'g..	5	4	4	4	Pairs..	H'comb..	Syph'n	H. T...	Dry....	Pump..
Jackson "25"	1100	22.5	R'ster..	2	4	3¾	4½	Block.	H'comb..	Syph'r.	H. T...	Dry....	Pump..
Peerless "29"	4200	25.6	Limous.	6	4	4	4⅝	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "29"	4300	25.6	Land't..	6	4	4	4⅝	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "31"	4300	40.0	Tour'g..	7	4	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "31"	4300	40.0	C.coupl.	5	4	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "31"	4300	40.0	R'ster..	5	4	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "31"	4300	40.0	Phaet..	2	4	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "31"	4300	40.0	T. ton..	4	4	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "31"	4300	40.0	Torp'o..	4	4	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "31"	5400	40.0	Limous.	7	4	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "31"	5500	40.0	Land't..	7	4	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "31"	4800	40.0	D.lim...	7	4	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "32"	6000	60.0	Tour'g..	7	6	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "32"	6000	60.0	C.coupl.	5	6	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "32"	6000	60.0	R'ster..	5	6	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "32"	6000	60.0	Phaet..	2	6	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "32"	6000	60.0	P. ton..	4	6	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "32"	6000	60.0	Torp'o..	4	6	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "32"	7000	60.0	Limous.	7	6	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "32"	7100	60.0	Land't..	7	6	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Peerless "32"	6500	60.0	D. lim..	7	6	5	5½	Pairs..	Tubular.	Gear..	H. T...	Storage	Pump..
Moline M-35	1650	25.6	Tour'g..	5	4	4	6	Pairs..	Tubular.	None..	H. T...	Storage	Pump..
Moline M-35	1600	25.6	T. ton..	4	4	4	6	Pairs..	Tubular.	None..	H. T...	Storage	Pump..
Haynes 20	2000	28.9	Tour'g..	5	4	4¼	5	Pairs..	Cellular..	Gear..	H. T...	Dry....	Splash..
Haynes 20	2000	28.9	T. ton..	4	4	4¼	5	Pairs..	Cellular..	Gear..	H. T...	Dry....	Splash..
Haynes 20	2000	28.9	R'bout.	2	4	4¼	5	Pairs..	Cellular..	Gear..	H. T...	Dry....	Splash..
Haynes Y	3000	40.0	Tour'g..	7	4	5	5½	Pairs..	Cellular..	Gear..	H. T...	Storage	Pump..
Warren-Detroit "30"													
11-A	1200	25.6	R'ster..	3	4	4	4½	Block.	Tubular.	Cent 'fl	H. T...	Dry....	Splash..
11-B	1300	25.6	D. ton..	4	4	4	4½	Block.	Tubular.	Cent 'fl	H. T...	Dry....	Splash..
11-C	1325	25.6	Tour'g..	5	4	4	4½	Block.	Tubular.	Cent 'fl	H. T...	Dry....	Splash..
11-D	1200	25.6	R'ster..	2	4	4	4½	Block.	Tubular.	Cent 'fl	H. T...	Dry....	Splash..
11-E	1750	25.6	Coupe..	2	4	4	4½	Block.	Tubular.	Cent 'fl	H. T...	Storage	Splash..
11-F	1500	25.6	Torp'o..	4	4	4	4½	Block.	Tubular.	Cent 'fl	H. T...	Storage	Splash..
11-G	1500	25.6	F.d Tg..	5	4	4	4½	Block.	Tubular.	Cent 'fl	H. T...	Storage	Splash..
11-H	1300	25.6	Delv'ry	2	4	4	4½	Block.	Tubular.	Cent 'fl	H. T...	Dry....	Splash..
11-I	1300	25.6	Delv'ry	2	4	4	4½	Block.	Tubular.	Cent 'fl	H. T...	Dry....	Splash..
E-M-F- "30"	1250	25.6	Tour'g..	5	4	4	4½	Pairs..	Tubular.	Cent 'fl	H. T...	Dry....	Gravity
Thomas K	6000	72.6	Tour'g..	7	6	5½	5½	Single.	H'comb..	Gear..	H. T...	Dry....	Mech...
Thomas K	6000	72.6	Fly'b't.	4	6	5½	5½	Single.	H'comb..	Gear..	H. T...	Dry....	Mech...
Thomas K	6000	72.6	T'bout..	[2]	6	5½	5½	Single.	H'comb..	Gear..	H. T...	Dry....	Mech...
Thomas K	3500	72.6	Limous.	7	6	5½	5½	Single.	H'comb..	Gear..	H. T...	Dry....	Mech...
Thomas K	7600	72.6	Land't..	7	6	5½	5½	Single.	H'comb..	Gear..	H. T...	Dry....	Mech...
Thomas M	3750	43.8	Tour'g..	5	6	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Thomas M	3900	43.8	F.d. Tg.	5	6	4¼	5½	Pairs..	H'comb..	Cent 'fl	H T...	Dry....	Mech...
Thomas M	3850	43.8	Tour'g..	7	6	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Thomas M	4000	43.8	F.d.Tg..	7	6	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Thomas M	3750	43.8	F'bout..	4	6	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Thomas M	3900	43.8	F'd'F't.	4	6	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Thomas M	3750	43.8	Tour'g..	4	6	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Thomas M	5000	43.8	Limous.	7	6	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Thomas M	5100	43.8	Land't..	7	6	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Thomas R	4000	28.0	Brougm	6	4	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Thomas R	4100	28.0	Limous.	6	4	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Thomas R	4250	28.0	Land't..	6	4	4¼	5½	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Mech...
Velie 40-G	1800	32.4	Tour'g..	5	4	4½	5¼	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Pump..
Velie 40-G1	2000	32.4	F.d.Tg..	5	4	4½	5¼	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Pump..
Velie 40 H1	2000	32.4	R'ster..	2	4	4½	5¼	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Pump..
Velie 40 I	1800	32.4	T. ton..	4	4	4½	5¼	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Pump..
Velie 40 GLL	3000	32.4	Limous.	7	4	4½	5¼	Pairs..	H'comb..	Cent 'fl	H. T...	Dry....	Pump..
Westcott G	2000	....	R'ster..	7	4	4¾	5	Single.	H'comb..	Cent 'fl	H. T...	Dry....	Splash..
Westcott F	2000	....	F.d.Tg.	5	4	4¾	5	Single.	H'comb..	Cent 'fl	H. T...	Dry....	Splash..
Westcott H	2250	....	F.d.Tg.	7	4	4¾	5	Single.	H'comb..	Cent 'fl	H. T...	Dry....	Splash..
Westcott J	2000	....	R'ster..	4	4	4½	5	Single.	H'comb..	Cent 'fl	H. T...	Dry....	Splash..
Westcott	1900	....	R'ster..	4	4	4½	5	Single.	H'comb..	Cent 'fl	H. T...	Dry....	Splash..

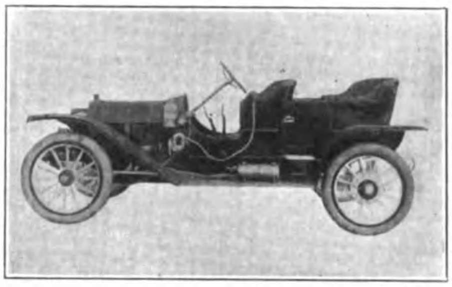
[1] Or 60 inches. [2] And storage battery.

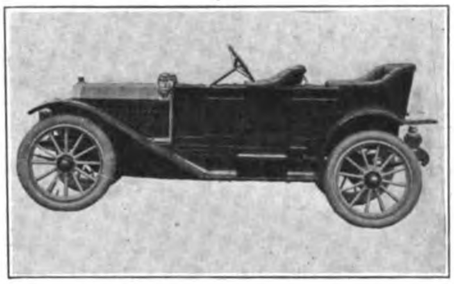
MARATHON—Southern Motor Works, Nashville, Tenn.
JACKSON—Jackson Automobile Company, Jackson, Mich.
PEERLESS—Peerless Motor Car Company, Cleveland, Ohio.
MOLINE—Moline Automobile Company, East Moline, Ill.
HAYNES—Haynes Automobile Company, Kokomo, Ind.

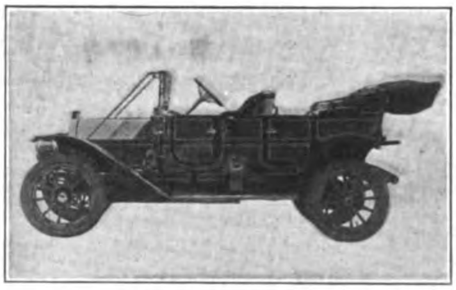
pal Mechanical Dimensions

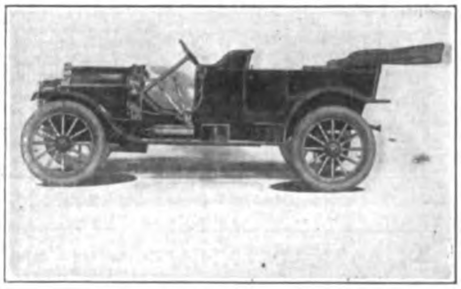
	TRANSMISSION							BEARINGS				TIRES	
Clutch	Type	Speeds	Loca-tion	Drive	Wheelbase	Tread	Frame	Crank-shaft	Trans-mis'n	Axle	Weight	Front	Rear
M. Disc...	Sel....	3	Motor...	Shaft....	116	56	P. Steel..	3 Plain.	Ball...	B. & R.	2250	34x3½	34x3½
M. Disc...	Sel....	3	Motor...	Shaft....	116	56	P. Steel..	3 Plain.	Ball...	B. & R.	2250	34x3½	34x3½
M. Disc...	Sel....	3	Motor...	Shaft....	120	[1]56	P. Steel..	5 Plain.	Ball...	R. & B.	2800	36x4	36x4
M. Disc...	Sel....	3	Motor...	Shaft....	120	[1]56	P. Steel..	5 Plain.	Ball...	R. & B.	2800	36x4	36x4
M. Disc...	Sel....	3	Motor...	Shaft....	110	[1]56	P. Steel..	3 Plain.	Ball...	R. & B.	2400	34x4	34x4
M. Disc...	Sel....	3	Motor...	Shaft....	110	[1]56	P. Steel..	3 Plain.	Ball...	R. & B.	2400	34x4	34x4
M. Disc...	Sel....	3	Motor...	Shaft....	115	[1]56	P. Steel..	3 Plain.	Ball...	R. & B.	2450	34x4	34x4
M. Disc...	Sel....	3	Motor...	Shaft....	105	[1]56	P. Steel..	3 Plain.	Ball...	R. & B.	2000	32x3½	32x3½
M. Disc...	Sel....	3	Unit....	Shaft....	105	[1]56	P. Steel..	2 B.&pl	Ball...	R. & B.	1850	32x3½	32x3½
Exp. b'd..	Sel....	4	Motor...	Shaft....	113	56	P. Steel..	Plain...	Ball...	Ball....	.....	34x4½	34x4
Exp. b'd..	Sel....	4	Motor...	Shaft....	113	56	P. Steel..	Plain...	Ball...	Ball....	.....	34x4½	34x4½
Exp. b'd..	Sel....	4	Motor...	Shaft....	123	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4	36x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	123	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4	36x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	119½	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4	36x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	119¼	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4	36x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	119¼	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4	36x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	123	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4	36x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	123	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4	36x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	123	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4	36x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	123	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4	36x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	136	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4½	37x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	136	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4½	37x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	132½	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4½	37x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	132½	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4½	37x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	132½	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4½	37x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	136	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4½	37x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	136	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4½	37x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	136	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4½	37x5
Exp. b'd..	Sel....	4	Motor...	Shaft....	136	56	P. Steel..	Plain...	Ball...	Ball....	.....	36x4½	37x5
Cone.....	Sel....	3	Motor...	Shaft....	112	56	Dr. St...	Plain...	Roller.	R. & B.	2400	36x3½	36x3½
Cone.....	Sel....	3	Motor...	Shaft....	112	56	Dr. St...	Plain...	Roller.	R. & B.	2400	36x3½	36x3½
Con.b'd...	Sel....	3	Motor...	Shaft....	114	56	P. Steel..	Plain...	Roller.	Roller,,.	2400	34x4	34x4
Con.b'd...	Sel....	3	Motor...	Shaft....	114	56	P. Steel..	Plain...	Roller,	Roller...	2400	34x4	34x4
Con.b'd...	Sel....	3	Motor...	Shaft....	114	56	P. Steel..	Plain...	Roller.	Roller...	2400	34x4	34x4
Con.b'd...	Sel....	3	Motor...	Shaft....	125	56	P. Steel..	Plain...	Roller.	Roller...	3400	36x4½	36x4½
Cone.....	Sel....	3	Unit....	Shaft....	110	56	P. Steel..	Plain...	Plain..	Ball....	2150	34x3½	34x3½
Cone.....	Sel....	3	Unit....	Shaft....	110	56	P. Steel..	Plain...	Plain..	Ball....	2200	34x3½	34x3½
Cone.....	Sel....	3	Unit....	Shaft....	110	56	P. Steel..	Plain...	Plain..	Ball....	2200	34x3½	34x3½
Cone.....	Sel....	3	Unit....	Shaft....	110	56	P. Steel..	Plain...	Plain..	Ball....	2150	34x3½	34x3½
Cone.....	Sel....	3	Unit....	Shaft....	110	56	P. Steel..	Plain...	Plain..	Ball....	2350	35x4	35x4
Cone.....	Sel....	3	Unit....	Shaft....	110	56	P. Steel..	Plain...	Plain..	Ball....	2200	35x4	35x4
Cone.....	Sel....	3	Unit....	Shaft....	110	56	P. Steel..	Plain...	Plain..	Ball....	2250	35x4	35x4
Cone.....	Sel....	3	Unit....	Shaft....	110	56	P. Steel..	Plain...	Plain..	Ball....	2250	33x4	33x4
Cone.....	Sel....	3	Unit....	Shaft....	110	56	P. Steel..	Plain...	Plain..	Ball....	2300	33x4	33x4
Cone.....	Sel....	3	Axle....	Shaft....	106	[1]56	P. Steel..	Plain...	Plain..	Roller..	2150	32x3½	32x3½
3 Disc....	Sel....	4	Unit....	Chain...	140	56	P. Steel..	Plain...	B.&R.	Ball....	4500	38x4½	38x5½
3 Disc....	Sel....	4	Unit....	Chain...	140	56	P. Steel..	Plain...	B.&R.	Ball....	4340	38x4½	38x4½
3 Disc....	Sel....	4	Unit....	Chain...	140	56	P. Steel..	Plain...	B.&R.	Ball....	4250	38x4½	38x4½
3 Disc....	Sel....	4	Unit....	Chain...	140	56	P. Steel..	Plain...	B.&R.	Ball....	4800	38x4½	38x5½
3 Disc....	Sel....	4	Unit....	Chain...	140	56	P. Steel..	Plain...	B.&R.	Ball....	4800	38x4½	38x5½
3 Disc....	Sel....	3	Unit....	Shaft....	125	56	P. Steel..	Plain...	Ball...	Roller...	3775	36x4½	36x4½
3 Disc....	Sel....	3	Unit....	Shaft....	125	56	P. Steel..	Plain...	Ball...	Roller...	3800	36x4½	36x4½
3 Disc....	Sel....	3	Unit....	Shaft....	125	56	P. Steel..	Plain...	Ball...	Roller...	3800	36x4½	37x5
3 Disc....	Sel....	3	Unit....	Shaft....	125	56	P. Steel..	Plain...	Ball...	Roller...	3800	36x4½	37x5
3 Disc....	Sel....	3	Unit....	Shaft....	125	56	P. Steel..	Plain...	Ball...	Roller...	3660	36x4½	36x4½
3 Disc....	Sel....	3	Unit....	Shaft....	125	56	P. Steel..	Plain...	Ball...	Roller...	3685	36x4½	36x4½
3 Disc....	Sel....	3	Unit....	Shaft....	125	56	P. Steel..	Plain...	Ball...	Roller...	3650	36x4½	36x4½
3 Disc....	Sel....	3	Unit....	Shaft....	125	56	P. Steel..	Plain...	Ball...	Roller...	4150	36x4½	37x5
3 Disc....	Sel....	3	Unit....	Shaft....	125	56	P. Steel..	Plain...	Ball...	Roller...	4175	36x4½	37x5
3 Disc....	Sel....	3	Unit....	Shaft....	123	56	P. Steel..	Plain...	Ball...	Roller...	3650	34x4½	34x4½
3 Disc....	Sel....	3	Unit....	Shaft....	123	56	P. Steel..	Plain...	Ball...	Roller...	3620	34x4½	34x4½
3 Disc....	Sel....	3	Unit....	Shaft....	123	56	P. Steel..	Plain...	Ball...	Roller...	3680	34x4½	34x4½
Disc......	Sel....	3	Unit....	Shaft....	115	56	P. Steel..	Plain...	Roller.	Roller...	2800	34x4	34x4
Disc......	Sel....	3	Unit....	Shaft....	115	56	P. Steel..	Plain...	Roller.	Roller...	2850	34x4	34x4
Disc......	Sel....	3	Unit....	Shaft....	115	56	P. Steel..	Plain...	Roller.	Roller...	2500	34x4	34x4
Disc......	Sel....	3	Unit....	Shaft....	115	56	P. Steel..	Plain...	Roller.	.Roller..	2600	34x4	34x4
Disc......	Sel....	3	Unit....	Shaft....	115	56	P. Steel..	Plain...	Roller.	.Roller..	3400	35x4½	35x4½
Cone.....	Sel....	3	S. Frame	Shaft....	120	56	P. Steel..	Plain...	Ball...	Roller...	3000	36x4	36x4
Cone.....	Sel....	3	S. Frame	Shaft....	120	56	P. Steel..	Plain...	Ball...	Roller...	3000	36x4	36x4
Cone.....	Sel....	3	S. Frame	Shaft....	120	56	P. Steel..	Plain...	Ball...	Roller. .	3000	36x4	36x4
Cone.....	Sel....	3	S. Frame	Shaft....	112	56	P. Steel..	Plain...	Ball...	Roller...	2700	34x4	34x4
Cone.....	Sel....	3	S. Frame	Shaft....	112	56	P. Steel..	Plain...	Ball...	Roller...	2700	34x4	34x4

[3]2, 3 or 4 passengers. [4]3 or 4 passengers.


Haynes five-passenger touring car


Warren-Detroit "30" fore-door touring car


Velie fore-door type touring car with top and windshield


Westcott standard type of touring car


E-M-F "30" touring car

WARREN-DETROIT "30"—Warren Motor Car Co., Detroit, Mich.
E-M-F "30"—E-M-F Company, Detroit, Mich.
THOMAS "FLYER"—E. R. Thomas Motor Co., Buffalo, N. Y.
VELIE—Velie Motor Vehicle Company, Moline, Ill.
WESTCOTT—Westcott Motor Car Company, Richmond, Ind.

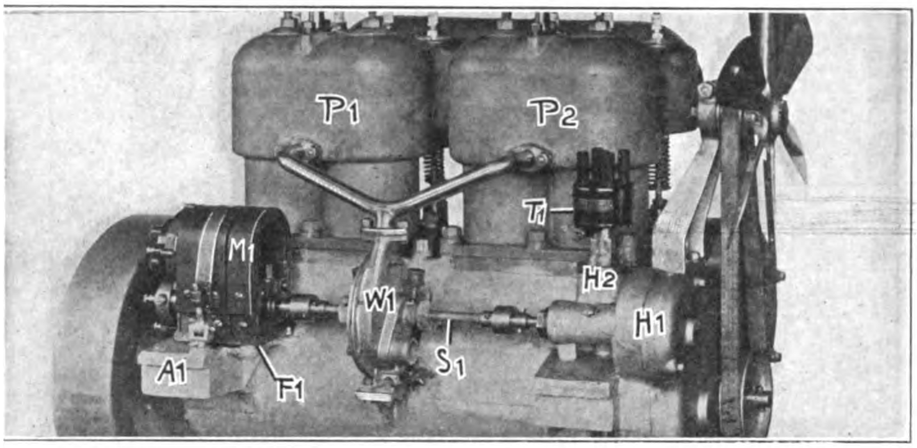


Fig. 20—Example of Velie work, presenting magneto and water pump drive

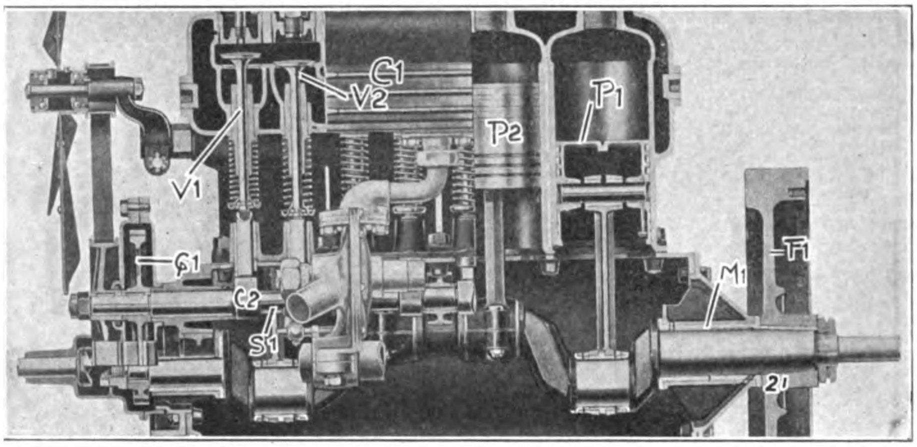


Fig. 21—Flanders "20" motor in part section, to show details and crankshaft

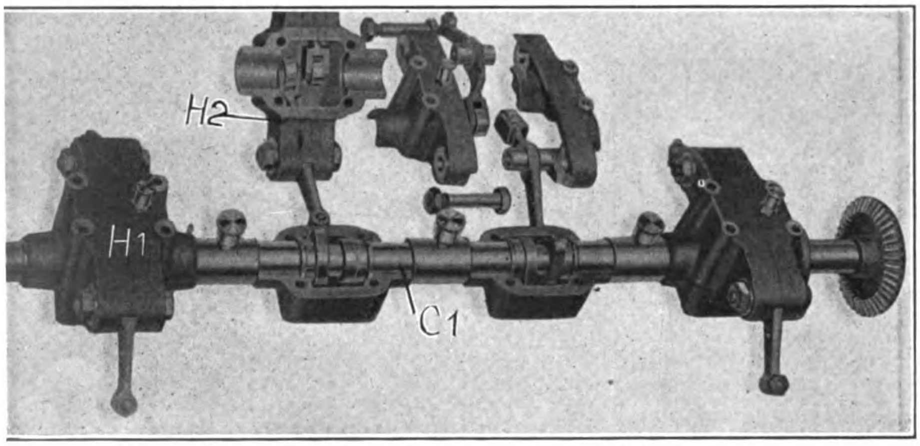


Fig. 22—Overhead camshaft construction of the Jackson motor

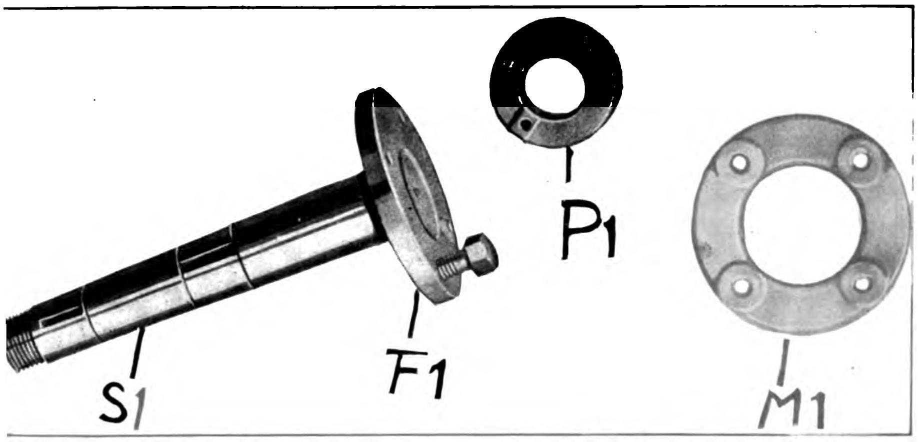


Fig. 23—A very nice detail of the universal magneto drive in the Model M Thomas motor

lower half is extended E1 for the accommodation of the lubricating oil. Other details of unusual interest will appear to the discriminating reader.

Westcott

Referring to Fig. 19 of the Westcott 4-cylinder water-cooled motor, details of which are extended in the accompanying tabulation, the magneto M1 is located on an extension E1 of the crankcase, forming a part of the motor support S1 and the magneto is driven by a shaft from a gear in the housing H1, and the timer T1 is also driven from a gear out of the same housing; the shape of the casting below is such as to accommodate the oil pump drive and the shrouded pulley P1 for the fan belt is pressed up on the end of the crankshaft. The carbureter is located on the opposite side, leaving ample room for the breather B1. The rear motor arm S2 comes out as close to the flywheel F1 as possible, so that the gyroscopic action of the flywheel member is taken care of without introducing crank arm moments. In many other respects the motor presents evidences of designing refinement.

Velie

Referring to Fig 20 of the 4-cylinder water-cooled Velie motor, more complete details of which are given in the accompanying tabulation, the magneto M1 rests on a finished face F1 on the rear motor arm A1 and in common with the water pump W1 is driven by the shaft S1, taking power through a gear in the halftime gear housing H1, and the timer T1 is also driven by a gear on the end of a vertical shaft in the housing H2. The carbureter is located on the opposite side of the motor and the cylinders in pairs P1 and P2 are of neat and symmetrical design, substantially flanged and bolted to finish faces on the crankcase. In other respects the design is conspicuous for clean and simple work.

E-M-F

Referring to Fig. 21 of the 4-cylinder water-cooled E-M-F (Flanders "20") motor, details of which are more completely stated in the accompanying tabulation, the block casting C1 is shown in part section presenting the piston P1 at the downward end of the stroke and the piston P2 at the upward end of the stroke, while at the other end the valve V1 is shown in the open position, and the valve V2 is presented in the closed position. The sections of the cylinders are of even thickness throughout, and the water space is uniform. The details of the valve lifts come out clearly in the illustration showing the cam, C2 integral with the camshaft S1, and at the end of the camshaft the halftime gear C1 is also shown in section. The crankshaft with its connecting rod and main bearings come into view and attention is called to the long main bearing M1 supporting the flywheel F1.

Operation and Care

FASTENING FLYWHEELS TO STAY; SYSTEMATIC LUBRICATION TABLE; CANTOR LECTURES; LETTERS; DON'TS; QUESTIONS; PRACTICAL REPAIRING; CARE AND REPAIR OF TIRES, ETC.

WHILE it is true that flywheels are put on to stay, the fact remains that a large amount of energy is stored up in a mass of this character when it is rotating at a speed of more than a mile in a minute. If the flywheel is fastened to the crankshaft by means of a flange and six holding bolts, there is no chance of it loosening up unless the nuts back off of the bolts, which is not likely to happen if the nuts in turn are locked by means of cotter pins. But these are all matters that the automobilist should look into; if cotter pins are used he should see that they are all in good condition. If locking is done by simply battering up the thread of the nut, the situation is not so healthy, and other means of locking should be taken advantage of.

When the flywheel is put on the end of the crankshaft rather than being bolted up on a flange, it remains to see if it is pressed up tight, but unless it is it will work loose. As the flywheel works off it will manifest its condition by a series of knocks; when a strange knock is heard it is a good idea to feel of the flywheel and note if it shakes. If the end of the crankshaft is ground down to a taper of 3-8 inch to the foot, or some other slow taper, the flywheel will press on tightly, and with close grinding to begin with together with a pressure of, perhaps, 15 tons it should stay on; it still remains for the automobilist to examine the flywheel occasionally and see if it is all right.

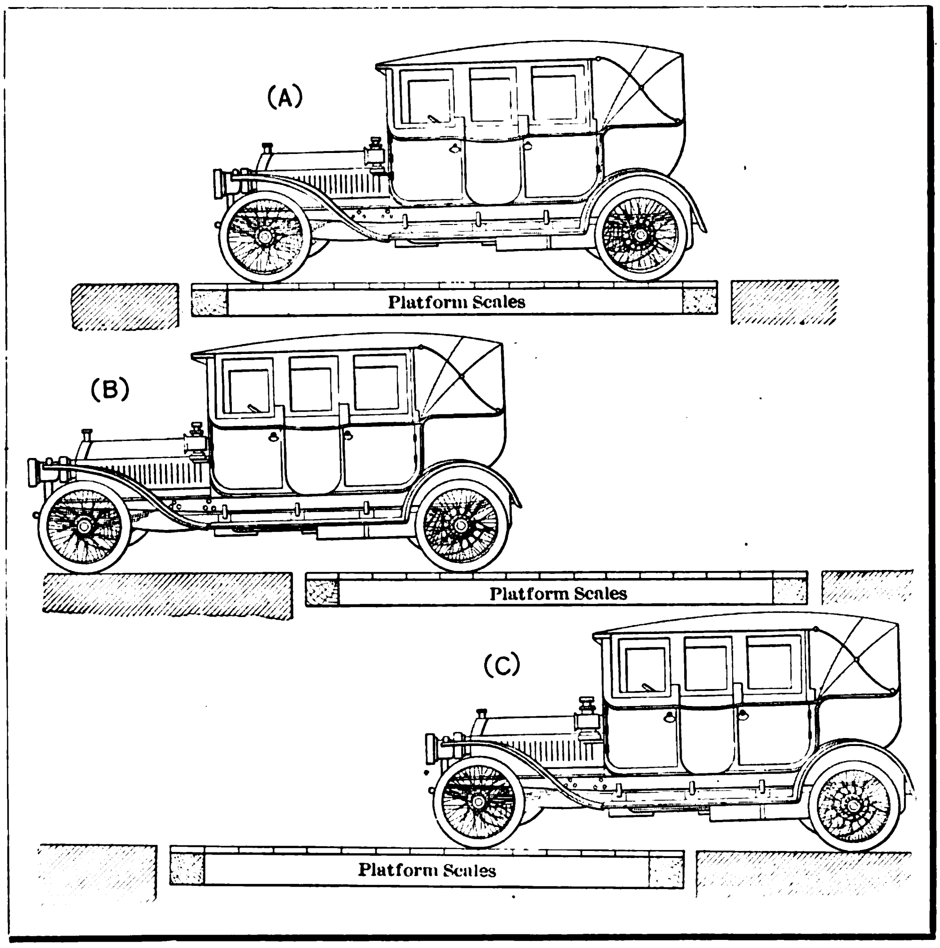
How to Weigh a Car

Important to Know in Selecting Proper Size Tires

THE best way to ascertain the weight of a car is to take it to the public weigh scales and, if possible, place it so that the four wheels rest on the scales as shown in Fig. A. Sometimes this is not possible owing to the great length of the wheelbase or the shortness of the scales. In any case, the car should be fully equipped with all accessories—spare tires, full tanks, water, oil and gasoline, and each seat that can be occupied filled with a passenger, for reasons that will be made clear. Of course if the car can be weighed on the scales with both front and rear wheels resting on the bridge, to obtain the total weight it is only necessary to add, say, 150 pounds average for the number of passengers the car will carry; but this does not give the weight per axle or per wheel—the important point in determining the proper size tires.

It can first of all be assumed that the combined weight obtained by weighing the car as shown in Fig. B and Fig. C should give the total weight obtained by the method used in Fig. A to within a few pounds; but the weight carried on each of the four wheels is by no means one-fourth of the combined weight. The reason of this is that different bodies are of different weights, and the position of the body and seating capacity has a bearing on the amount of weight thrown on the front and rear wheels. Take, for instance, seven-seated limousine and two-seated runabout bodies that are used on the same chassis. The tires that are just large enough for the latter will be quite inadequate for the former, but the cost of upkeep on the runabout will be decreased if it is fitted with tires that are large enough for the limousine, although if detachable rims are fitted a smaller section tire could be used if desired. However, the cost of the rims would not compensate for the difference in price of the two tires.

American Exporters Should Quote Prices in Money of Importing Country—The quotation of prices of American-made automobiles and accessories in the money of the country in which the manufacturer hopes to build up a trade is imperative if the house expects to win the confidence of the foreigner. Quoting prices in American money when advertising goods, even if it is in England, has recently proved to be a great error, attractively written though the advertisement was, in the publications in which it appeared. The effect upon the reader was to prejudice him against the goods by requiring him to calculate what the prices would be in English money.



Method of weighing a car, with special reference to the fitting of the proper size tires

Where Lies the Mystery?

Lack of Harmony of the Motor to the Gear Ratio More Likely Than Not

POOR performance of some automobiles is due to an overwrought ambition. When an automobilist whets his appetite up to the point where he wants to go at the rate of 60 miles per hour in an automobile that might reasonably be expected to make 40 miles in that time, it stands to reason that the poor automobile must be doctored in some way or other, and it is scarcely to be expected that it will be an all-around good performer. A low gear ratio will make the automobile go faster if the motor will continue at a given speed, but when a hill is approached, or the roadbed is soft, the motor will be at a great disadvantage. Under such conditions it will be necessary to fall back upon the sliding gears, and continual shifting of gears will fall to the lot of the automobilist.

It has been said that the sliding gear mechanism used in automobile work is a most clumsy innovation; so it is. Why, then, fix a set of conditions that will demand the use of this gear so much that it will be worked to death, so to say? Why acquire a taste for speeding on a level if it is to be accompanied by a lot of "sliding" when the roads are a little hummocky, or as the brow of a hill lifts its noble contour above the horizon? Who is to blame for this condition? If automobilists persist in demanding speed on a level, and they will have it, it is quite evident that makers will have to bow to the will of those who have the money to pay for what they want and insist upon having it.

It might be said: Why limit the power of the motor so that trouble of this sort will be experienced? Must it be told that considerations of economy demand that a motor be of the size that will give it a fair load when it is propelling the automobile? Mechanical efficiency and, let it be understood, thermal efficiency as well decrease as the load tapers down, falling to a low level if the loading is less than half of that which the motor is capable of. The proper course, under the circumstances, is to use a size of motor that will afford a good all-around efficiency, but, in order to do so, it is necessary to regulate the gear ratio so that the motor will be capable of pulling the automobile up the hills that beset its path without having to drop into low gear.

If the gear ratio is such that the motor will do the work of propelling the automobile up every 7 per cent. hill and through stretches of soft going without sliding the gears, it follows that it will not shine as a racing automobile on level hard roads. In a sense, when all the considerations are fittingly estimated, the automobile that will be most capable on a grade and reasonably alive on a level hard road is the one for the man who has to count the cost, either of operation from the fuel and tire point of view, or from the standpoint of depreciation as well.

The Slide versus the Poppet Valve

What Hamlet would have said about it

To slide or not to slide? That is the question.
Whether it is wiser in a valve to suffer
Th' external noise of the poppet system,
Or take to sleeves (not arms) against the trouble,
And by back-sliding end it? To slide—to pop
No more; and by a sleeve to say we end
The vices, and the thousand natural shocks
The poppet's heir to—'tis a consummation
Devoutly to be wished. To slip—to slide—
To slide—perchance to heat—ay, there's the rub.

—*Motor News* (Ireland).

Conserve the Automobile

BY THE SYSTEM OF LUBRICATION HERE SHOWN (IF CLOSELY ADHERED TO), IT IS BELIEVED THAT THE LIFE OF THE AUTOMOBILE CAN BE PROLONGED MARVELOUSLY

WHEN an automobilist goes in quest of a car and he is instructed how to care for and run it, one of the points that every maker will try to impress upon him is that the car must be well lubricated. Just what these instructions will mean to the purchaser will depend upon his previous training. If a machinist makes a purchase it is highly improbable that he will be impressed at all; he will know that the mere mention of such an important matter is scarcely sufficient.

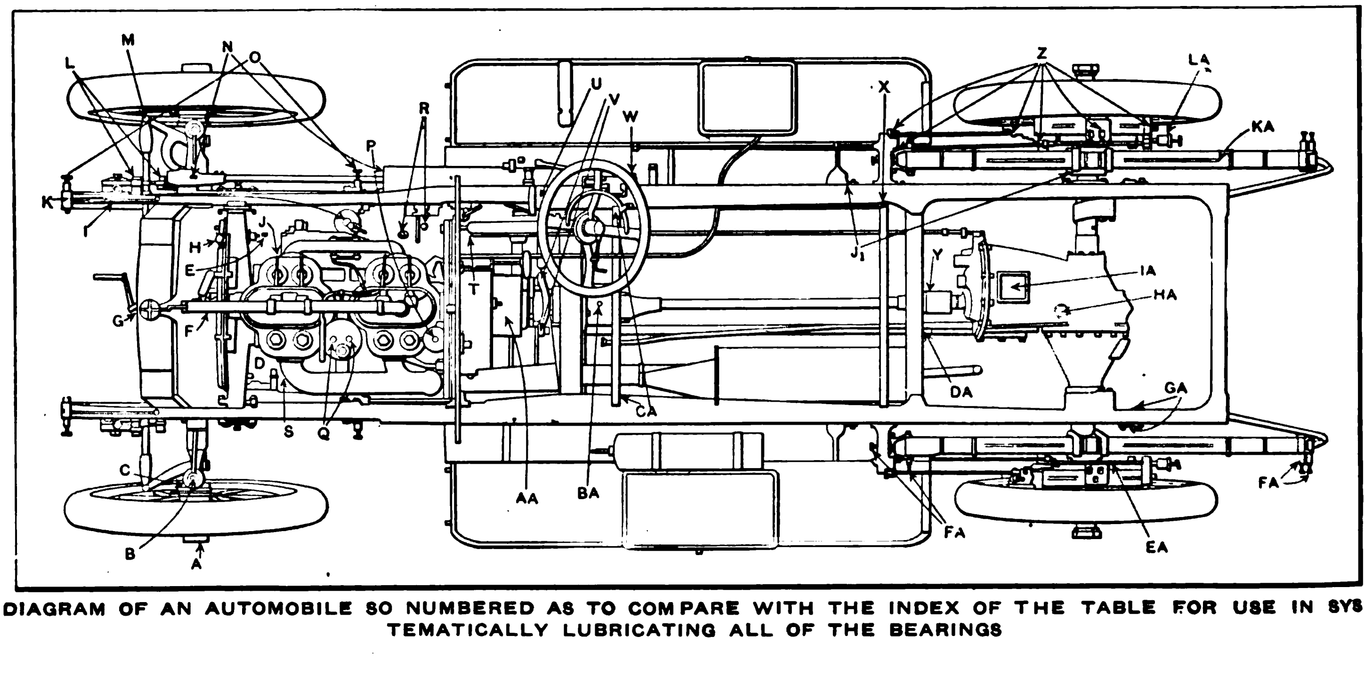


DIAGRAM OF AN AUTOMOBILE SO NUMBERED AS TO COMPARE WITH THE INDEX OF THE TABLE FOR USE IN SYSTEMATICALLY LUBRICATING ALL OF THE BEARINGS

But if the purchaser knows no more about machinery than he may have learned by trying to fix his wife's sewing machine, he will come away sufficiently impressed to make him believe that a squirt can should be emptied at frequent intervals, although it will be all the same to him whether the oil out of the can goes into the bearings or over the exterior surfaces, and he will wonder what all the little holes are for; the places that ought to be protected from the silt of the road by a suitable oiler. The grease cups will look so large to an automobilist of this character that he will wonder if they will ever be emptied.

The real situation is quite different; every place that has relative motion, as every joint, and bearing, even unto the plates of the springs, must be lubricated at frequent intervals or the automobile will soon fall into a state of disuse; at all events it will soon make so much noise that the owner will lose his taste for it. But all of the bearings do not have to be lubricated with the same frequency, and the quality of the lubricant does not have to be the same in each location. Of course, it will be a good idea to use a good grade of lubricating oil in any case, but it will not be necessary to use a high-priced cylinder oil in the little bearings around the chassis, as the brakeshaft journals, etc. In certain places it will be proper to employ a good grease; the consistency of the same to be varied to suit the time of the year and the place of use. Graphite may also have a use in this work, as for illustration, it is good to use with the grease in lubricating the side-chains and in like service. The tabulation, as here given, tells the days of the months, for a whole year, on which to lubricate the various bearings, and, while it is true that this diagram will not serve for all makes of automobiles, the fact remains that, with but slight departure, the automobilist may follow the outline suggested, and, if he will take the pains to employ the system here given, he may be sure that his automobile will run twice as long, at least, as it will if he merely does the work on a haphazard basis.

Reminder to the Automobilist When and Where to Lubricate

No.	LOCATION	*	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
A	Front wheel hub caps	G	7	4	4	1	6	3	1	5	2	7	4	2
B	Steering knuckle bolts	O	**7,21**	**4,18**	**4,18**	**1,15,29**	**13,27**	**10,24**	**8,22**	**5,19**	**2,16,30**	**14,28**	**11,25**	**9,23**
C	Front wheel bearings	O	**7**	**4**	**4**	**1**	**6**	**3**	**1**	**5**	**2**	**7**	**4**	**2**
D	Magneto shaft coupling	G	14,28	11,25	11,25	8,22	6,20	3,17	1,15,29	12,26	9,23,30	7,21	4,18	2,16,30
E	Water pump shaft coupling	G	14,28	11,25	11,25	8,22	6,20	3,17	1,15,29	12,26	9,23	7,21	4,18	2,16,30
F	Fan bearing oiler	O	**7,14,21, 28**	**4,11,18, 25**	**4,11,18, 25**	**1,8,15, 22,29**	**6,13,20, 27**	**3,10,17, 24**	**1,8,15, 22,29**	**5,12,19, 26**	**2,9,16, 23,30**	**7,14,21, 28**	**4,11,18, 25**	**2,9,16, 23,30**
G	Starting crank bearing	O	**7,21**	**4,18**	**4,18**	**1,15,29**	**13,27**	**10,24**	**8,22**	**5,19**	**2,16,30**	**14,28**	**11,25**	**19,23**
H	Timing gear compartment	O	**14**	**11**	**11**	**15**	**13**	**17**	**15**	**12**	**16**	**14**	**18**	**16**
I	Spring leaves	G	28	25	25	29	27	24	29	26	30	28	25	30
J	Valve rod guides	O	**7,14,21, 28**	**4,11,18, 25**	**4,11,18, 25**	**1,8,15, 22,29**	**6,13,20, 27**	**3,10,17, 24**	**1,8,15, 22,29**	**5,12,19, 26**	**2,9,16, 23,30**	**7,14,21, 28**	**4,11,18, 25**	**2,9,16, 23,30**
K	Air valve stem	O	**21**	**18**	**18**	**15**	**13**	**24**	**22**	**19**	**16**	**14**	**25**	**23**
L	Shock absorber studs	O	**7**	**4**	**4**	**1**	**13**	**10**	**8**	**5**	**2**	**14**	**11**	**9**
M	Steering cross tube greasers	G	7,14,21 28	4,11,18, 25	4,11,18, 25	1,8,15, 22,29	6,13,20, 27	3,10,17, 24	1,8,15, 22,29	5,12,19, 26	2,9,16, 23,30	7,14,21, 28	4,11,18, 25	2,9,16, 23,30
N	Steering connecting rod greasers	G	21	18	18	15	13	24	22	19	16	14	25	23
O	Spring bolt greasers	G	14,28	11,25	11,25	8,22	6,20	3,17	1,15,29	12,26	9,23	7,21	4,18	2,16,30
P	Commutator oiler and greaser	O	**7,21**	**4,18**	**4,18**	**1,15,29**	**13,27**	**10,24**	**8,22**	**5,19**	**2,16,30**	**14,28**	**11,25**	**9,23**
Q	Crank case filler and oil tank	O	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**	**Daily**
R	Steering case greasers	G	7	4	4	1	6	3	1	5	2	7	4	2
S	Magneto oil cups and wells	O	**7,21**	**4,18**	**4,18**	**1,15,29**	**13,27**	**10,24**	**8,22**	**5,19**	**2,16,30**	**14,28**	**11,25**	**9,23**
T	Accelerator pedal joints	O	**21**	**18**	**18**	**15**	**13**	**24**	**22**	**19**	**16**	**14**	**25**	**23**
U	Brake pedal bearing	O	**7,14,21, 28**	**4,11,18, 25**	**4,11,18, 25**	**1,8,15, 22,29**	**6,13,20, 27**	**3,10,17, 24**	**1,8,15, 22,29**	**5,12,19, 26**	**2,9,16, 23,30**	**7,14,21, 28**	**4,11,18, 25**	**2,9,16, 23,30**
V	Clutch pedal bearings	O	**14,28**	**11,25**	**11,23**	**8,22**	**6,20**	**3,17**	**1,15,29**	**12,26**	**9,23**	**7,21**	**4,18**	**2,16,30**
W	Brake and gear lever ratchets	O	**7,21**	**4,18**	**4,18**	**1,15,29**	**13,27**	**10,24**	**8,22**	**5,19**	**2,16,30**	**14,28**	**11,25**	**9,23**
X	Brake shaft and connections	O	**14,28**	**11,25**	**11,25**	**8,22**	**6,20**	**3,17**	**1,15,29**	**12,26**	**9,23**	**7,21**	**4,18**	**2,16,30**
Y	Rear universal joints	G	14,28	11,25	11,25	8,22	6,20	3,17	1,15,29	12,26	9,23	7,21	4,18	2,16,30
Z	Brake fittings and connections	O	**7,14,21, 28**	**4,11,18, 25**	**4,11,18, 25**	**1,8,15, 22,29**	**6,13,20, 27**	**3,10,17, 24**	**1,8,15, 22,29**	**5,12,19, 26**	**2,9,16, 23,30**	**7,14,21, 28**	**4,11,18, 25**	**2,9,16, 23,30**
AA	Plate clutch housing	O	**7,21**	**4,18**	**4,18**	**1,15,29**	**13,27**	**10,24**	**8,22**	**5,19**	**2,16,30**	**14,28**	**11,25**	**9,23**
BA	Front universal joint	G	14,28	11,25	11,25	8,22	6,20	3,17	1,15,29	12,26	9,23	7,21	4,18	2,16,30
CA	Gear and brake lever shaft bearings	O	**7,21**	**4,18**	**4,18**	**1,15,29**	**13,27**	**10,24**	**8,22**	**5,19**	**2,16,30**	**14,28**	**11,25**	**9,23**
DA	Gear shifter shaft	O	**14**	**11**	**11**	**15**	**13**	**17**	**15**	**12**	**16**	**14**	**18**	**16**
EA	Internal brake cam oilers	O	**21**	**25**	**25**	**22**	**20**	**24**	**22**	**26**	**23**	**21**	**25**	**16**
FA	Rear spring bolt greasers	G	14,28	11,25	11,25	8,22	6,20	3,17	1,15,29	12,26	9,23	7,21	4,18	2,16,30
GA	Shock absorber bearing studs	O	**7**	**4**	**4**	**1**	**13**	**10**	**8**	**5**	**2**	**14**	**11**	**9**
HA	Differential housing	O	**7**		**4**		**13**		**8**		**2**		**11**	
IA	Transmission case	G		4		1		10		5		14		9
J1	Rear brace rod connections	O	**14**	**11**	**11**	**15**	**13**	**17**	**15**	**12**	**16**	**14**	**18**	**16**
KA	Spring leaves	G	21	18	18	15	13	24	22	19	16	14	25	23
LA	Rear axle outside bearing greasers	G	7,14,21, 28	4,11,18, 25	4,11,18, 25	1,8,15, 22,29	6,13,20, 27	3,10,17, 24	1,8,15, 22,29	5,12,19, 26	2,9,16, 23,30	7,14,21, 28	4,11,18, 25	2,9,16, 23,30

*O—Oil (bold face type). G—Grease.

Cantor Lectures on Motors

PROFESSOR W. WATSON, D.S.C., F.R.S., DELIVERED A SERIES OF LECTURES ON THE GASOLINE MOTOR, OF WHICH THIS IS THE EIGHTH INSTALLMENT—BY PERMISSION OF THE ROYAL SOCIETY OF ARTS

TAKING the case where there is no compression, and taking the initial volume of the mixture as unity, and representing its state by the point, A, we suppose that by the burning of the petrol 1,150 foot-pounds of heat energy are communicated to the gas, the volume remaining constant, so that the condition of the contents of the cylinder at the end of combustion is represented by the point, E. Next, let the piston travel out, doing work, till the gases have expanded to twice their original volume, *i. e.*, till the point, F, is reached; the exhaust valve is then supposed to open, so that the pressure falls to atmospheric pressure, represented by the point, G, and the piston, on the return stroke, expels the gases, and thus we get back to the point, A. The work done during this cycle is represented by the area of the figure A E F G.

Next, starting with the same quantity of mixture at the same pressure, represented by the point, A, let it be compressed adiabatically, *i. e.*, without loss of heat, to the point, B. Then, the piston remaining stationary, let the mixture be fired, so that 1,150 foot-pounds of heat energy are again communicated to the gas. The pressure will rise to the point, C. Then, allowing the piston to move out, the gases will expand, doing work on the piston, till the original volume is reached, that is, till we come to the point, D. The exhaust valve is then opened, and the products of combustion are allowed to escape. The work done during the cycle is represented by the area of the figure, A B C D, and a mere glance is sufficient to show that the area of this figure is very much greater than the area of the figure, A E F G, or, in other words, the work done by the engine is greater, and, since the energy supplied in the form of fuel is the same in the two cases, it follows that the efficiency, in the case of the compression cycle, is considerably greater than in the case of the non-compression cycle. The actual value of the work done in the compression cycle is 410 foot-pounds, so that the efficiency is 410 ÷ 1150 or 0.36. In the case of the non-compression cycle, the work done is 205 foot-pounds, and the efficiency is 0.18.

It will be observed, further, that if the expansion in the case of the compression cycle were carried to twice the original volume, as was done in the case of the non-compression cycle, an additional amount of work, represented by the area, D H G A, would be obtained, and that this additional work would be about two-thirds of the whole work obtained in the non-compression cycle.

If we consider an ideal engine, working on the Otto cycle, in which there are no thermal losses due to conduction and radiation, and in which the gas in the cylinder, usually called the working fluid, has at all temperatures the same properties as has air at ordinary temperatures, then the efficiency of such an engine can be at once calculated if we know the amount of the compression. Thus, if r is the ratio of the original volume of the charge before compression to the volume after compression, that is, is the ratio of the stroke volume plus the volume of the combustion space to the volume of the combustion space, the efficiency is given by

$$y = 1 - \left(\frac{1}{r}\right)^{0.408}$$

The quantity, r, is called the compression ratio, and some values of the efficiency calculated by this formula are given in the following table:

AIR STANDARD EFFICIENCY

Value of r.	Efficiency
2	.25
3	.36
4	.43
5	.48
6	.52
10	.61
100	.85

In practice, the compression ratios of petrol engines lie between 3.5 and 5, generally about 4.

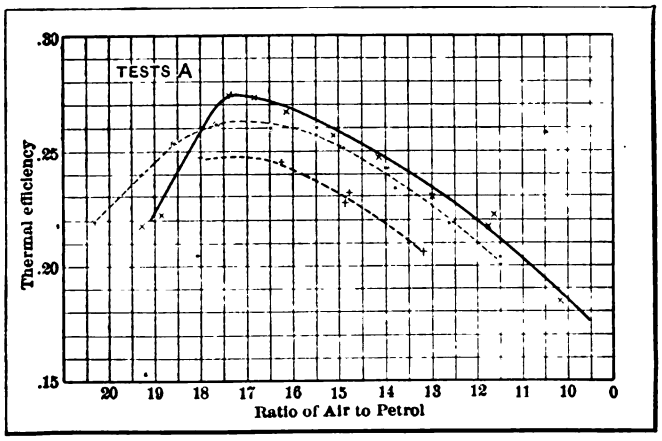


Fig. 30—Indicator diagram showing actual measurements of thermal efficiency obtained from a four-cylinder engine at varying speeds

Some actual measurements of efficiency are shown in Fig. 30, which were obtained from a four-cylinder engine having a bore of 85 millimeters and a stroke of 120 millimeters, the compression ratio being 4.71. The full line curve corresponds to a speed of about 1,300 revolutions per minute. The curve marked with small dots to a speed of 1,100, and the curve marked with dashes to a speed of 700 revolutions per minute.

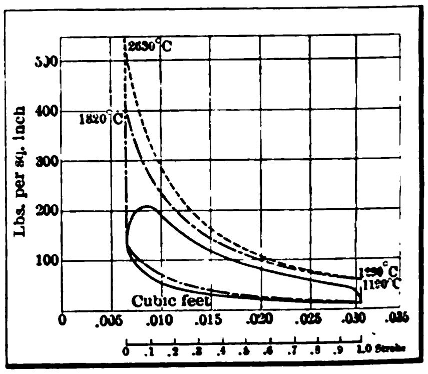


Fig. 31—Showing efficiency with heat supply per cycle of 962 foot pounds

It will be observed that, except with very weak mixtures, the efficiency increases with the speed. Considering the measurements made at the highest speed, and starting with the weakest mixture that will fire, which is about 19 of air to one of petrol, the efficiency is about 0.22. As the mixture gets richer, the efficiency rapidly increases, and reaches a maximum of 0.276 for 17 parts of air to 1 of petrol. After this the efficiency steadily decreases as the strength of the mixture increases. It is important to notice that the maximum efficiency is not obtained with the exact amount of air required to give complete combustion, that is with 14 of air to 1 of petrol; increased efficiency is obtained by working with weaker mixtures, that is with mixtures containing an excess of oxygen. For mixtures richer than 1 of petrol and 14 of air there is a certain amount of combustible gas (CO, H and CH_4) in the exhaust, and hence some of the energy of the fuel is wasted owing to incomplete combustion. This is a point to which I shall return later.

Since only about 27 per cent. of the heat energy supplied in the fuel is converted into work, it follows that the remaining 73 per cent. is wasted, and I now wish to consider what becomes of this wasted heat, and if it is practicable to avoid such loss to any great extent. The heat which is not converted into work is either communicated to the walls of the cylinder and hence to the jacket water, or escapes in the exhaust, the gases of which are at a very high temperature. We require to separate the losses of heat into two parts, namely, that communicated to the cylinder walls during the compression and working stroke, and the remainder, which represents the sensible heat of the exhaust gases at the end of the working stroke. The first of these (*a*), namely, the heat lost to the cylinder walls during the working stroke, is pure waste, and in every way it is advantageous to reduce it to a minimum. The second, (*b*) namely, the heat represented by the hot exhaust gases; although it represents a waste as far as the conversion of heat energy into work is concerned, is quite unpreventable so long as the engine works on the Otto cycle, in which the expansion stops when the volume is equal to the initial volume of the uncompressed charge. To what extent we may hope to reduce it by using a different cycle of operations will be discussed later on. Now it is quite impossible in a four-cycle engine to separate experimentally the heat losses into the two parts, *a* and *b*, for the reason that the jacket water receives quite a large proportion of the heat from the exhaust gases. This is due to the fact that the hot exhaust gases remain in contact with the cylinder walls throughout the exhaust stroke. Further, in order to prevent the burning of the exhaust valve and its seating, the part of the exhaust passage near the valve is always well waterjacketed. Thus, on both these accounts, much of the heat of the exhaust gases is communicated to the jacket water. We can, however, form some idea of the relative magnitudes of the losses, *a* and *b*, by studying the action of an ideal engine, in which the walls of the cylinder are supposed to be impervious to heat, and hence there is no loss of heat from the working fluid to the walls. In such an ideal engine we can calculate the heat contained in the exhaust, and then the difference between the total quantity of heat lost in the actual engine, and the quantity of heat lost in the exhaust of the ideal engine will give us some idea of the quantity of heat lost owing to conduction in the actual engine.

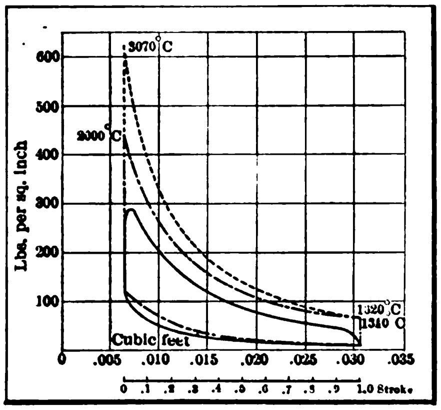


Fig. 32—Showing efficiency with heat supply per cycle of 1150 foot pounds

When considering the ideal engine we may either suppose that the working fluid has also the ideal property of having the same specific heat at all temperatures, when it is usual to refer to the engine as one working on the air cycle, or we may suppose that the properties of the working fluid are identical with those of the gases which are actually present in the cylinder of an engine. In this case it will be necessary to allow for the fact that the specific heat of such gases increases as the temperature rises.

In the air-cycle engine the efficiency will vary with the compression ratio, as already mentioned, but will not vary with the amount of heat supplied per stroke. In the case of the variable specific heat ideal engine, the efficiency will vary with the compression ratio to almost exactly (in reality a very little less) the same extent as in the case of the air cycle. Owing, however, to the increase in specific heat with temperature the efficiency will vary with the heat supply per cycle, for the temperature reached at the end of the combustion will depend on this quantity, *i. e.*, on the strength of mixture in the charge.

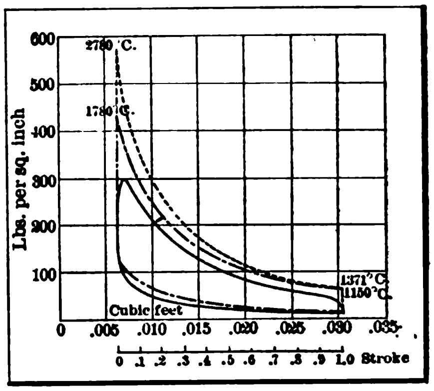


Fig. 33—Showing efficiency with heat supply per cycle of 1027 foot pounds

In Figs. 31, 32, 33 are shown for three different amounts of heat supply per cycle, the three indicator diagrams corresponding to—(1) an ideal engine working on the air-cycle; (2) an ideal engine working on the variable specific heat cycle, and (3) an indicator diagram taken from an actual engine, in each case the compression ratio being 4.7. In Fig. 31 the heat supply per cycle is 962 foot-pounds, which corresponds to the use of a mixture containing 17.4 parts of air to 1 of petrol. The following table gives the manner in which the heat supply is utilized in the three cycles:

	Efficiency	Mean effective pressure lbs. per sq. in.	Heat converted into work per cycle ft. lbs.	Heat rejected per cycle ft. lbs.
Ideal engine, air cycle......	.463	128	445	517
Ideal engine, variable specific heat cycle............	.367	102	352	610
Actual engine...............	.275	77	265	697

Thus it appears that while an ideal engine, in which there are no thermal losses due to loss of heat to the cylinder walls, would reject in the exhaust 610 foot-pounds the actual engine rejects 697 foot-pounds. Of this 697 foot-pounds, part is lost to the walls of the cylinder, and we see that such loss probably amounts to about 87 foot-pounds per cycle.

In Fig. 32 the heat supply per cycle is 1,150 foot-pounds, which corresponds to a mixture containing 14.1 of air to 1 of petrol, and the heat supply is accounted for as follows:

	Efficiency	Mean effective pressure lbs. per sq. in.	Heat converted into work per cycle ft. lbs.	Heat rejected per cycle ft. lbs.
Ideal engine, air cycle......	.463	153	530	620
Ideal engine, variable specific heat cycle...........	.856	118	410	740
Actual engine...............	.248	84	285	865

In this case the entire loss in the actual engine is 125 foot-pounds per cycle.

In Fig. 33 the heat supply per cycle is 1,027 foot-pounds. This corresponds to the heat actually developed in the cylinder when a mixture containing 10.1 parts of air to 1 of petrol is used. The calorific value of the fuel is much greater than 1,027 foot-pounds, but with this limited supply of air the petrol is only partly burnt, a large proportion of carbon monoxide, hydrogen and methane being present in the exhaust. The heat developed by the combustion that actually takes place is accounted for as follows:

	Efficiency	Mean effective pressure lbs per sq in.	Heat converted into work per cycle ft. lbs.	Heat rejected per cycle ft. lbs.
Ideal engine, air cycle......	.463	137	475	552
Ideal engine, variable specific heat cycle............	.381	113	390	637
Actual engine...............	.289	86	297	730

In this case the extra loss in the actual engine amounts to 93 foot-pounds per cycle.

In the latest type of Blériot aeroplane, as exhibited at the recent aviation show in Paris, the designer takes distance from the revolving type of motor, having equipped his machine with a four-cylinder Gregoire-Gyp motor, which is furthermore placed upside down so as to lower the center of gravity for the whole structure and incidentally gaining whatever improvement in balancing may result from having reciprocating parts work against gravity instead of with this force during the power stroke.—*Allgemeine Automobil-Zeitung.*

Letters from Subscribers

THIS DEPARTMENT IS DEVOTED TO THE ANSWERING OF LETTERS FROM SUBSCRIBERS ON ANY SUBJECT RELATED TO THE RUNNING OF AUTOMOBILES

Wiring Diagram of Delco Distributor

Editor The Automobile:

[2,450]—Will you please publish a wiring diagram of the Delco ignition system? Subscriber.

Jersey City, N. J.

Using six cells of battery in the series, arranged for a four-cylinder motor, connected up to four spark plugs, the wiring diagram is as shown in Fig. 1.

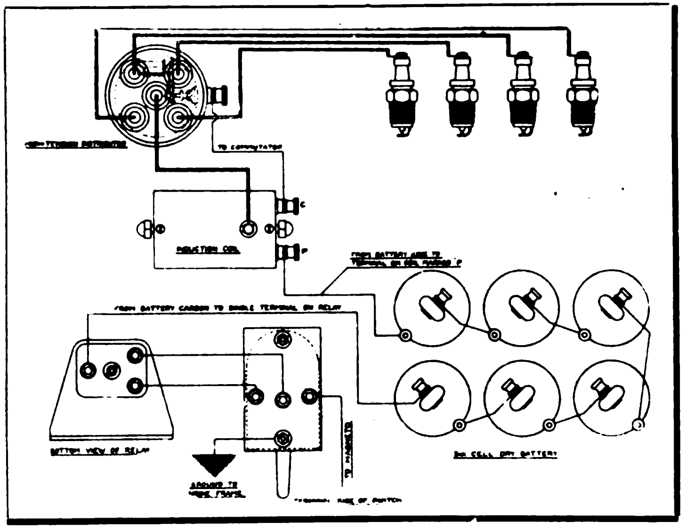


Fig. 1—Illustrating the method of wiring in a Delco Ignition system

Refinement in Design Readily Noted

Editor The Automobile:

[2,451]—I have had some experience as a designer, but I do not understand what is meant by ultra-refinement, or to what extent motors and other parts of automobiles can be made better than they are, taking them as they may be found in the many examples of the present day. Will you give a single example, illustrating the difference between a real refinement and a design that might be classed as indifferent? Kindly make the comparison as plain as possible, so that it will appeal at once to the reader. Predesinger.

Detroit, Mich.

Referring to Fig. 2 of a cylinder and to the metal around the seat of the valve, note that it is not of uniform thickness, being bunched at A and quite thin at B. Now examine another cylinder design as depicted in Fig. 3, observe that the metal of the cylinder around the valve is uniform in thickness and that the water J1 and J2 is in quantity, with free circulation all around. Also observe that the water connection at the top J3 is in good volume. A moment's observation, taking in the two designs, will suffice for your purpose.

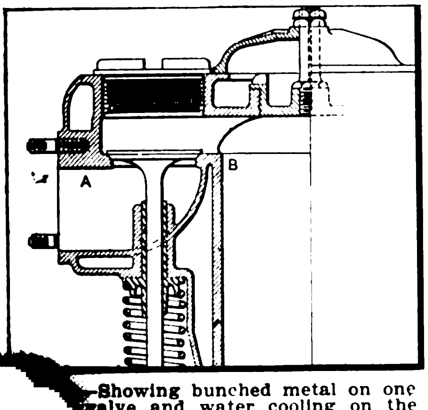
A Useful Tool for Magneto Work

Editor The Automobile:

[2,452]—I recently wanted to set the make and break of my magneto and tighten up some nut on it, but found the ordinary small adjustable wrench was useless for the purpose. Is there any spanner designed for this especial use? R. C. Jones.

Pittsburg, Pa.

A spanner is usually supplied by makers of magnetos, but if you wish to make one it is a very simple matter. Out of a piece of 3-16 inch steel as shown in Fig. 4 a spanner can be cut with a hacksaw and filed up to shape to the sizes indicated, which are the usual ones for nuts and bolts used for this work. It is a tool that can be carried about in the pocket without inconvenience, and one that will allow of getting at ordinarily inaccessible places without much trouble, incidentally avoiding the possibility of a set of badly barked knuckles and the consequent profanity.



—Showing bunched metal on one valve and water cooling on the

Alcohol Mixtures Kept at Proper Strength

Editor The Automobile:

[2,453]—When alcohol is used with water in the radiator of a motor and heating up is enough to boil the solution, the question is, does the alcohol boil off, and if so, how can one determine when to strengthen the solution in order to be sure that the same will not fall below the desired point?

Brooklyn, N. Y. C. F. G.

According to law, denatured alcohol is the "grain alcohol of commerce rendered unfit for beverages." The freezing point of this alcohol is about 160 degrees Fahrenheit. When added to water in various proportions it lowers the freezing point of the water. An approximation of the freezing points of various proportions of water and denatured alcohol is given below:

FREEZING POINT OF DILUTED DENATURED ALCOHOL

Proportion of water in gallons	Proportion of denatured alcohol in quarts	Freezing point in degrees Fahrenheit
1	1	10
1	1.5	5
1	2.5	—20
1	4	—35

NOTE.—The solution must be balanced from time to time, maintaining the same at the proper level. If it is safe to employ a mixture holding 2.5 quarts of denatured alcohol to the gallon of water it is necessary to maintain this level.

A very simple way of observing the relation of alcohol to water is to mix, say, 2 1-2 quarts of denatured alcohol with 1 gallon of water and then by means of a weighted float with a stem on it find out how low the float sinks in the solution and mark this point on the stem as shown in the illustration (Fig. 6). With a good-sized cork, a long, slender stick of wood and a couple of washers it would be possible to make a measuring instrument in five minutes that will serve every purpose. Calibrate the instrument by finding out how low it will sink in the solution and mark the place. After this all that has to be done is to draw off some of the solution from the radia-

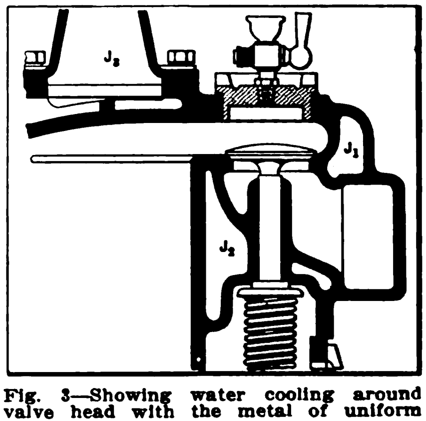


Fig. 3—Showing water cooling around valve head with the metal of uniform thickness

tor in a bucket and drop the instrument into the liquid, noting how low it will sink. If it does not sink down to the mark, add alcohol until it will; if it sinks below the mark, add water to float it up to the same.

Some Pointers as to Electrically Lighting a Car

Editor The Automobile:

[2,454]—I am desirous of equipping my car with electric light throughout, and would be obliged if you will answer the following queries in order that I may form an idea as to what the cost of operation will be:

1. How should the wiring be carried out for a complete equipment?
2. What capacity storage battery would give the best results?
3. What would be the consumption of current per lamp per ampere hour?
4. Is it a simple matter to fit a lighting dynamo?

New York. Limousine.

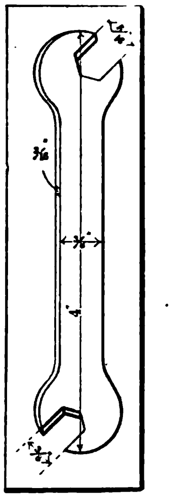


Fig. 4—Wrench for magneto

1. Fig. 5 shows how the wiring should be carried out, with a central switch L on the dash. The battery M can be carried in a box on the running board, but of course it can be placed anywhere, although the position will depend upon the length of wiring. The different fittings—A, headlights; B, side lamps; H, electric horn; J, pillar light for lubricators and speedometer; F, cigar lighter; D, interior light; C, tail lamp—can all be run together, the inside lights being controlled by the switch E and the horn by switch I.

2. The capacity of the storage battery depends upon the candlepower of the lamps. Six-volt lamps are the ones usually employed and are the easiest to replace if broken, as this size is usually carried in stock. The headlights could be fitted with 16-candlepower lamps, the side lamps with 4 candlepower, the tail lamp with 2 candlepower and the interior with 4 candlepower lamps.

3. The consumption of the above would be as follows if tungsten lamps were used: The 2-candlepower lamps consume 0.4 ampere per hour; the 4, 0.8 ampere per hour, and the 16-candlepower, 3.2 amperes per hour. It will be noticed that the amperage is just double the candlepower. The amount of current consumed by the horn and other fittings is but slight. Carbon lamps, although much cheaper than the metal filament type, burn about three times the amount of current that is consumed by the latter.

4. Yes, and in some makes it can be used to charge the storage battery while not being used for lighting purposes.

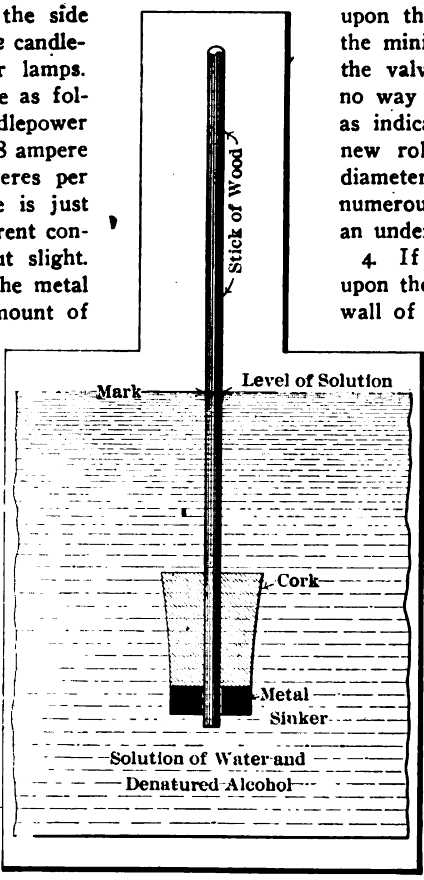


Fig. 6—Instrument to determine proper proportions of alcohol and water in anti-freezing mixture

A Baker's Dozen of Serious Motor Happenings

Editor The Automobile:

[2,455]—My motor is of the T-type. The timing gears are noisy, no doubt from wear. Would you advise getting new ones from the builders of motor, or having spiral gears made? If so, where could I have them made, and what should the price be? Also, what do you consider the best material for the gears? The timing of the valves is marked out on flywheel. I have the valves set so that when marks are at proper place there is no clearance between slider and valve stem, and valve is ready to open. This leaves quite a bit of clearance when valves are closed and makes noise. Is there any way this clearance can be taken up without changing timing? The valve sliders are square and oil works out, running down crankcase. Would grinding off corners of sliders allow oil to drain back, or would more be thrown out? Some makers are using telescoping sleeves to enclose valve springs, guides and sliders. Do you think they would help me? How are they made?

I have a Stromberg carbureter. Do you think a mechanical device used in intake manifold to break up mixture would increase power and smooth running, and decrease gasoline used?

Hammondsport, N. Y. I. J. Brundage.

1. A new set of gears might reduce the noise in the half-time system; they do not have to be spiral if they are well made. The cost will certainly be the lowest if the old gears are replaced from interchangeable stock which the maker should have.

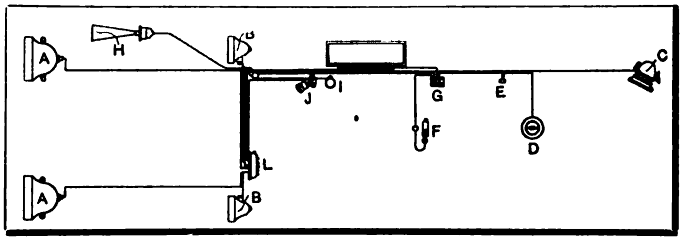


Fig. 5—Diagram showing method of wiring a car for electric lighting

2. Halftime gears are sometimes made of cast gray iron in order to keep the noise down. They may be of any good grade of gear steel, and to render them noiseless a ring of Babbit may be cast around inside of the flange, adhering to the inner surface of the teeth base. After this band is cast in, the gears may be set up in centers, and the Babbitt may then be turned down to any desired smooth contour.

3. There should be a little clearance between the lift of the valve and the stem in order to make sure that the valves will seat. The exact amount of this clearance will depend upon the diameter of the cam roller; reduce it to the minimum possible consistent with the seating of the valve. You will understand that there will be no way of reducing this clearance by a certain way as indicated by the diameter of the roller, unless a new roller is substituted, the latter of a reduced diameter, which is equal to redesigning the motor in numerous particulars, and this may be too much of an undertaking.

4. If oil sneaks up the valve lifts and crawls out upon the ledges above, cut a recess around the inner wall of the outer extremity of the guide and clap a washer down on top of it, making the same with a hole that will hug the lift. When the oil crawls up and touches the washer it will fall back into the cavity instead of crawling out upon the ledge.

5. Telescoping sleeves are advantageous, nor should they be hard to make. You might take two lengths of brass or copper tubing so sized as to telescope each other, and after inserting them into place, prevent them from dropping down by drilling a hole through and slipping a long cotter pin clear through, thereby clinching back the ends.

6. Adjust the Stromberg carbureter so that it will give you a mixture that will not heat your motor too much when it is running slow. You should have no trouble at all after you make the proper adjustments. The level of gasoline in the jet on this particular carbureter is very easily adjusted, and decreasing the level in the float chamber may have the desired effe-

Don'ts for the Autoist

THE BURDEN OF THIS PLAINT IS IN THE NATURE OF SOME INJUNCTIONS FOR THE GOOD OF THE SERVICE AND THE EDIFICATION OF USERS, OR THOSE WHO MAY JOIN THE RANKS

Don't set up a wail of woe if you run on a deflated tire for a few feet only and then have to visit the tire maker.

Don't try to achieve fame in an automobile at the rate of 60 miles per hour; you might have to wear splints.

Don't be seized with hysteria if the brasses of your motor melt out after they put up with the abuse which comes from a shortage of lubricating oil for three hours.

Don't shoot down your intelligence in cold blood; this is what you do when you abuse your chauffeur for keeping your automobile in good working order.

Don't exhibit grief if you purchase a second-hand automobile and, failing to examine it, discover that it is a white elephant instead.

Don't write an advertisement entitled "News for investors" if you wish to dispose of a second-hand automobile that is positively useless; just say "Bait for suckers" instead.

Don't be less than the shrewd investor who will first consult his needs and then select an automobile to fill them.

Don't spend money on the patching of bad roads; build good roads instead.

Don't forget that good road-building requires science, skill and money.

Don't live on a bad road; it is a sign that you will always remain poor.

Don't overlook the fact that automobilists are men of affairs.

Don't argue against the automobile; it runs out of doors; fresh air is also to be found in the very places that it will be found in.

Don't forget that man is not a fish; he needs air; water is only a solvent.

Don't hover around a drawing room absorbing silly conversation; go out in an automobile and absorb oxygen; it will do you infinitely more good.

Don't be a reservation Indian; the noble red man fell into droll ways directly when he dropped his practice of hunting around for enough to eat and fresh air.

Don't pay your tailor to make you look like a man; get an automobile and watch Nature re-shape you into one whom the tailor will not have to pad.

Don't under-estimate the value of the crisp set of brains that nestle under the hair of the man who rides daily in an automobile; you would not have the slightest show in a mental tussle with him.

Don't hang around a sanitarium to be weaned; if you have the drinking habit and you desire to stop fighting, get an autobile and have the cobwebs swept away.

Don't have melancholia if you are a banker and you want to unload mining stock, but cannot; fall into line; buy an automobile and forget it.

Don't be a chucklehead; supposing it is true that the pianos you make are going but slowly, do you blace 'em? You ride in a big locomotive yourself, and you enjoy it too.

Don't go to a drug store for beauty dope; it rubs off; ozone, as it greets you from the four winds, as you brace to the breeze in a tonneau, is indelible.

Don't get mixed up in the financial ditch with a lot of high-priced millinery and other trappings; an automobile is much less expensive and it has more class; moreover, it is of real value in a dozen ways that feathers are as strangers to.

Don't disregard the traditional aid to sobriety as the "gold cure"; apply it in the purchase of an automobile, backing sobriety of judgment; get a good automobile.

Don't be overwhelmed by the force of acccuracy as it is set forth by the salesman; let him out a link on the road to proof of the pudding.

Don't put a damper upon the salesman who has the courage of his convictions; let him show you what he can do.

Don't dissolve the parliament of the senses or be content with a half-repair job at double-cost; convene the parliament and pass an act of censure if necessary.

Don't take the wind out of the sails of a good chauffeur; if he wants a tire gauge for purposes of economy, get one for him.

Don't take to a "safety razor" to work an economy sufficient to perpetuate a fallacy; if the chauffeur fails to help you out, fire him.

Don't imitate a barber when a "prospective" accepts your suggestion to see what your car is like; he neither wants a close shave, nor does he desire to be talked to death—send a dumb demonstrator.

Don't snort with disgust at the service your tires are giving: inflate them and they will last three times as long.

Don't bind your thoughts to make them small like the Chinese ladies' feet.

Humors of Aviation

Parisians Have Devised an "Easy-Drop" Garment for Sky Sailors

RUDYARD KIPLING wants aviators to don pneumatic clothes. Henry Norman insists that they should be provided with a parachute device. Capping the climax, Paris combines the pneumatic clothes and the parachute in the wonderful garment for aviators shown in the accompanying illustration. The moment the aeroplane strikes the unfriendly earth with some force, the shock releases compressed air and inflates the vestment, or if the aviator choose to abandon his craft in midair, he jumps, spreading his arms, and there is the parachute, ready to transform itself into a ball of air and guaranteed to land the daring airman with the most durable portions of his anatomy underneath.

Front and side views of the latest Parisian style of aviation apparel—the parachute dress

It Stands to Reason

THAT THERE ARE QUITE A NUMBER OF THINGS THAT WILL BEAR MENTION WITHOUT PROOF WOULD SEEM TO BE TRUE—THESE ARE SOME OF THEM

That the delightful throbbing of a well-timed motor creates a sensation of restful comfort in the being of the fortunate owner of the automobile; this condition may be perpetuated through the proper use of lubricating oil.

That there is romance in everything; cut out the romance and you murder enthusiasm; slay enthusiasm and your automobile will sell for junk.

That there is an affinity between a mechanic and a mechanical masterpiece; sever the magic connection and the machine will fall into disuse.

That the man who cannot get up an admiration for the automobile that he owns had better dispose of it before the varnish looses its lustre; strange to relate, the varnish can tell if its master has lost his heart to another form of beauty.

That the locomotive engineer who talks lovingly to and pets the iron-horse that so willingly bends to his touch, is the best engineer in the employ every time; the reason lies in the fact that the engineer does not abuse the machine that he longs to caress.

That pleasant dreams depart on black plumed wings with the dawn of the day that sees the automobilist unmindful of his charge.

That discordant sounds come bellowing from the midst of unlubricated automobiles.

That the man who wants something for nothing is in the guise of longing coiled about despair.

That work, while it is death to lily-white hands, is the birthplace of happiness.

That the poet's dream and the craftsman's work are the equivalent of each other; the one delivers brain-food and the other produces bodily comforts that give the poet breath and being.

That the plundered soul of the abused machine leaves a wreck behind when it departs.

That ravages of time are as naught to the unmindful petty ways of unthinking man.

That delights elude the embrace of the bungler.

That the mind should not have such balloon power as to lift the feet up from the ground.

That water can be separated out of the gasoline if a chamois skin is first soaked in gasoline and then used as a filter.

That the wiring must be kept free from lubricating oil, otherwise the insulation will deteriorate.

That the high-tension cables must be protected in every way; the voltage is not far from 10,000, and it is prone to jump to adjacent metals through the insulation of the wire.

That much of the ignition trouble that is experienced is due to the presence of oil and dirt.

That some of the balance of the ignition trouble is due to bad joints.

That batteries must be kept charged if the ignition current from them is to be up to the fullest requirement.

That dry cells have to be replaced at sufficiently frequent intervals to assure the presence of a reliable source of electrical energy to deliver the required spark.

That slime in the gasoline piping is frequently at the bottom of an insufficiency of gasoline.

That a drop of solder in the piping is sometimes the mischief maker.

That a wad of waste, left in by the workman, is occasionally the cause of a shortage of gasoline.

That automobilists are sometimes absent-minded or languid.

That a misplaced float in the carbureter is the cause of the loss of much gasoline in many an automobile.

That it is easier to put a carbureter out of adjustment than it is to readjust it.

That a slipping clutch is a power consumer and a nuisance in other respects besides.

That a "fierce" clutch will wreck an automobile.

That the way to keep a clutch from acting "fierce" is to lubricate it.

Pointer on Chain Drive

Oilers in Convenient Places Insure Lubrication in Wet Weather

THE efficiency of chain transmission depends upon the amount of lubrication that the chain receives and the immunity from becoming clogged with dust and mud, provided the pitch of the teeth of the sprockets is correct and the alignment good. The first question is: What causes a chain to stretch, as it is made of metal, unlike a belt that can contract and expand? The answer is, wear; and the best way to avoid this is to have chain covers fitted so that all dirt is excluded and the chain can dip into oil and so be continually lubricated. Some cars do not adapt themselves very easily to chain covers, and it is also an expensive matter to fit these so that they do not rattle. Lubrication remains, therefore, to be properly attended to. Apart from fortnightly taking off and soaking in kerosene and graphite grease, small oilers that can be turned on and off at the driver's wish and without trouble, as here illustrated, would be found beneficial if the following method were adhered to: Copious oiling is not necessary, as it will bespatter the car with oil and make the paint soon look shabby. It is needless to tell an autoist what the effect of oil is on his tires. Of course, if he really wishes to know let him pour some on the floor where the car stands, so that the tire touches it. No, it won't explode; but with the tentacles of the octopus it will grip that tire, squeezing all the elasticity out of it, rendering it lifeless and asking every stone it meets to end its misery, as it is about to fall asunder. Returning to our muttons: The leads from the oilers should allow the lubricant to drop over the front sprocket so that the oil enters the rollers on the side of the chains nearest to the car — that is where the rollers touch the bridge pieces. Two to three drops per minute is sufficient for dry weather and four to five for wet. In wet weather the oil will prevent the chain receiving a coating of mud and so prevent wear. In Winter the oil should be very thin; otherwise it may freeze and clog in the pipes.

Drip feed lubricators below front seats for oiling chains

Questions That Arise

SOME OF THOSE THAT COME UP IN EVERY-DAY AUTOMOBILING ARE ANSWERED BY THE MATTER WHICH IS BEING PREPARED BY FOREST R. JONES IN THE NEW EDITION OF THE "AUTOMOBILE CATECHISM" THAT WILL SOON GO TO PRESS

[307]—Give the events that occur in a four-cycle gasoline engine in the order of their occurrence.

Any part of the cycle may be taken as the starting point. It is convenient to begin with the stroke that draws in the combustible mixture.

First stroke: Intake or admission stroke. The piston starts from its extreme position next the combustion chamber (from the highest position in a vertical cylinder engine) and the inlet valve is opened either by suction (automatic valve) or by the inlet cam (mechanical valve) at about the same time so as to allow the combustible mixture (charge) to be drawn in by suction until the end or about the end of the stroke. The inlet valve closes at (or about) the end of the intake stroke.

Second stroke: Compression stroke. Both valves are closed. The piston moving toward the closed end of the cylinder (combustion chamber) compresses the charge to a pressure of about 65 pounds per square inch, as shown by gauge reading if a gauge is attached to the combustion chamber for obtaining the pressure.

Third stroke: Impulse, working, expansion or driving stroke. Includes ignition, inflammation, combustion and expansion of charge. The electric spark or other ignition device ignites the charge about the time the piston has completed compression, and combustion (following inflammation) takes place more or less rapidly. The gas pressure is increased by the heat of combustion (to about 350 pounds per square inch or less) and drives the piston out from the closed end of the cylinder. The expansion and cooling of the products of combustion lower the pressure as the piston moves out. Shortly before the end of the impulse stroke the exhaust valve is opened by the exhaust cam (the exhaust valve is always opened by a cam or other device positive in its action) and the gases escape rapidly with a characteristic puff until the pressure falls to about that of the atmosphere (to nearly zero by gauge).

Fourth stroke: Exhaust stroke. The piston, moving toward the closed end of the cylinder, expels more of the remaining gases through the open exhaust port. The exhaust valve is held off its seat until (or after) the end of the stroke. This completes the cycle. It is begun again with the next stroke, and continues on indefinitely.

[308]—What speed of rotation must the camshaft have?

Half as fast as the main shaft of the engine if each cam has only one lobe (lug, protuberance) or depression. The camshaft must be positively driven, as by tooth gears, by the main shaft. The gear on the camshaft has twice as many teeth as the one on the crankshaft. This applies to the four-stroke cycle motor. In a two-stroke cycle motor the camshaft rotates at the same speed as the crankshaft when the cam has only one lug, provided there is a camshaft, which is not usually so for a two-cycle motor.

[309]—What are two-to-one gears?

The gears used to drive the camshaft of a four-cycle motor. The driving gear is on the crankshaft. The driven gear on the camshaft has twice as many teeth as the driving gear.

[310]—What is a muffler and why used?

It is an enlargement (or enlargements) of the exhaust pipe, or a corresponding device to deaden the noise of the exhaust.

[311]—Does the muffler reduce the effective power of the engine?

Yes, but only to a slight extent when properly designed and installed. A cut-out valve is often applied to allow the exhaust to escape without passing through the muffler.

[312]—Why are piston rings used?

In order to make an air-tight fit of the piston and rings combined in the bore of the cylinder. It is found impossible to make the solid piston fit tightly enough in engine practice. The rings, on account of their thinness and being cut open on one side, expand by their elasticity against the bore of the cylinder so as to make a tight-fitting joint and adjust themselves to variation in diameter of bore caused by heat and wear.

[313]—What is a "dead center"?

In reference to an engine it means the position of the crankshaft which brings the connecting rod and crank in line so that a force exerted upon the piston to move it along the bore of the cylinder has no rotative effect on the crank, and the engine remains dead. In the ordinary types of engine each crank has two dead centers, one-half revolution of the crank apart, one for each position of the piston at the end of a stroke. The dead centers are not one-half revolution apart in an engine whose cylinder is offset so as to be somewhat to one side of the crankshaft.

Peculiarities of Dry Batteries

Telling Why an Open Circuit Test Gives Little Real Information

DRY batteries are much in vogue as the auxiliary source of electrical energy when a magneto is relied upon under working conditions for ignition purposes. The improvements that have been made in dry cells in view of the promise of a large return since the coming of the automobile were very marked indeed. It is within the memory of the average automoblist when dry cells were absolutely limited to unimportant open circuit work, as for bell-ringing in private dwelling houses, and even then confined to the minor responsibilities.

The unknown quantity in a dry battery is the internal resistance. Let the voltage be what it may on open circuit, the fact remains that if the cell is poorly made, or "dried out," instantly the circuit is closed, and the current begins to flow, the voltage will drop responding to the conditions of Ohms' Law, which may be stated as follows:

"The electro-motive force in volts is equal to current in amperes divided by the resistance in ohms."

The understanding of this law will compel the conclusion that measuring the voltage of the cell affords no information other than that given by the measurement. It stands to reason that if the resistance (internal) is high, instantly the circuit is closed, the voltage will drop, and the energy available from the cell under such conditions will be reduced accordingly. The energy output of a battery may be known as follows:

"The instantaneous value of the energy in watts is equal to the electro-motive force (unclosed circuit) multiplied by the current in amperes."

An examination of this statement will suffice to indicate that if the internal resistance of the cell is high, since it is the constant in the formula, the voltage will drop as the current increases and the output in watts will be low and in a poor battery too low to properly serve the intended purpose. From what has been said, it remains to reach the conclusion that in testing dry cells to obtain stable information it is necessary to use an ampere meter to show the current flowing, and a volt meter (simultaneously) in order to observe the voltage.

Keep Out of the Poorhouse

Watch the Carbureter and Make Sure That It Is Properly Adjusted.

JUST making an automobile go is the least thing to do. Economy tests almost invariably show better results, by far, than are realized by automobilists in everyday work. Why is this? Why not? When a company enters one of its models in an economy run, one of its skilled artisans takes at least a few moments adjusting the carbureter and oiling up the various bearings. What is this for? Were the bearings to run so freely that there would be no friction at all, the automobile, once started, would run on forever unless it were to come to a hill. Of course, the road bearing is counted in the list that must perform without friction. Having eliminated all the friction that oil is capable of, it remains to put the motor in good order so that it will deliver the desired amount of power with the minimum use of gasoline.

Now, there is no good reason why any automobilist may not obtain exactly the same economy which the maker is credited with in a run. It is the same automobile; every function may be taken advantage of to the same extent, but it will surely be necessary for the automobilist to realize that it is the carbon, hydrogen and methane that are of value; to throw these fuel components away is like throwing the motor out of the car.

The way to coax economy into the motor is to keep at the carbureter; trying to reduce the size of the hole through which the gasoline runs out without shutting down the motor or reducing the power below the reasonable demand.

The gasoline taken into the combustion chamber from the tank through the carbureter will be spent to no avail unless a sufficient amount of air is also drawn in.

The air holds 82.7 per cent. of nitrogen by volume, and with it must come 22.0 volumes of oxygen. The nitrogen is valuable because it is inert; detonation being thus avoided. But the oxygen is what is wanted in order to burn the gasoline. When the gasoline is properly mixed with the air it is ready to be burned, forming carbonic acid and water. If there is not enough air present the mixture will not burn as stated, but a certain quantity of carbon monoxide, hydrogen, carbon and menthane will escape to the atmosphere.

Now, the value of the hydrogen, methane, etc., is so great that if a very small percentage of them escape the loss in fuel value, in other words, in distance that can be covered per gallon of gasoline, will be great. It has been estimated that over one-third of the gasoline is lost in the average motor, due to the fact that there is too much gasoline feeding to the motor. Cut down the gasoline as much as possible and feel around with the air valve lever to find the rate of air that will make a smaller quantity of gasoline do more work.

Hardening Permanent Magnets

Hardening All Over Is the Latest Practice

PERMEABILITY, while it is maximum in annealed iron, and desirable in magnets, is not the only requirement in permanent magnets, and it has been found in practice that the retentivity is better in the permanent form of magnet when it is hardened all over. In the Lindenberg Steel Mill, at Remscheid-Hasten, using the electric furnace steel, experiments with hardening resulted in the conclusion as follows: The permanence is the same when the magnets are either hardened at the ends or when they are hardened all over. It is stated by them that the average value of the magnetic flux in the long run it better when the magnets are hardened all over. In hardening plain water, acidulated water and brine were experimented with, and the best results were obtained when brine was used as the hardening solution.

Practical Repairing

DEFINING THE PROCESS OF REPAIRING CYLINDERS THAT HAVE BEEN CRACKED BY FROST OR OTHER CAUSES, USING THE LATEST AND MOST EFFECTIVE METHODS, WITH ILLUSTRATIONS OF WORK

PARTS of a car that have for some reason or other broken or been cracked, such as cylinders and the like, can with care be reinstated to their original condition by what is known as autogenous welding. This process consists, in a few words, of melting the adjoining pieces and running into them metal similar to that from which they are made. The source of heat is either a mixture of hydrogen and oxygen, known as the hydro-oxygen process, or acetylene gas mixed in correct proportions with oxygen, known as the acetylene process. The equipment illustrated in Fig. 3 is of the latter type and consists of the cylinder C1 containing, when full, oxygen compressed to 150 pounds per square inch, to which are attached two gauges G1, the amount of pressure being used and controlled by the valve V2. G2 is a gauge showing the total amount of pressure in the tank, with a stop-cock S1 to entirely turn off the pressure.

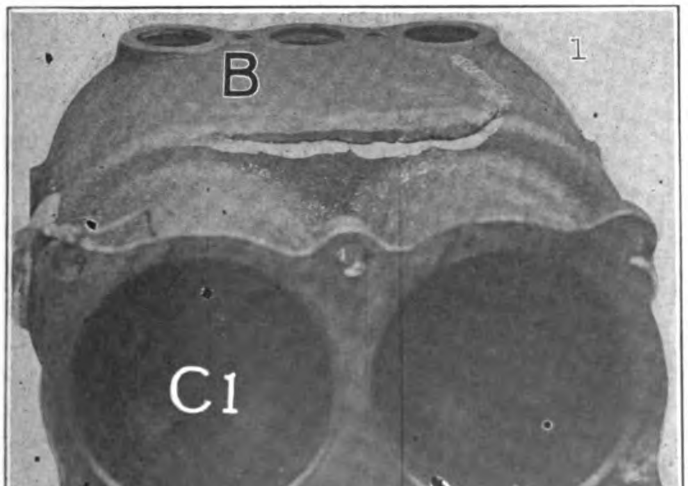


Fig. 1—Cylinders, cracked by frost, showing V-gap for welding

Cylinder A2 contains compressed acetylene gas, the flow of which is operated by the main tap T1 and the valve V1. The handling of acetylene is attended with risk if great care is not exercised, as should the flow exceed 20 pounds pressure per square inch the makers of the cylinders state that the gas becomes self-explosive. The interior of the cylinders is filled with asbestos discs which are steeped in acetone, which is capable of assimilating 25 times its own volume of acetylene, and in this manner the gas becomes transformed into a liquid. The air and gas pass from their respective cylinders through special rubber piping P1 and P2 to the burner B1. Rubber tubing is preferable to metal piping, for should the pressure become too strong the rubber will give and there the damage is ended; otherwise the burner might explode with disastrous result to the operator.

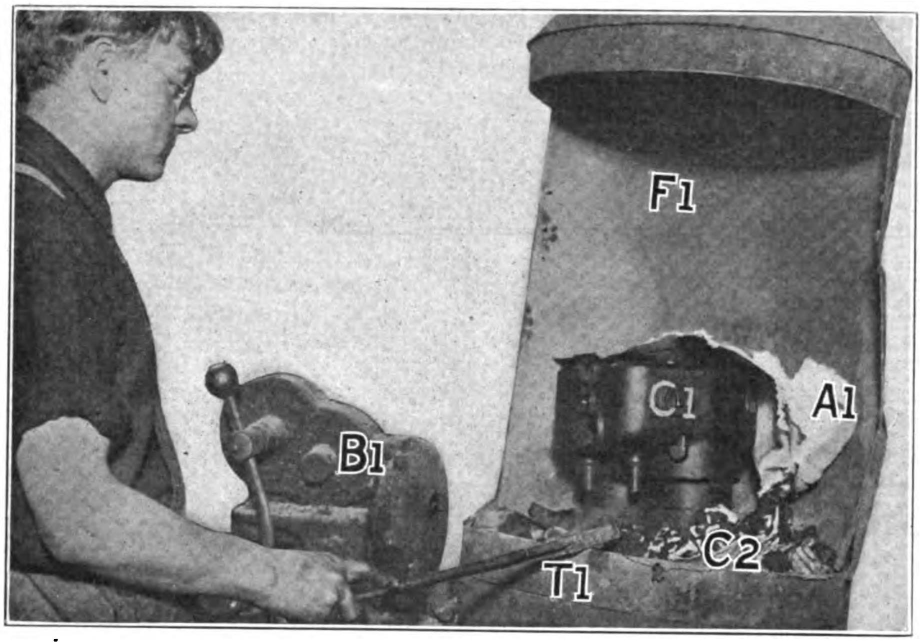


Fig. 2—Cylinders placed in blast forge and covered with asbestos, to be heated before welding

The illustration does not represent the relative size of flame used in welding by this process; the actual size is about one-half inch to one inch in length measured from the end of the nozzle of the burner. Different size burners are used, the size of the orifice depending upon the work to be carried out and whether the broken parts are large or small; they resemble the spray nozzle of a carbureter, being made of brass, and are known by the number size of the orifice. The light from the flame is so intense that it is necessary to wear blue glasses.

The burner B1 is held by the operator as shown in Fig. 1, and has two taps with which to regulate the flame. Parts that several years ago would have been thrown on the scrap heap can now by this process be repaired for a comparatively small sum, and made to answer the same purpose as new parts, with a great saving in the cost. Simple as the process may seem, the operator must thoroughly understand his work, as the metal can be overheated and cause a crack in another place. The heat of the flame from acetylene and oxygen can be raised as high as 6,500 degrees Fahrenheit, and when as an illustration of its power of dissolving metal, a steel railway rail was taken and cut through in a few minutes that in the ordinary way takes two men with a saw several hours to accomplish, some idea of its intensity can be realized.

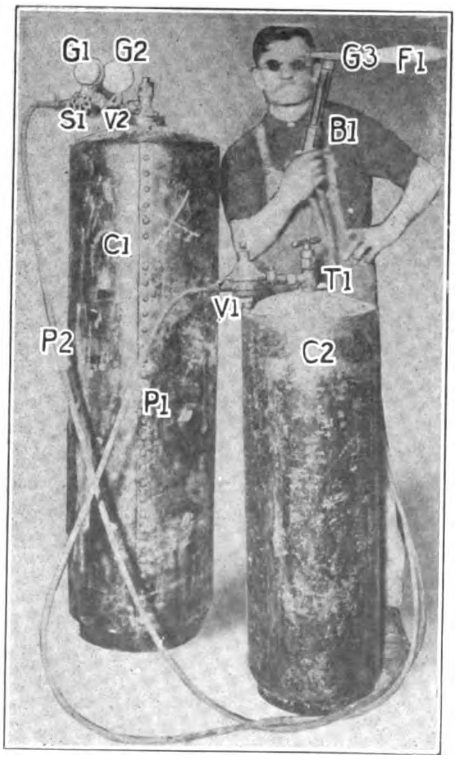


Fig. 3—Welding equipment, showing oxygen and acetylene tanks, gauges, valves, etc.

The pressures at which the gases leave their respective cylinders are 25 pounds per square inch for the oxygen and between 6 and 8 pounds for the acetylene, and as the valve V1 has only a very small opening the amount of flow can be regulated to a nicety.

Figs. 1 shows cylinders that have been damaged by over-cooling; in other words, by the freezing of the water in the jackets. It can be seen that the metal around the crack B1 has been cut away with a chisel in order to better get at the work and for a channel for the additional metal to flow into.

Fig. 4 represents the lug P1 of a cylinder C1 that has been broken off the base F1. The cause of this breakage is common where the thickness of the metal at the base is insufficient to withstand the force exerted inside the cylinders by the explosions, although if the cylinders are improperly bolted down or the nuts slacken off the result will be as here depicted.

It is proposed to deal with the method of welding the lug into place, and the same process applies to other work on cylinders. The first operation is to bolt the part in place as if it were on the base chamber; a piece of steel is drilled for the holes for bolts to pass through and with one of these the broken part is attached as shown in Fig. 6, the plate B2 extending the whole length of the base and secured by the bolts B1, B2. The part is then taken off and filed into a V-shaped gap to allow the metal to run in easily.

The cylinders C1 are now placed in a charcoal fire C2 as shown in Fig. 2, air blast being delivered by the blower B1. The top is provided with a cowl F1 to carry off the fumes, and strips of asbestos mill board are placed around the job to keep the heat in and give a uniform increase in heat. The object of this is to expand the metal uniformly, for when the extreme heat from the acetylene is applied at any particular spot, and the metal expands only at that spot, the other metal, if cold, is liable to crack or distort.

The heating has to be carried out slowly or the effects will be the same as if no heat were applied at all.

The burner is then taken in hand and, with the acetylene alone turned on, is lighted. The oxygen is now turned on in sufficient quantity to give a flame the required size and heat for the particular work and metal to be treated. and in the case of the cast gray iron from which cylinders are made the point of melting is about 2,220 degrees Fahr.

The flame is directed into the groove first, melting

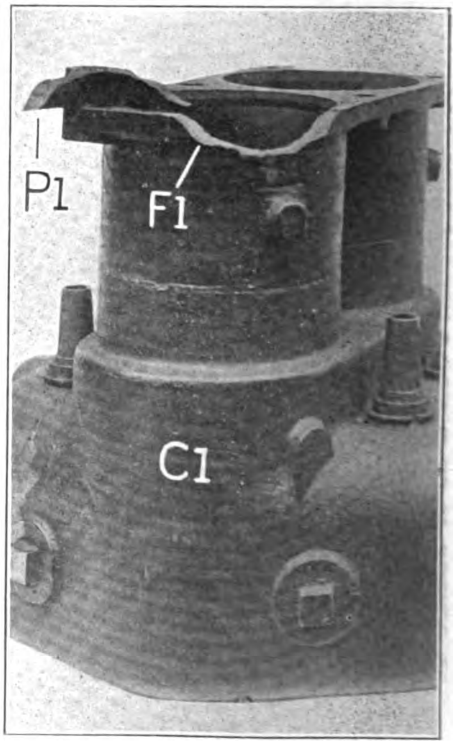


Fig. 4—Showing cylinder with bottom holding down lug broken off before repair

the thin bottoms, and at the same time a strip of metal in rod form 1-4 inch thick is held in the flame. This soon melts and runs into the parts to be joined, uniting them in such a way that when the superfluous metal has afterward been cleaned off it is impossible even to detect the joint. The process, therefore, consists in building up the gap by filling in new metal.

A white alkaline powder is used with cast iron only, other metal being treated with the flame alone. The powder is used to dissolve the globules of oxide that form in the heating process and acts as a flux in that it brings all impurities to the surface; it is known as a scaling or cleansing powder.

Fig. 5 shows the method of filling the crack inside the cylinder after the outside has been finished, as shown in Fig. 7. The operator is holding the metal rod M1 with the tongs T1 in his left hand and with the right directing the flame F1 onto the crack F2, the plate bolting the lug L1 in place having previously been removed.

During the operation of running the metal it is necessary to move the cylinders around so that the part on which the flame plays is vertical and the metal will run down into it. Particles of metal may run inside the cylinder, but there is no difficulty in dislodging them, as the moment the flame is withdrawn the fusion stops.

The final operation consists in cleaning up the outside and turning off and polishing the inside walls at the parts treated.

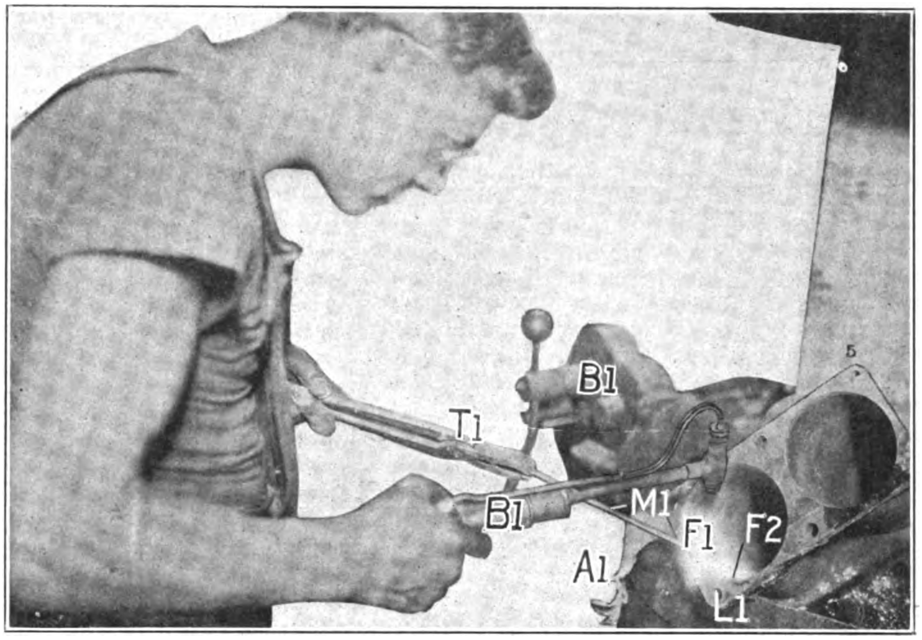


Fig. 5—Showing operator working at inside of cylinder to repair a crack

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Magnesium as an Alloy—Magnesium has a specific gravity of 1.7, so that it is much lighter even than aluminum, whose specific gravity is 2.6, while that of iron is 7.8, so that magnesium is more than five times as light as iron and 50 per cent. lighter than aluminum. A recent French patent describes a process of manufacturing alloys of magnesium and zinc, containing as much as from 90 to 96 per cent. magnesium. The same inventor claims to have succeeded in making a practicable alloy of calcium, whose specific gravity is 1.58, with zinc, copper or aluminum, or a mixture of these three metals. It is proposed to produce a magnesium alloy suitable for aeroplanes, combining lightness with strength. Visitors to the Olympia Aviation Show of 1909 may recall an alloy answering in some respects to these characteristics. It was about 40 per cent. lighter than aluminum, *e.g.*, a triple stayed eight-gallon fuel tank of the bolster pattern weighed 43-4 lbs.—*The Trader.*

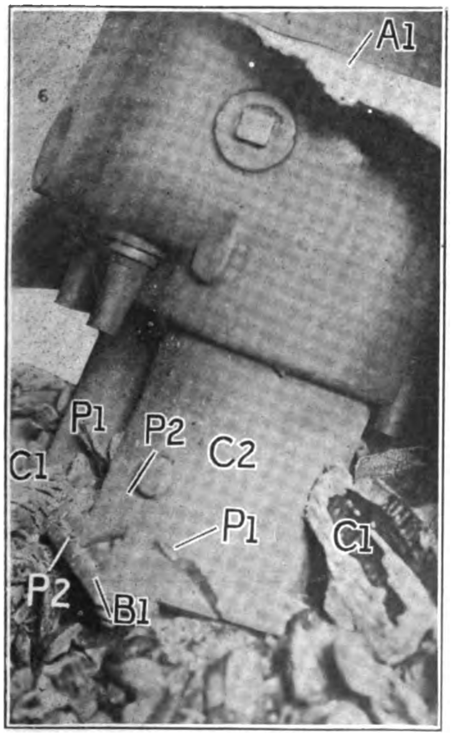


Fig. 6—Showing lug bolted to cylinders and V-shape groove cut; the charcoal fire around 'can be seen.

There Are Others

Chauffeurs Not the Only Delinquents As Regards Underinflation

SAYS THE AUTOMOBILE staff man: "During the past two weeks I have put the gauge on at least 60 tires, and there has been but one that showed a pressure approaching correctness, viz., a 36 x 4 1-2 showing 90 pounds. A few days ago I saw a large six-cylinder car with 37 x 5 1-2 tires that had just been put on by the tire makers and which the men tried to inflate till they were fatigued. They said the tires had 115 pounds pressure in them, but as a matter of fact when I put the gauge on them one showed 75 pounds and the other 45 pounds. If a man is supplied with some mechanical device with which to pump the tires there is no excuse for underinflation. At a garage where pressure is supplied free from a central compressor I pumped a tire so that it would stand no more, or, rather, the compressor would not give any more than was in the tank, which was 75 pounds. One would have thought that the tires would also have 75 pounds; but no, they registered only 45 pounds. The reason for this was that there was a leak in the connection in the piping from the tank to the main floor of the garage, which shows the necessity of testing with a gauge and not guessing."

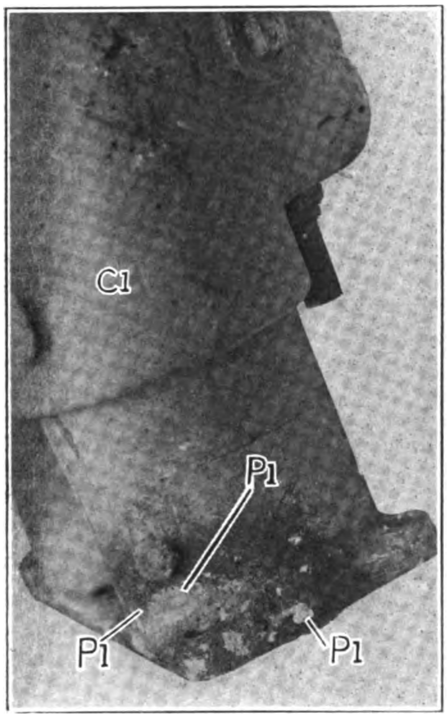


Fig. 7—Completed repair before filling up. After this has been done it is impossible to see the join.

Care and Repair of Tires

MANY TROUBLES AND A GREAT AMOUNT OF THE EXPENSE OF TIRES CAN BE TRACED TO THE CLINCHER RIM

THE average autoist when he buys his first car knows very little about such things as quick detachable and demountable rims except that he is aware that there are such things; and if they are not fitted to the car as a regular part of the equipment there may come some suggestion from the seller of the car that they should be fitted as an extra. This is just the point that a discerning buyer has to grapple with after the car proper has been decided on, viz.: How little can be spent on extras? The causes of tire trouble are twofold; abuse and the difficulty in putting tires on clincher rims without damaging the tires in the first place. Abuse of tires has been handled in these columns from different points of view, and the mere question of rims cannot alter matters if brakes are applied harshly or if the tires are run underinflated. It has been estimated by competent authorities that 18 per cent. of tube troubles can be laid at the door of the ordinary clincher rim; by this it is not meant that the rim proper is the culprit, but owing to the difficulty attending the putting of tires on this rim, and want of experience and practice of the owners of cars, the operation cannot be carried out without damaging the tire in some way or other. The greatest item in the upkeep of a car is the tire bill, and as makers do not build their cars to the tire but fit tires after the car is manufactured it is up to the autoist, so to speak, to insure himself against trouble. A fair mileage for the all-the-year-round driver would be, say, 25 miles per day for 300 days, which would show a mileage of 7,500 miles per annum. Supposing the life of the tires averages 2,000 miles per tire, 16 tires will be required for this mileage, and it would be safe to estimate two tubes per tire, not taking into consideration for the moment the cost of repairs to same from any cause whatsoever. What is the natural result? If an outlay of say $100 would show a return of 6 per cent. per annum in the ordinary course of events the investment would be considered a good one. This figure more than represents the cost of any device on the market to facilitate quickly detaching tires and assist the process of putting them on the wheel.

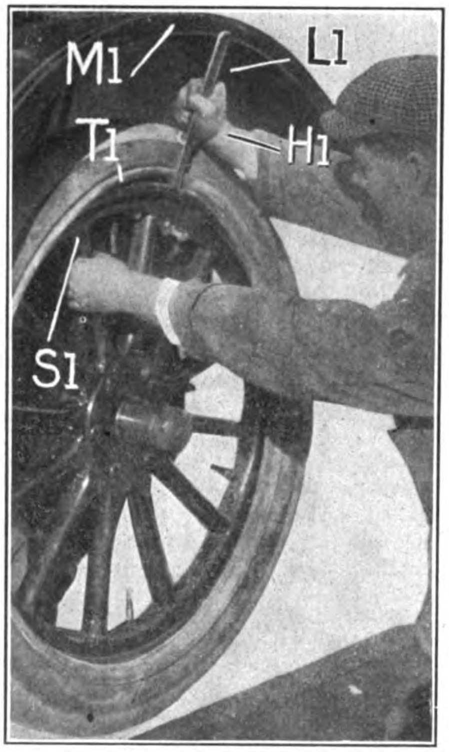


Fig. 1—Operator using short lever unable to get at tire owing to mudguard

The claims of the devices are various, but the gist is that tires can be put on and detached easily without the laboring and struggles attending the use of the clincher. It is no uncommon sight to see drivers using hammers or anything handy to knock, push or prod a refractory tire, and instead on saving the tire abuse in this manner their paramount idea is to get the tire on. If the work has to be accomplished on the road, the quicker it is done the better they like it.

Fig. 1 shows a man struggling with an ordinary clincher beaded tire with a short lever L1 barely a foot long. This amount of leverage is altogether inadequate to overcome the resistance of the tire. Further, the mud guard M1 gets in the way, preventing him from gripping the lever with his right hand in the position H1 so as to obtain all the leverage possible and at the same time giving the lever only a small amount of travel. The average amount of clearance allowed between the mud guard M1 and the tire T1 is five inches, but this is often decreased through structural causes, necessitating the operation being carried out as shown in Fig. 3. Here the man has the full travel of the lever, be it a straight lever L1, as in Fig. 1, or the forked lever L11, as in Fig. 3. The operator is here shown inserting a security bolt as it should be done, and the method depicted in Fig. 2 shows how it should not be done. In the latter case the bead B1 is distorted by the lever L1 and the point of the lever is straining on the canvas C1. The probability is that the canvas strands will be segregated at the point of contact of the lever and start the foundation of a blow-out. As long as the strands of canvas remain intact the strength of the fabric is sufficient in a well-made tire to withstand the strain imposed upon it, but the moment the strands are damaged in any way the chafing and rubbing and rolling of the tire will increase the size of the hole. There is a right and a wrong way of doing most things, and inserting inner tubes is no exception to the rule. One has only to catechise oneself and ask: "How many tubes that have been damaged on my car are the result of nipping?" Supposing the tubes to cost $5 apiece, the 18 per cent. amount of trouble due to nipping can be obviated by using some additional fixture, and on an outlay of $100 for tubes in the course of the year the saving, instead of the safe investment of 6 per cent., has risen to 18 per cent., without taking into consideration the additional life that would ensue if the outer casings were handled with more care and did not undergo the ill usage to which they are unavoidably subjected.

No one would think of going out without any oil in the engine, but how many times

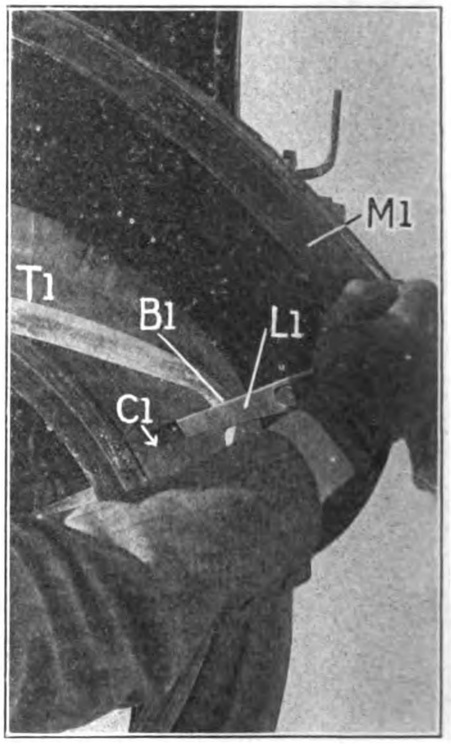


Fig. 2—Easiest way to cut the inside canvas, forming the nucleus of a blow-out

are tires put on the car without a particle of soapstone or French chalk to prevent heat and friction! Tires require in a certain sense as much lubrication as any other part that is subjected to friction. Fig. 4 shows what occurred to a tire that had been run 500 miles without soapstone. It will be seen that the tube T1 has a gash G1 about a foot long; this was not caused by heat alone, but was due to the tube sticking to the outer cover and the security bolt, so that when the tire was removed to repair a pinhole puncture, instead of coming out easily, as it should have done when pulled, it simply tore in the manner shown. The imprint I1 shows where the security bolt stuck to the bead, and the tube adhered so strongly to the inside of the casing that it took two men to tear it apart, one man pulling the tube while the other pulled the cover in the opposite direction. Flake graphite sprinkled in between the tire and shoe will prevent them from sticking together and is quite as efficient as talc. There need be no fear that graphite will in any way be detrimental to the rubber, because graphite is absolutely inert, not having any acid or alkaline properties. Large quantities of flake graphite are used by rubber packing manufacturers in order to get the necessary lubrication. When flake graphite is sprinkled into the vulcanizing mold a clean neat job is practically assured.

Fig. 4 serves as a good means of showing how an outer casing should be opened to thoroughly examine same for small holes and cuts in the fabric and gives an opportunity of patching them with canvas supplied by the tiremakers and in tool kits for the purpose. The size of the patch should be at least one and a half inches larger than the hole or cut so that the adhesion will be sufficient to counteract the outward expansion of the tire. Care should be taken to clean off all traces of soapstone on the lining of the casing so that the canvas patch will have a good foundation, for if it is only superficially attached the first wet day will allow sufficient moisture to get in to detach it, and it is principally against this enemy of tires that the patches are put on.

If the care of tires can be rendered less a matter of hard labor the autoist would try to pay more attention to the matter, but the average man would sooner leave well enough alone. If a tire is running satisfactorily at the moment it would seem unnecessary to disturb it. But if the tube could be taken out from time to time easily without fear of damage it would be greatly benefited with a rub over to remove the caked powder and fresh soapstone inserted. A tire that looks a little weak might with advantage be taken off the rear wheel and be placed on one of the front wheels with advantage and so prolong its life.

All this is possible with a good many of the devices on the market, but there is one point that must not be lost sight of when choosing such a fitting, and that is that besides possessing the virtue of quick detachability the rim must be fixed in such a manner that it is secure and has no wearing parts to lubricate or get out of order.

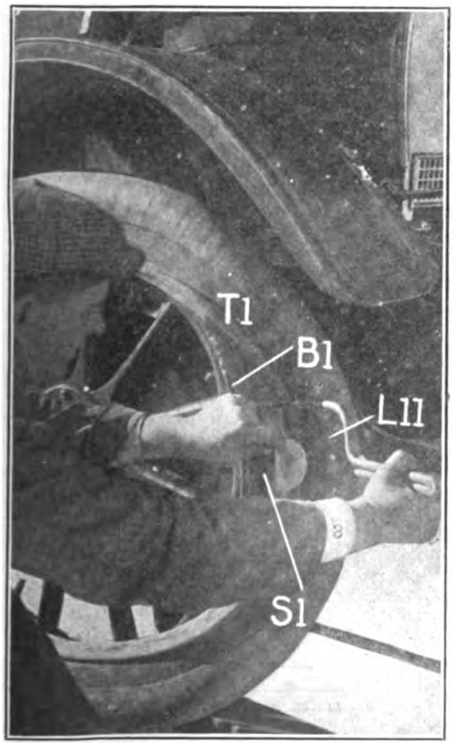


Fig. 2—Correct method of inserting security bolts and valves with a forked lever

The Village Blacksmith

"A Friend In Need Is a Friend Indeed" Is Applicable In This Case

FROM time to time it becomes necessary to have the car overhauled so that one can be sure not to be "hung up" on the road on a dark rainy night, this being the worst time to work on a car, although it is bad enough to have trouble at any time, especially with the engine. The point about the dark rainy night that particularly strikes the autoist is that in this particular vagary of the atmospheric conditions it is hardest to work and keep one's temper.

A joint comes loose perhaps and it is necessary to get the car somehow to the nearest forge to heat the job for brazing. The average village blacksmith is a good fellow, with brawny arms, but automobiles are not his pet weakness owing to the amount of trade he has been deprived of through the death knell of the horse having been sounded, as some will have it; every one will admit he has lost some trade. But he can be of great use to stranded autoists, as most automobilists can testify.

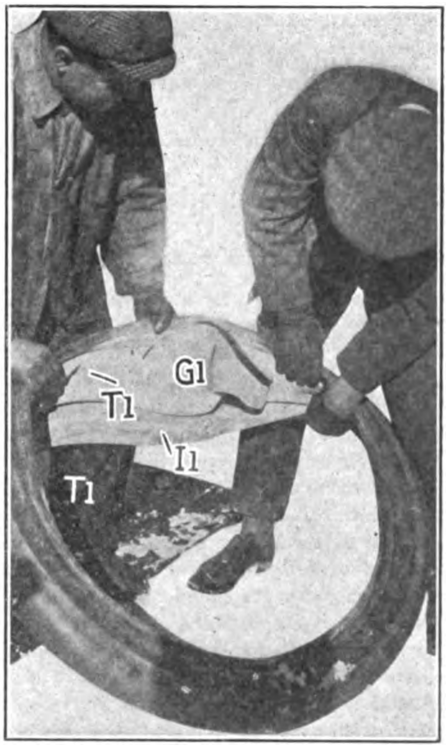
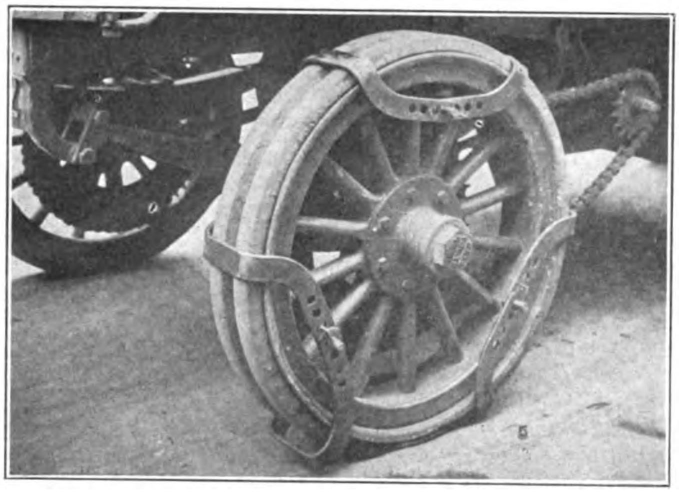


Fig. 4—Tube torn through sticking to the cover owing to want of soapstone

For example, the autoist is unfortunate enough to have a collision and bend his frame. The blacksmith can be of service in putting the frame back in such order that it is safe to drive; the first thing to do is to heat the frame to a good red heat, removing the body if necessary and inserting asbestos boards, or failing this, sheets of metal in order not to burn the paint on the springs; while hot with the use of bending irons the frame can be brought back to its original position. It is not often that the rear end of the car suffers in a collision, it usually being the front members of the frame that receive the blow. To effect repairs to the front of the car it is as well to remove the radiator and fit up some means of protecting the engine from heat that is applied to the frame. Heat applied at the point of bending and the use of a large wrench over which a tube has been fitted to increase the leverage should bring the form back with a little judicious hammering.

The ingredients a blacksmith does not always know are the fluxes for brazing and soldering, and these are as follows:

METAL	FLUXES
Cast iron, Malleable iron, Steel,	Borax, Sal ammoniac.
Copper, Brass, Gun-metal,	Sal ammoniac. Chloride of zinc. Rosin.
Tinned iron,	Chloride of zinc or rosin.
Zinc,	Chloride of zinc, commonly called "killed spirits."



Lyon non-skid for trucks consisting of metal bridges easily detached. Picked up by the "Staff Photographer" on the street in New York during the recent snow storm

Stops Thief and Joy Rider

Tricks of These Gentlemen Are Legion, but Axle Drawing Checkmates

SEVERAL suggestions have been given from time to time as to how the car can be left so that it cannot be used in the owner's absence, and among these are lock switches and lock taps for the gasoline; but to any one with the desire to do wrong, what are these trivialities? Of course they are good for street stoppages, but the garage fiend can easily overcome them. One method is to fit a strap over the hood with a lock. If any one wishes to take it off, the screws can be taken out; and if this is impossible, as the strap is sometimes riveted, a knife will soon overcome the leather bonds. Quite the latest method of effectively preventing the car being used while the owner is away for any length of time is to withdraw the axle shafts, if it is possible. The intention of the makers of cars so fitted was to facilitate the removal of such parts as the bevel gears without dismantling the whole axle, but the further use should not be forgotten. It stands to reason that if the magneto or a valve is removed, the car cannot be used; but less trouble is required in removing a shaft; besides, magnetos and valves are not uncommon things.

Dead Magnets Rejuvenated

When Permanent Magnets Weaken It Is Necessary to Remagnetize Them

ELECTROMAGNETS are made with a soft iron core and a coil of insulated wire is wound around them so that when the armature is rotated the current from the same passes through the wire of the magnets and they are saturated. By means of this magnetism the voltage of the armature "builds up" and the faster the armature is rotated the higher will be the voltage. But when the armature is stopped the current will fall to zero and then the soft magnets will be depleted of their magnetism excepting for a residual magnetic field that is always present, decreasing in value as the iron of the core is soft in variety and in the more perfectly annealed state.

Substituting high carbon steel for soft iron has a marked effect upon the behavior of the magnets. If the steel is hardened the magnetism will remain in once it is induced. The retentivity of the steel for magnetism will be great as the carbon content is increased, being a maximum at 90 points carbon, with the metal in the hardened state, as when it is heated at a high temperature and quenched in brine. If tungsten is added to the metal the carbon may then be reduced from 90 points to a lower level with a gain in the good working of the magnets. If the tungsten is 6.5 per cent. or nearly so, the carbon may then be held at about 60 points and for magneto work this metal will hold to a high state of magnetic saturation for a long time.

There are two reasons for desiring to reduce carbon and add tungsten. It is unfortunate, perhaps, that as carbon is increased the flux density decreases. This difficulty is overcome to some extent by reducing carbon and adding tungsten. It has also been found that the magnets will weaken faster if carbon is high, without tungsten, than with lower carbon and when tungsten is present.

Substituting high carbon tungsten steel for the soft iron core before mentioned would result in permanently magnetizing the cores, and thereafter the occasion for using a field winding is done away with. True, a soft core will build up a stronger field and if this is a necessity the soft core must be used; in lighting and power dynamos such is the necessity. For magnetos as used in ignition work permanent magnets provide a field that is amply strong and it is an advantage therefore to do away with the winding.

In the course of time the permanent magnets lose some of the magnetic flux and the voltage generated in the windings of the rotor is then reduced considering a given speed. Under such conditions it is either necessary to run the rotor at a higher speed, or have the permanent magnets remagnetized. It is not a large undertaking to do so. A very simple way is to purchase a length of No. 12 Brown & Sharp's gauge, double-cotton-insulated copper wire, sufficient to measure 0.3 ohm. Wind this wire into a coil with an opening in it so shaped as to permit the permanent magnets to enter it as shown in the illustration. When the wire is in place put the keeper in place and then connect the two terminals of the coil of wire to a 3-cell storage battery such as is used for ignition work. The flow of electrical current from the battery will be:

Let $I =$ current in amperes; $E =$ electromotive force in volts, and $R =$ resistance of the coil of wire in ohms.

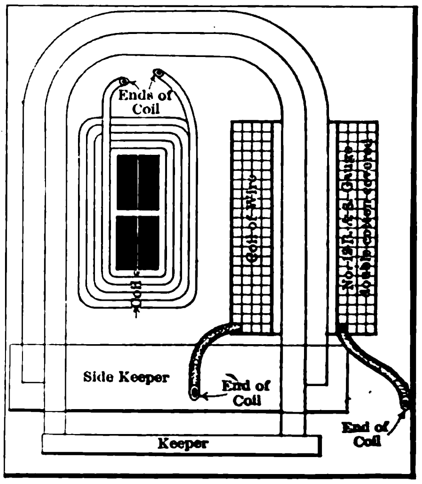
When,

$$I = \frac{E}{R} = \frac{6}{.3} = 20 \text{ amperes of current.}$$

This is on the assumption that the storage battery of three cells in series will deliver 20 amperes of current at 6 volts. The resistance is given as .3 ohm; it is measured cold, remembering that the current will not be passed through the coil long enough to raise the temperature so high as to interfere with the process.

Several applications of current are better than one, but the time required for each application will scarcely have to be more than a few moments. In parting the circuit when it is desired to interrupt the flow of current, it is right to pull the wire away slowly in order not to reverse the polarity of the permanent magnets. Drawing the arc is but a matter of parting the wires at a slow rate and this process has the same effect as putting a resistance in the circuit and increasing the same until the current recedes to zero.

The storage battery will not be damaged even if this work does require a discharge greater than the normal rating of the same.



Showing how the magnetizing coil is wound around the magnets to be rejuvenated

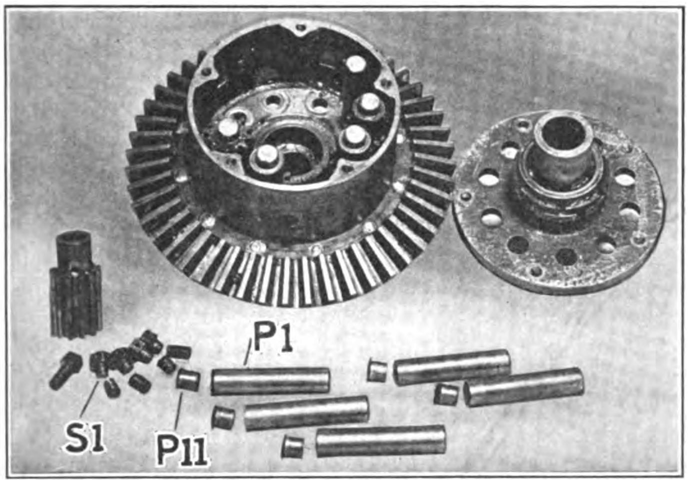


Fig. 1—Pins and bolts sheared in differential housing caused by going over a bad bump at high speed

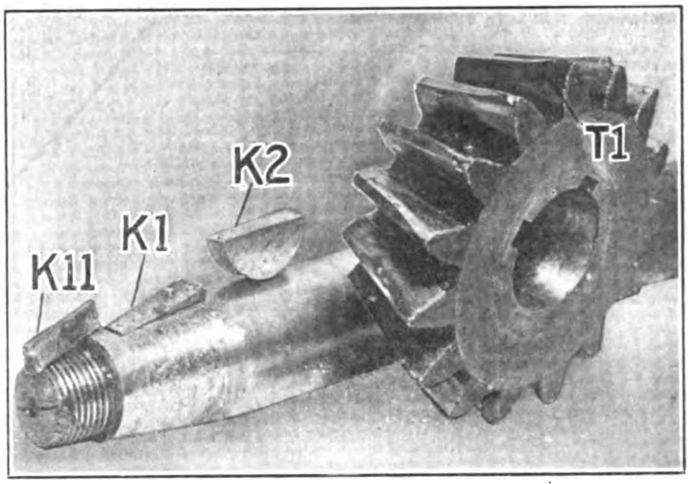


Fig. 2—Keys sheared and pinion deformed by the combination of bad road and high speed

Cause and Effect

Bumpy Boulevards Should Be Driven Over at Slow Speeds (Verb. Sap.)

THOSE familiar with the Hoffman Boulevard, Long Island, know it to be a bad road, and would never drive along it at a rate of over 20 miles per hour. But an automobile is a good-natured beast and stands for a lot of ill-usage, and the more it stands the more it is likely to be asked to stand. It cannot be wondered at, therefore, that sometimes it revolts; but the worst of it is that when it does kick in the traces it is not so quickly over with as when its equestrian rival shows its temper. The effect of striking a bad bump in the road at high speed can be seen by referring to the photographs of a differential recently put out of action on the above-mentioned Boulevard. Pause for one moment and think what happens to a car that leaves the road at speed, and what strain is thrown on every part of the car. Pinions are fixed on shafts either by keys, or the shafts are squared at the ends, or the shaft has a solid key milled out, and it depends upon the breaking strain of the metal as to when the shaft or key will give up work. The weakest part goes first, as is natural, and in this case the key K1, that holds the driving pinion T1 on the propeller shaft, succumbed. If only one key was fitted one can readily imagine that it would go; but there were two and they both sheared off as if they were made of lead. Laying on the shaft is a new key, K2, but before this can be fitted the shaft will have to be cleaned up, as it has been ploughed up by the particles of the old key after the shaft rotated inside the pinion. The broken part of the key K1 is shown near the key. This method of fixing cannot be recommended for this part of the car, a flat key of uniform thickness and having a bearing the entire length of the pinion being preferable. The differential proper has come off equally as bad, if not worse. Fig. 1 shows the differential housing with five pins in place; the pins that lay on the outside came apart in two pieces, P1 and P11. The part P11 fits in the housing and on this part all the stress is thrown. The screws S1 hold the outer cover of the casing to the main body and they sheared when the pins gave way as everything inside the housing was loose. The pinion took a decided twist in its teeth T1, as can be seen in Fig. 2, which all goes to show that it pays to drive slowly on bad roads. The damage is not always apparent at the time and may not show itself for a month or more; but when the last straw is imposed on the back of the long-suffering part it is bound to break and then people look around for the culprit. The usual answer to the problem is "faulty material."

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, ANNUAL MEETINGS AND OTHER FIXTURES

Dec. 31-Jan. 7, '11.	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 7-14.........	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 11-12........	New York, Annual Meeting, Society of Automobile Engineers.
Jan. 14-28........	Philadelphia, Annual Show, Philadelphia Licensed Automobile Dealers' Association, First and Third Regiment Armories.
Jan. 16-21........	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A.L.A.M.
Jan. 16-21........	Detroit, Mich., Tenth Annual Show, Detroit Automobile Dealers' Association, Wayne Pavilion.
Jan. 28-Feb. 4....	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-11.........	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Feb. 13-18........	St. Louis, Mo., Fifth Annual Show, Coliseum.
Feb. 18-25........	Minneapolis, Minn., Annual Show, Minneapolis Automobile Show Association, National Guard Armory.
Feb. 18-25........	Brooklyn, N. Y., Annual Show, Brooklyn Motor Vehicle Dealers' Association, 23d Regt. Armory.
Feb. 18-25........	Binghamton, N. Y., Second Annual Show, Binghamton Automobile Club and Chamber of Commerce, State Armory.
Feb. 18-25........	Newark, N. J., Fourth Annual Show, New Jersey Automobile Exhibition Co.
Feb. 24-27........	New Orleans, La., Annual Show, New Orleans Automobile Club.
Feb. 25-Mar. 4....	Toronto, Ont., Automobile Show, Ontario Motor League.
Feb. 27-Mar. 4....	Kansas City, Mo., Fifth Annual Show, Kansas City Automobile Dealers' Association, Convention Hall.
Mar. 4-11.........	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.
Mar. 14-18........	Syracuse, N. Y., Third Annual Show, Syracuse Automobile Dealers' Association, State Armory.
Mar. 14-18........	Denver, Col., Annual Automobile Show, Management Motor Field, Colorado Auditorium.
Mar. 18-25........	Pittsburg, Annual Show, Pittsburg Auto Show Association (Inc.), Exposition Hall.
Mar. 25-Apr. 1...	Buffalo, N. Y., Fourth Power Boat and Sportsmen's Show, Sixty-fifth Regiment Arsenal, Buffalo Launch Club.
Mar. 25-Apr. 8...	Pittsburg, Fifth Annual Show, Duquesne Garden, First Week, Pleasure Cars; Second Week, Commercial Trucks. Automobile Dealers' Association of Pittsburg, Inc.
Apr. 1-8..........	Montreal, Can., Automobile and Motor Boat Show, Automobile and Aero Club of Canada.

THE AUTOMOBILE

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FINIS will be the proper word to apply to the automobile business from the standardization point of view whenever it will be possible to visit an automobile show and come away impressed by the fact that all the automobiles are precisely alike in every essential detail, and when that more or less indefinable and vague thing "art" is in the throes of ecstasy. This sad state has never fallen to the lot of any art; ambition has ever been master of the situation, and if standardization means anything in this material world it has to do with the gradual advancing along progressive yet stable lines of the work that men do. In presenting the details of the automobiles that will be offered to the clientèle of the industry in the early part of 1911, it is not with the idea that they will represent the last word; it is even impossible to predict the time when the last word will be spoken—let us hope, never.

* * *

GRANTING that the wear and tear on the pneumatic tires of an autombile will depend upon the square of the velocity of the car on the road as a prime consideration, and upon the weight that the tires must support as a secondary but important factor, it remains to keep the speed as low as consistent service will admit of; but the weight question is not to be dismissed by a mere injunction. Under the head of "How to weigh a car" a diagram is given showing an automobile in three positions on a platform scale, and the story has to do with the taking into account of the relative weight of the front, and the rear end of the car. It is not believed that the average automobilist seriously considers what it means to overload a car, especially if the particular tonneau is an especially made creation which he, for reasons of style, inflicts upon an innocent chassis. If the original idea of the designer had to do with a light body, and the rear wheels were designed accordingly, even a couple of extra passengers in the tonneau would have a marked bearing upon the tire life. But if the owner of the automobile decides to dispense with the light body, and substitute a château instead, the poor tires will have to labor under a bridge-breaking weight. Nor is this the end. The owner of the automobile, if he goes in for a castle on wheels, will feel obliged to invite his friends to ride in the new creation and he will be much gratified by the effusive way they will have of telling him how delightful it is; but the chauffeur will experience a revelation by way of language when the owner subsequently goes down in his pocket to pay for the tire bill.

* * *

CONSERVATION is the theme which has awakened interest in many quarters, but the best understanding of the term may be applied to the average automobile. Conserving the automobile is a paramount issue. If owners of cars would only understand that they might prolong the service per dollar expended in the ratio of 3 to 1 by the simple application of lubricating oil, the market on this slippery substance would go up. The reason why the average owner does not understand this situation may be traced to the simplicity of the remedy and the ease with which the work may be done by anyone. As a simile it will suffice to state that the main reason for the abnormal sale of patent medicine may be traced to the fact that the patient does not know what it contains. Were someone to tell him that copious applications internally of water out of a well coupled with a goodly sprinkling externally of water out of the ocean would cure, he would go to the nearest drug-store and invest in another bottle of patent medicine. It is the same story coupled with the automobile. Lubricating oil, and its cousin of greater consistency, grease, are shunned because of their undoubted efficacy and the perfectly simple process involved in their use. But for those who prefer a real remedy and desire earnestly to prolong life and abort noise, a plan is presented this week in THE AUTOMOBILE whereby the automobilist may spread out the process of efficient lubrication over a whole year, dates being given with proper intervals between so that some of the bearings may be cleaned and lubricated on each occasion, leaving the rest of them for other fixed dates, without risking the ills of neglect, since all are duly provided for under a plan which includes specific dates.

* * *

PRACTICAL repairing is a subject which is being handled in THE AUTOMOBILE in such a way as to illustrate the real work that is being carried on in the various repair shops, and cylinder repairing by means of the oxy-acetylene flame is the subject for this week, practical efforts being illustrated.

News Section

HAPPENINGS OF THE WEEK IN VARIOUS SECTIONS OF THE COUNTRY AS GATHERED BY THE 84 SPECIAL WRITERS AND CORRESPONDENTS OF "THE AUTOMOBILE"

Vice-President Brown, of the Willys-Overland Company, Says High Prices are Due to Bad Roads—A. L. A. M. Officials and News of the Garden Show—Completing Preparations for the Palace Exhibition—Making Ready for Displays at Brooklyn, Philadelphia, Cleveland, Cincinnati, Newark, St. Louis, Baltimore, Syracuse, Milwaukee and Hartford—New York to Have a Permanent Show—Advance News of the Paris Salon—Distant Lands as Seen Through Auto Goggles—First Race of the Year to Be On the Pacific Coast—News of Maker and Dealer in Many Fields—Short News from Every Section of the Country.

Brown Lays High Prices to Bad Roads

INDIANAPOLIS, Dec. 12—That efficiency in road construction advances with the development of civilization; that better roads would stop the migration of farmer boys to the cities, and that the high cost of living is attributable in a large measure to existing bad roads are beliefs of Will H. Brown, vice-president of the Willys-Overland Company, who was a prominent figure in the American Good Roads Congress, held December 6 to 9, under the auspices of the American Road Builders' Association.

Mr. Brown says the people of Indiana have lost enough in "invisible taxes" during the last ten years to have paved every mile of the 21,864 miles of gravel roads in Indiana. To support this statement Mr. Brown gives figures which he has compiled to show that bad roads increase the cost of farm products on the market.

Government estimates on the actual cost of transportation over Indiana roads indicate that for each ton hauled one mile the cost averages 25.5 cents; that is, the cost varies in different parts of the State from 16 cents to 35 cents a ton-mile. Tests over a bituminized road between Philadelphia and Atlantic City demonstrated that freight can be transported over country roads for less than 1 cent a mile.

It is estimated that over roads in Pennsylvania, New York and New Jersey freight can be hauled for less than 5 cents a mile, so that the cost of transportation over Indiana roads is unusually high.

Garage Men After Dead Beats

The Garage Owners' Association of New York is now on the trail of the motor dead beat or "Fly-by-Night," as that class of car owners is sometimes called. The association is endeavoring to have a law enacted making it a misdemeanor for a car owner to surreptitiously remove his automobile from a garage without paying the charges due thereon.

The lien given to the garage keeper by statute merely permits the garage owner to retain the car in his possession until the accrued charges have been paid. The lien is lost when the car leaves the garage and so is ineffective to check the practice of the "Dead Beat."

To Abolish Thompson Avenue Grade

Included in the budget of New York for next year will be an item covering the expenses of eliminating the grade crossing of the main line of the Long Island Railroad at Thompson avenue, if the borough presidents accept the urgent advice now being given them by the city streets committee of the Automobile Club of America.

The crossing in question is one of the most serious obstacles to traffic in the metropolis. It lies on the main route to Long Island and during such affairs as the Vanderbilt Cup race and the recent aviation meeting at Belmont Park it proved itself to be a nuisance of the first class.

Seldom could it be passed without delay at any hour, and during the press of traffic in morning and evening delays often of as much as half an hour occurred.

Black Crow Car to Be Sold by Makers

Announcement has been made to the trade by the Crow Motor Car Company of Elkhart, Ind., that it has dissolved relations with the Black Manufacturing Company of Chicago, which has handled the selling end of the Black Crow car.

The announcement is dated December 6, but it is only just being received through the East. The Crow Company has secured considerable additional capital and in future will handle the selling of the car direct.

Otto F. Rost, who has represented the Black Company in New York, will remain with the Crow Company as manager for the East, New England and export business.

It is announced by the Crow Company, that the additional capital secured is sufficient to purchase the building in which the car has been built and to finance the new selling plan. C. C. Darnell as general sales manager and a number of other representatives have been taken over by the Crow Company.

Pioneers at A. L. A. M. Banquet

When the Association of Licensed Automobile Manufacturers assembles for its annual banquet, which will be held January 12 at the Hotel Astor, during the first week of the Madison Square Garden Show, it is expected that the function will set a new mark in the progress of the association.

One of the features of the affair will be speeches by several of the pioneers of the industry. The set program of toasts will be limited to three or four speakers of national repute.

McMurtry Resigns as Technician

Alden L. McMurtry, one of the leading technicians of New York with regard to automobiles, has resigned as chairman of the Technical Committee of the Automobile Club of America. Mr. McMurtry is a member of the Technical Committee of the Contest Board of the A. A. A.

A. C. A. Gives Smoker

The Automobile Club of America gave a well-attended smoker at the clubhouse Tuesday evening. Vaudeville, entertainment and refreshments were enjoyed by those present.

A·L·A·M· OFFICIALS

Col. Charles Clifton
President

Alfred Reeves
General Manager

M. L. Downs
Sec. of Show Com.

Col. George Pope
Treasurer

L. H. Kittredge
Secretary

CULMINATING next month in a show that promises greater things than any so far staged on the American Continent, the history of the A. L. A. M. to this date has been a brilliant one. The life of the organization has been varied. It has not always floated along on the full tide of prosperity; it has had its ups and downs like everything else that bears the stamp of mortality.

From a small beginning it has grown into a vast, machinelike body, working—constantly working—for progress along lines of conservatism.

The history of the organization, like everything else connected with the rise of the automobile, is brief, measured in terms of years, but its work is colossal.

The association was formed in 1903 and its first roster included the comparatively few names of American motor car makers who were privileged to operate under the terms of the Selden patents which are now in a final stage of litigation in the United States courts.

Fred Smith of the Oldsmobile Company was chosen first president of the new-formed body, with George H. Day as general manager. Most of President Smith's term of office was spent in organizing and preparing for future activity and, at the end of the year for which he had been selected as standard bearer, he retired to give place to Col. Charles Clifton. Seven times in succession Col. Clifton has been invested with this leadership and he has seen not only the association grow out of its swaddling clothes, but he has also witnessed the automobile industry wax strong and lusty until to-day it stands out as the most remarkable development of this age, or, for that matter, of any other age.

While Col. Clifton has remained as president of the association, the executive officer—the general manager—has changed several times. In 1907 E. H. Cutler was chosen to fill that important post. Mr. Day, the original general manager, died about that time. Mr. Cutler served a year and was succeeded by M. J. Budlong, now president of the Licensed Dealers' Association of New York City. E. P. Chalfant was elected in 1909 and retained the office until the election of the incumbent, Alfred Reeves, who was recently re-elected.

One of the big things that has been accomplished by the A. L. A. M. was the work of its mechanical branch. When the association was formed the art of automobile construction was in its infancy. Everybody had widely differing views of many of the points of construction that are now considered well settled. In order to solve the maze of engineering problems that confronted the trade in those early days, the constituent companies delegated some of their best engineering talent to form a practical, professional body to straighten out the cumbersome puzzles. For several years the mechanical branch of the A. L. A. M. labored to eliminate some of the guess work from automobile building and the result of that work is acknowledged today wherever motor cars are made. The manufacturer who commences work to-day has the advantage of the titantic efforts and the gold and blood that was spent in perfecting the art to its present stage, by the mechanical branch. Coker F. Clarkson, who served long as assistant general manager of the organization, was working head of the mechanical branch, and due credit is given Mr. Clarkson by motordom for his earnest efforts along that line.

When the pioneers had demonstrated the necessity and advisability of holding annual shows, the idea was accepted by the A. L. A. M. without debate and, when the time was ripe, the association executed one of those simple, yet revolutionary coups that have marked the progress of motordom like milestones. The organization which had conducted a series of shows at Madison Square Garden since 1900 allowed its option on the exclusive right to exhibit automobiles in that building to lapse and the A. L. A. M. jumped at the chance like a hungry trout at a brown hackle fly in June.

Before anybody was the wiser, the exclusive right to show in the Garden had been tied up in a contract covering several years and the A. L. A. M. held the contract.

From the first show, held in 1906, the annual exhibition has been the event of the year, at least in Eastern automobile circles. Each successive show was larger, more scientific and more important than any of those that had gone before, and now, on the eve of the great show of 1911, the promise is for a display of vastly more brilliance and general interest than any of the others.

The accompanying picture gives some idea of how the great hall will appear when the time comes to swing wide the doors on January 7. An automobile is a bulky bit of mechanism at the best and would seem out of place in a drawing room, but artistic conditions and proportions have been studied out with so much care that the giant road locomotives seem to fit into the scene like a bunch of blush roses in the corsage of a bride. They are not jammed in any old way and while there will be literally hundreds of them in the Garden, their presence will not be unduly obtrusive.

For all practical purposes the vogue of the automobile began in 1903 when 2,037 cars were made in the United States. Of these about half were manufactured by the members of the association. The following year saw a great spurt in the industry, the production running up to nearly 9,000, including both licensed and unlicensed cars. The following year, 1905, saw the licensed cars swell to a volume of over 20,000. From that point to 1908 the increase was steady in spite of the most uncertain financial conditions. In fact, the upheaval of 1907 must have proved a financial rout and an industrial disaster but for the steady prosperity of the great and growing manufacture of automobiles.

The panic had its effect upon the industry to a certain degree, for the figures of production show that, with the first gleam of returning confidence, the motor industry blossomed out like a sunflower and the production of the A. L. A. M. reached the magnificent total of 95,000 cars. Last year was another season of gigantic production and the astonishing total of 163,000 was recorded for the various members of the association.

The variation in average selling prices obtained by dealers during the past eight years tells an interesting story. In 1903 the average price was $1,133. It increased steadily each year with the augmentation of size and luxury and also experimentation until it reached $2,137 for each machine. That was in 1907. Prices did not break abruptly as might have been expected, but each year since the panic the average selling price of automobiles in the United States has declined until last year it touched $1,545, about the same level as obtained two years prior to the top of the wave. The reason for this apparent decline lies in the fact that large numbers of moderate priced cars have been marketed. At the same time the highest grade cars also increased largely in volume and to some extent in price.

The scope of the motor industry in the United States to-day may be estimated from a few subjoined statistics. There are 11,165 companies engaged in making automobiles of all sorts and accessories and parts for them. There are 137 distinct companies manufacturing gasoline pleasure cars. When the truck makers and electric and steam automobiles are added to this total, the aggregate foots up to 205. Michigan leads in this respect with Ohio second, New York third and Indiana fourth. But in the grand aggregate of motordom, New York is far and away ahead of any other State in total number of concerns devoted to the manufacture of the various things that go to make up the sum total of the American industry. In the Empire State there are no less than 2,329 companies that draw their support from the automobile in the making. Massachusetts is second, Ohio third, and Illinois fourth on the list.

In making up this list, fifty-one different headings were used, ranging all the way from completed automobiles, embracing ten-ton trucks, costly touring cars and the dainty little runabouts and down to cotter pins, almost as fine as small needles.

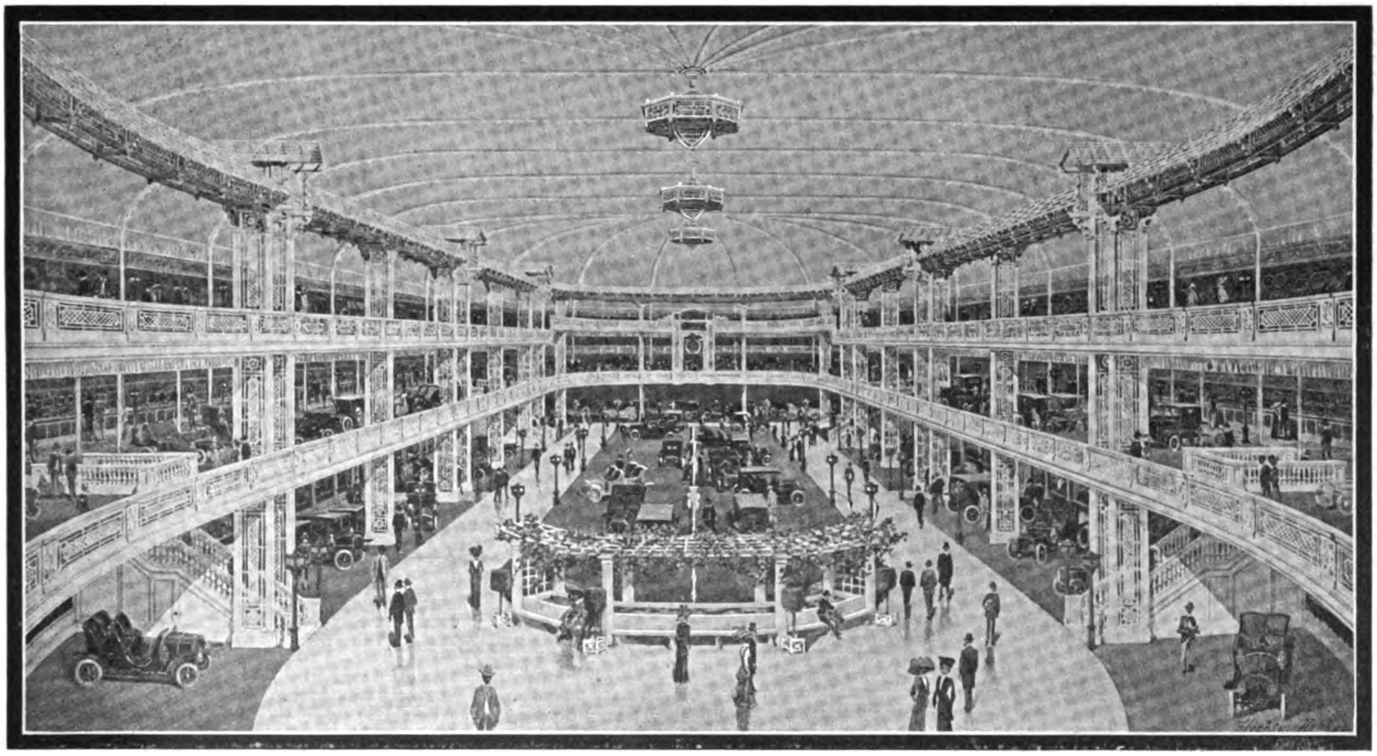
The automobile of 1910 is the most significant development of human ingenuity since the dawn of history. It represents a distinct advance step in transportation and, as the students of history declare, "a step toward perfecting transportation is a stride on the way toward perfect civilization."

No man who has due regard for facts can doubt that the annual display of automobiles in New York has had its part in this vast progressive movement. And there will be few to deny a share of credit for the development of the automobile to the Association of Licensed Automobile Manufacturers.

Gas Engine Trade Convenes

MILWAUKEE, Dec. 12—H. F. Apple, of the Apple Electric Company, Dayton, O., will be one of the principal speakers at the annual convention of the National Gas & Gasoline Engine Trades' Association, which meets at Racine, Wis., on Dec. 12, 13, 14 and 15. Mr. Apple's subject is, "The Installation of a Mechanical Ignition System Complete." H. I. Lee of Chicago, will speak on "Gas" and Joseph Tracy of New York on "Comparisons of Various Methods of Testing Engines." Charles F. Kratsch of Chicago has for his subject, "Does the Efficiency of a Gas Engine Depend on the Equipment?" Otto Heims of New York will analyze "Gas Engine Ignition."

A large exhibition of engines and accessories will be held in connection with the convention. The Mitchell-Lewis Motor Co. and Pierce Motor Co. will have a large share in the entertainment of the 400 delegates expected.



Interior of Madison Square Garden as it will appear when the doors of the Eleventh Annual A. L. A. M. Show are thrown open to the public

Palace Show Will Display Seventy Automobiles

According to official announcement, the automobile exhibits at the Grand Central Palace Show, which opens New Year's eve, will number over 70, including all kinds of types from the smallest runabouts to big racing machines and in the commercial line embracing trucks built to carry anything from a few parcels to ten tons of bulky freight.

The accompanying illustration shows how part of the big hall will look when the show opens. The color scheme is in cream and crimson with some contrasting green tints.

The recent snowfalls in New York have more than ever demonstrated the value of the motor trucks and business wagons. Horses were found wholly inadequate to their tasks in that merchandise was held up for hours and in some cases for days in transit about the city, as is the case in almost any period of heavy snowfall when the thermometer falls below the freezing point.

The motor truck walks away with the goods that must be delivered, the merchant is learning by experience. Business vehicles of all kinds are to be shown at the International Show, which, the makers assert, will cause the horse to become a rarity on the streets of New York within the next half decade.

The first big aviation show in the United States is to be held simultaneously with the Grand Central Palace Automobile Show, and it will give New Yorkers that have never seen aeroplanes at close range, an opportunity to inspect some of the world's most famous flying machines. All of the well-known makes of aeroplanes, such as the Wright Brothers, Curtiss, Lovelace-Thompson, Bleriot and other French types of biplanes and monoplanes are to be shown, in addition to many of the machines of the new manufacturers whose ideas are just coming into practical use.

Scores of model aeroplanes are to be shown and demonstrated to visitors at the shows, and the exhibits will prove a liberal education to laymen unfamiliar to the technical and scientific side of aviation.

Among the prominent aeroplanes to be shown are:

The Wright Brothers machine in which the late Ralph Johnstone made his world's altitude record of 9,714 feet shortly before his tragic death.

A second Wright machine, which has been built for Russell A. Alger, Jr., of Detroit.

The Bleriot biplane in which John B. Moisant flew from Paris to London, making his famous Channel flight carrying a passenger with him. This machine is now at the Lovelace-Thompson Aeroplane Works being repaired.

Another Moisant machine of all steel construction, which it is expected will successfully resist heavy strains in flying against sudden "pockets" of wind and shocks in alighting.

A third machine of Moisant's in which he made his famous flight across Brooklyn and around the Statue of Liberty.

The original Santos-Dumont "Demoiselle" aeroplane which has been brought over from France for the exhibition.

Two machines built by Burgess Company and Curtiss, one of which is a large passenger-carrying biplane, and the other being a smaller biplane.

A Lovelace-Thompson passenger-carrying aeroplane, and a racing machine built by the same company.

Glenn H. Curtiss's famous machine in which he made his remarkable flight from Albany to New York, winning the $10,000 prize given by the New York *World*.

A Bleriot type monoplane, built by the Scientific Aeroplane Company of New York, in which a gyroscope has been installed to demonstrate the balancing and stabilizing power of this invention as applied to aeronautics.

A Bleriot type of monoplane made by the Metz Company of Waltham, Mass.

A monoplane of original type manufactured by the Walden-Dyott Company of New York.

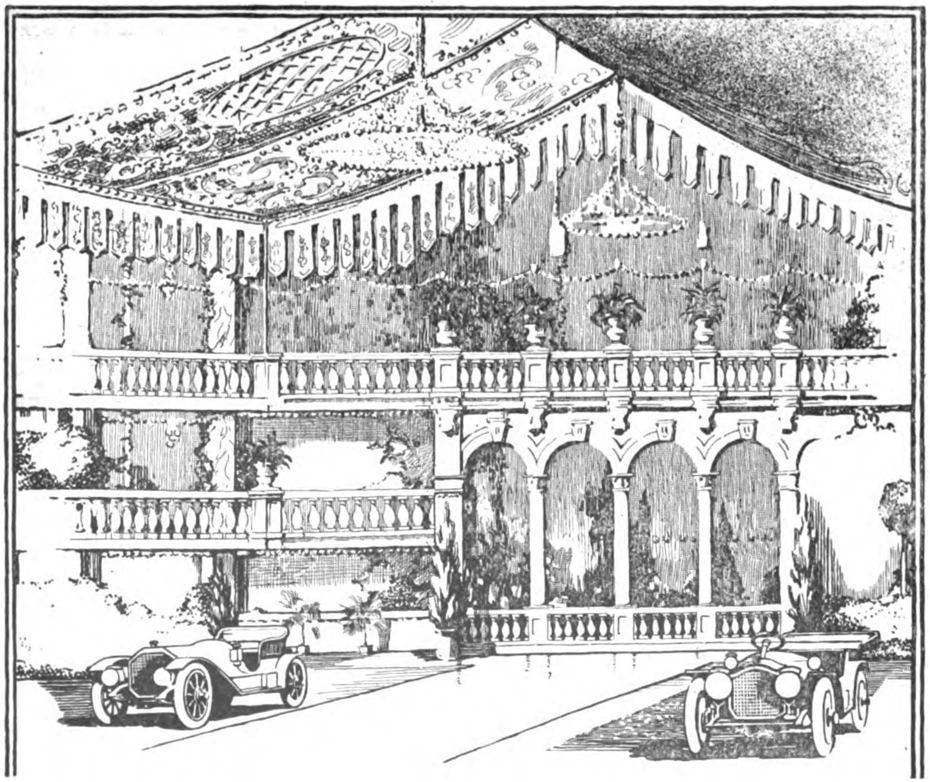
A biplane built by C. & A. Witteman of Staten Island.

A dozen other machines of types not so well known, several of them of odd and novel construction.

The Aeronautic Society of New York will display a score of models in a special exhibition booth, which is to be devoted to the interests of that organization. In another booth the Aeronautic Reserve will have an exhibit. The Reserve was organized to excite public interest in aeronautics and for the purpose of aiding the army and navy in time of need. Two tents, such as the one which was erected at the Belmont Park Meet, are to be set up in the exhibition space and numerous persons, prominent in aeronautics, are to attend.

The Junior Aero Club of America, under the direction of Edward Durant, is to be represented at the show.

Exhibitions of special attractiveness in the Aviation Division will be the showing of aeroplane accessories, consisting of engines, parts, ailerons and other sections of machines which may now be ordered and supplied upon a few hours' notice in case of accident.



Giving an idea of the scheme of decoration to be seen at the Palace Show

Stratton Resigns.

Philadelphia, Dec. 12—E. V. Stratton, manager of the Philadelphia Studebaker branch, has resigned, to take effect February 1. Mr. Stratton has been in charge of the Studebaker branch for the past two years.

Brooklyn's Show in White and Gold Glory

EVER since the formation of the Brooklyn Motor Vehicle Dealers' Association there has been a ground-swell of demand for an automobile show in Brooklyn. In response to this demand, the first annual motor vehicle show ever held in Brooklyn will be staged at the Twenty-third Regiment Armory, commencing February 18 and continuing to February 25.

The building is an immense affair containing more floor space than Madison Square Garden and is located on the chief Brooklyn motor artery, Bedford avenue. Bids for space are reported in considerable numbers, even so far in advance of the show, and the promoters are confident that a comprehensive exhibition will result.

The color scheme will be in white and gold and a special set of rules to gain uniformity in decorations has been enacted. Peculiarly liberal provision has been made for the members of the trade and affiliated organizations to attend the sessions. To the public, a charge of 25 cents will be made on all days except February 21, 22, when, on account of special features, the admission will be double.

Brooklyn boasts of owning more automobiles than any other city in the land except Manhattan and the vogue of the motor car has had a significant effect upon the whole of Long Island. For these two reasons the management is confident that the show will be well patronized.

The officers of the Brooklyn Motor Vehicle Dealers' Association are: W. H. Kouwenhoven, president; J. D. Rourk, first vice-president; C. F. Batt, second vice-president; C. M. Bishop, secretary; I. C. Kirkham, treasurer

Exhibition Committee: C. F. Batt, chairman; W. H. Kouwenhoven, H. L. Carpenter, E. T. Bloxham, Joseph D. Rourk, C. M. Bishop, I. C. Kirkham, W. H. A. Bruns, A. W. Blanchard, H. W. Palmer, M. J. Wolfe, Frank G. Dunham, Matchett & McFarlane, H. W. C. Hasbrouck, A. R. Townsend, Charles Carlson

Reception Committee: E. T. Bloxham, chairman; C. M. Bishop, H. L. Carpenter, W. H. A. Bruns, W. H. Kouwenhoven, J. D. Rourk, H. W. C. Hasbrouck, Chas. F. Batt, I. C. Kirkham, A. W. Blanchard.

Finance Committee: H. L. Carpenter, chairman; C. M. Bishop, E. T. Bloxham, C. F. Batt, W. H. Kouwenhoven.

Entertainment Committee: J. D. Rourk, chairman; Frank Dunham, H. W. C. Hasbrouck, H. L. Carpenter, C. F. Batt.

Press Committee: W. H. A. Bruns, chairman; Chas Carlson, A. R. Townsend, E. T. Bloxham, F. G. Dunham.

Transportation Committee: A. W. Blanchard, chairman; M. J. Wolfe, J. Matchett, H. W. Palmer, Chas. Carlson, A. R. Townsend.

Automobile show manager, Chas. H. Green.

Cleveland Shows Promising

CLEVELAND, Dec. 12—Arrangements for Cleveland's two automobile shows are progressing satisfactorily. The first show, held under the auspices of the Cleveland Automobile Show, will be given at Central armory the week of February 13. Frank Philips, Harry Moore, H. M. Adams and C. M. Brockaway are the committee in charge. George Collister has been appointed manager and has arranged for the opening to take place Saturday night, February 18.

The Manufacturers' and Dealers' show will open Saturday night, March 11, at Central armory. A committee composed of W. H. Barger, Ray Colwell, Harry G. Smith and H. J. Twelvetree has been appointed and 196 applications for space have already been received. The balcony and main floors will be used for automobiles and the banquet hall for accessories.

The committees of both shows are planning elaborate decorations and both shows will be the largest that the city has seen.

Queen City Show in Music Hall

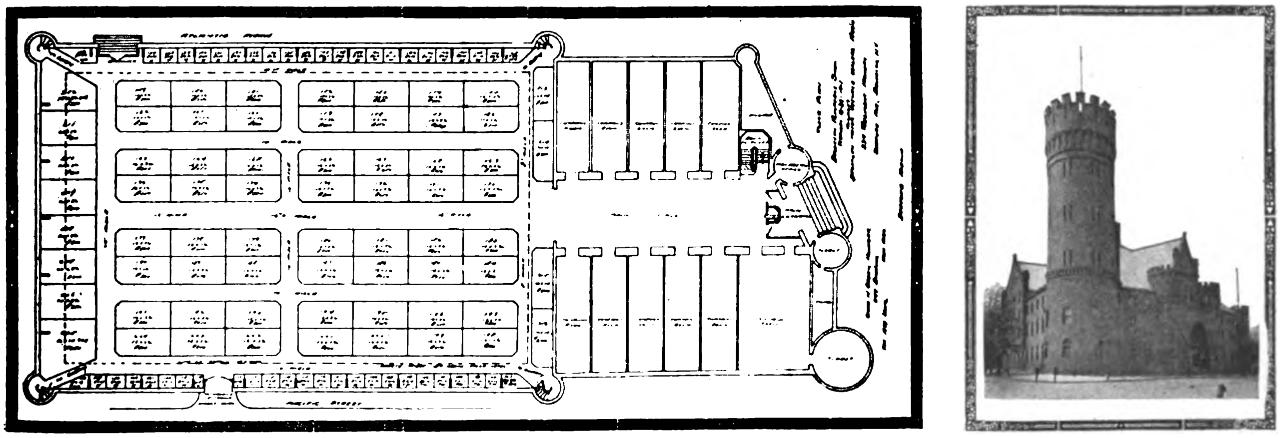
CINCINNATI, O., Dec. 12—Although the application blanks for space at the Cincinnati Automobile Show to be held at Music Hall from February 20 to 25 have been placed in the mail during the last few days, there is already a decided demand for space, indicating that the exhibition this year will be, in every way, more comprehensive than any enterprise of the kind heretofore arranged for Cincinnati.

The executive committee of the Cincinnati Automobile Dealers' Association will conduct the show this year. It has been decided that the entire first floor of the south wing of the Music Hall will be given over to automobiles exclusively. Accessories, motor boats, flying machines, and other special attractions, including the roof garden, will be located on the second floor.

Will Mail Newark Show Blanks

NEWARK, N. J., Dec. 12—Application blanks of the forthcoming Newark show, which takes place from February 18 to 25 in the First Regiment armory, are being mailed this week. A vast volume of inquiries has been directed at the promoters of the enterprise from prospective exhibitors and the indications are favorable for the disposal of all available space long before the show opens. Engineers have been busy measuring the armory and mapping out exhibition spaces.

The decorative scheme, while not yet fully worked out, will be elaborate. Offices of the show committee have been opened on the tenth floor of the Firemen's building.



Ground plan showing arrangement of the Brooklyn Show in 23rd Regiment Armory, and a view of the exterior of the building

Permanent Auto Show Is Being Planned

PREPARATIONS are being made with vigor to renovate the Brewster Building, Forty-eighth street and Broadway as the home of a permanent automobile exhibit in New York. The plan is being carried out by Frank E. Malone, 1670 Broadway, who handles the Mora and the Westcott cars. It is the intention of Mr. Malone to open the show December 26 and continue its first instalment until after the conclusion of the A. L. A. M. show at Madison Square Garden.

The idea, as advanced by Mr. Malone, is of considerably more breadth than a simple automobile show. In outlining his plan, Mr. Malone said: "I have secured the Brewster building on long lease and am busy now installing lighting, heating and communicating systems in anticipation of the opening of the show. There are five floors in the building, each with a floor space of about 7,000 square feet. On the main floor there is sufficient room for twenty-two car exhibits. On the second and third floors the accessories will be shown. On the fourth we will have a line of aeroplanes and on the top floor inventions and patented devices of a mechanical nature will be exhibited."

Caley Gets Club Job

CINCINNATI, O., Dec. 12—The announcement has been made by the directors of the Cincinnati Automobile Club of the appointment, effective January 15, 1911, of Frederick H. Caley, as general manager of the organization. The place, which was created especially for Mr. Caley, was offered him to-day at a meeting in the Gibson House club quarters, and Mr. Caley accepted it.

The new general manager is at present registrar of automobiles in the office of Secretary of State Carmi A. Thompson, in Columbus, O., is the author of much of the present legislation affecting the licensing, operation and regulation of motor vehicles, and is credited with many reforms in the relations between the State and automobile owners, which other States have been quick to seize upon and incorporate into their own laws.

St. Louis Space Snapped Up

ST. LOUIS, MO., Dec. 12—It is announced that about 90 per cent. of the space available in the Coliseum for the Fifth Annual Automobile Show, to be held February 13 to 18, has been taken. It is estimated that nearly 150 cars will be shown, many of which will be shipped to St. Louis from the National Show at Chicago, which closes the Saturday preceding the Coliseum exhibit.

Among the dealers who have taken space are the Beguelin-Buschart Motor Car Company, with the Selden car; the Case Threshing Machine Company, with Case cars; the Cook Motor Vehicle Company, with the Columbus Electric, Krit and Firestone-Columbus; Franklin Automobile Company, with the Franklin; Grand Motor Car Company, with the Regal; Gray Motor Car Company, with Kline cars; Hall Automobile Company, with the Jackson; Haynes Automobile Company, with the Haynes, Cole and Page; Kardell Motor Car Company, with the Reo, Fal, Michigan and Gramm truck; Kissel Kar agency, with the Kissel; Mound City Buggy Company, with the Halladay; Overland Motor Car Company, with the Overland; Pope-Hartford Motor Car Company, with the Pope-Hartford and Everitt; Southern Auto & Machine Company, with the Ohio gasoline car; Smith Auto & Battery Company, with the Ohio electric; St. Louis Stearns Auto Company, with the Stearns; Swartz Auto Company, with the Velie; Van Cleave Auto Company, with the Speedwell; White Garage Company, with the White; Whitman Motor Car Company, with the Mercer and the Grabowsky truck, and the Wilcox Trux Company, with Wilcox trucks and the Rayfield.

The German invasion brings along a Cyklonette type of vehicle for package and other forms of nimble delivery

Date for Baltimore Show

BALTIMORE, MD., Dec. 12—The annual show in this city will be held February 20. Whether it will be entirely under the auspices of the Maryland Club, as last year, or be given jointly by the club and dealers will be decided within the next few weeks.

The announcement that the show would be held on the date mentioned was made by Dr. H. M. Rowe, president of the Automobile Club of Maryland and the White Automobile Company, at a meeting of twenty representative dealers the past week who met to formulate the Baltimore Automobile Dealers' Association The first step in forming this organization of dealers was taken and further action will take place within the next week.

Syracuse Exhibition to Follow Boston Show

SYRACUSE, N. Y., Dec. 12—At a meeting of the Syracuse Automobile Dealers' Association, held at the Yates Hotel, at which President C. Arthur Benjamin, M. W. Kerr, George E. Messer, T. F. Willis and J. H. Valentine were present, it was definitely decided to hold the third annual show in the State Armory during the week of March 14. M. W. Kerr was again elected chairman of the show committee, the members of which will be selected later.

In selecting the date, the Association arranged, as usual, to follow the Boston show, which is dated from March 4 to March 11. It is understood that some of the Hub exhibits will be sent on. Negotiations for the use of the State Armory for the week of the exhibition have been completed.

What German Invasion Offers This Week

The Cyklonette, as the illustration shows, is a three-wheeler. It is made by the Cyklon Machinenfabrik G.m.b.H., Berlin, and it is handled in America by Richard B. Darré, who has one of the cars at the garage, 2 West Ninetieth street, New York City. The motor is placed on springs on the fork of the front wheel, which is also fitted out for steering, and the drive is by means of a sprocket set. The motor is of the air-cooled type and cooling is rendered more effective through the use of a vacuum system which works automatically. The machine is well made, is suited to running over ordinary pavement, and the tire equipment is 650 x 80 millimeters all around. The full set of brakes includes double bands for the rear wheels in addition to tire brakes. The length of the wheelbase is 100 inches, with a tread of 56 inches. The frame is of tubular steel, and the body is of stamped metal. The speed is about 30 miles per hour, and the motor is rated at 6 horsepower. The size of the cylinder of the motor is 72 x 90 millimeters, the stroke being relatively long.

Ready to Draw in Milwaukee

MILWAUKEE, Dec. 12—The first drawing for space for the first annual show of the Milwaukee Automobile Dealers' Association will be held in the Auditorium, Milwaukee, Wis., on Dec. 15. Applications for the first drawing must be in the hands of the show committee or Manager Bart J. Ruddle, on Dec. 14.

This show will be the third to be held in Milwaukee, the Milwaukee Automobile Club having held shows in 1909 and 1910. This year the dealers' association undertook the management with the co-operation of the club. The semi-annual meeting of the Wisconsin State Automobile Association will be held at the Auditorium during the show, which opens January 16 and closes January 21.

Figure on Two Halls at Hartford

HARTFORD, Dec. 12—From present indications the forthcoming show of the Automobile Dealers' Association, which is to be held in Hartford Foot Guard Armory the last week in February, or the first week in March, will be the biggest thing the show committee has ever attempted. A member of the committee states that two halls the size of the armory could easily be filled if all applications for space were considered.

It is not unlikely that another hall may be rented and two shows operated by the dealers' association, one admission covering both exhibitions.

To Build Road Across State

NASHVILLE, Dec. 12—Governor-elect Benj. W. Hooper, who will take his seat as chief executive of Tennessee in January, has inaugurated a project to build a State highway across the State the long way, from the extreme border in the mountains on the east to the Mississippi on the west, touching en route many of the leading cities and towns of the State and passing through the capitol city. The road will be about 600 miles in length.

The plan is to build the highway in two days, the work being done by thousands of volunteers and the material, wagons, tools and other things being donated.

Permanent Good Roads Body

INDIANAPOLIS, Dec. 12—Permanent organization was decided upon by the Indiana Good Roads Association before that body adjourned last week. A committee to accomplish this result was named as follows:

Indiana Engineering Society—C. C. Brown and Professor W. K. Hatt.

Indiana Bureau of Good Roads—J. C. Crabill and G. J. Pyle.

Indiana Manufacturers' Bureau—M. W. Mix and J. L. Ketcham.

Indiana Rural Letter Carriers' Association—W. J. Ward and J. O. Bonebrake.

Northern Indiana Good Roads Association—Lorenzo D. Hall and Cadmus E. Crabill.

Indiana State Trustees' Association—C. E. Pittinger.

Indianapolis Trade Association—C. G. Fisher and C. A. Bookwalter.

Indianapolis Commercial Club—William Fortune and Hugh Dougherty.

Indianapolis Board of Trade—Bert A. Boyd and William Scott.

Indianapolis Manufacturers' Association—H. H. Rice and S. C. Parry.

Indianapolis Automobile Trade Association—Fred I. Willis and F. O. Smith.

Indiana Conservation Society—William Holton Dye and Dr. H. O. Pantzer.

C. A. Kenyon will continue to act as chairman and Will J. Dobyns as secretary until the permanent organization is effected.

Aside from the matter of organization, this committee was empowered to appoint a sub-committee to draft a bill for presentation to the legislature, authorizing the formation of a State highway commission.

Dinner to David Bruce-Brown

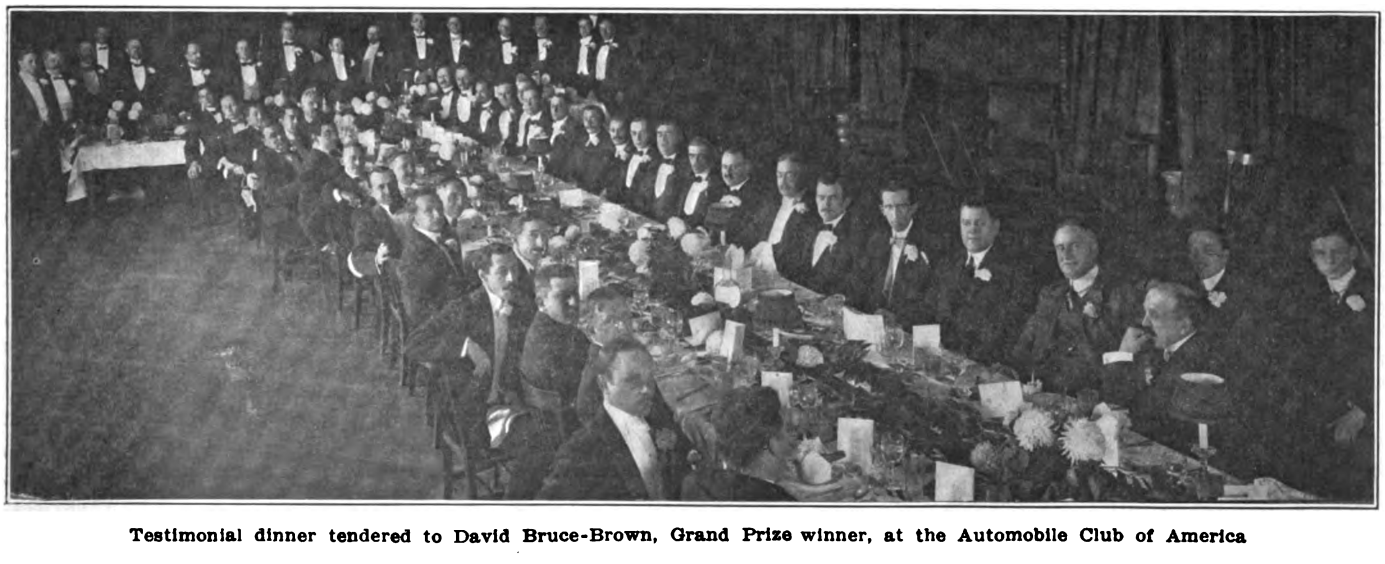
David Bruce-Brown was tendered a testimonial dinner by the Benz Auto Import Company of America, in recognition of his services in winning the Grand Prize Race at Savannah, November 12, at the club house of The Automobile Club of America, Friday evening. The occasion brought together members of the Automobile Club, members of the Savannah Automobile Club, members of the Benz Auto Import Company, newspaper men and many personal friends of the winner of the Grand Prize.

The dinner was set in the grand salon.

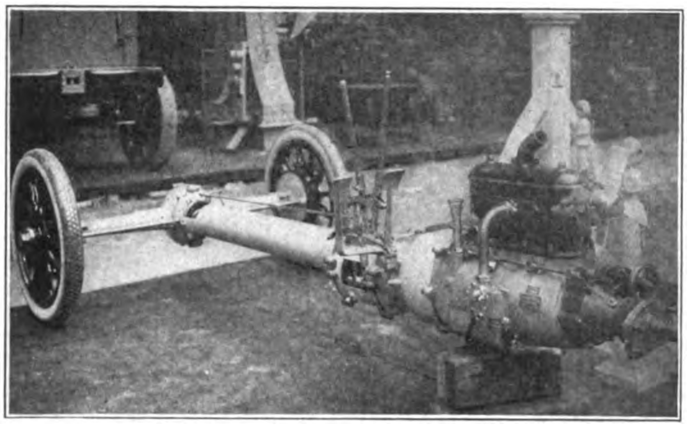
Mr. Schwarzkopf, acting as toastmaster, introduced Robert Morrell, of the Motor Cups Holding Company, who made the presentation of the prize, calling attention to the spirit of the race. Mr. Bruce-Brown responded, paying a tribute to his competitor in the race, Ralph De Palma.

Mr. Neumier, selling agent of the Benz Auto Import Company in Germany, spoke and was followed by Thomas Moore, of New York; Charles Ellis, of Savannah; Major Humphrey, of the Post, and Ralph De Palma.

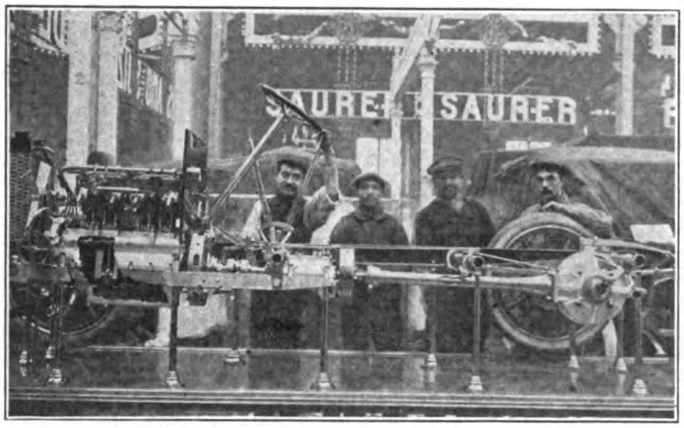
The dinner closed with a brief compliment by Mr. Froelich to the Savannah Automobile Club for the very efficient manner in which it conducted the race.



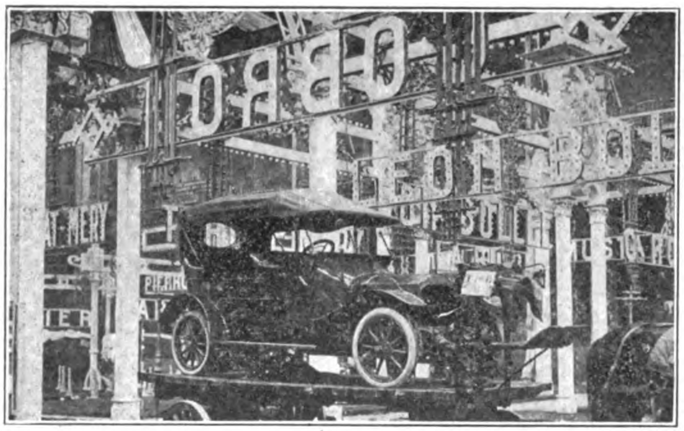
Testimonial dinner tendered to David Bruce-Brown, Grand Prize winner, at the Automobile Club of America



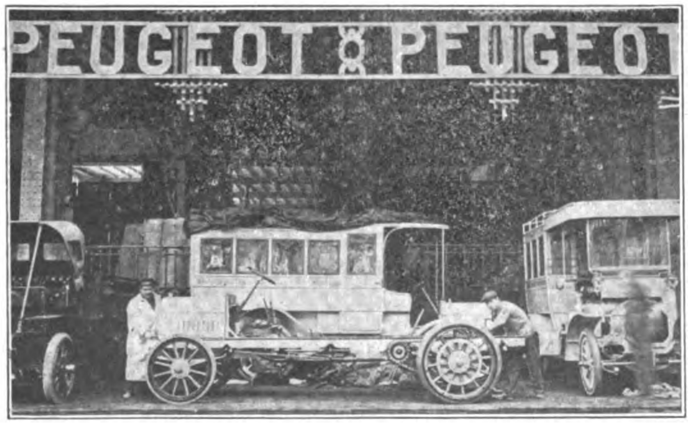
Chassis Lacoste et Battmann of the Simplicia car



Section of the De Dion Bouton chassis



Placing a De Dion Bouton chassis on the stand



Twelfth Salon in Paris. Preparing the Peugeot stand before the opening

Long Stroke Motors

PARIS, Dec. 3—Two years ago the Automobile Club of France was at the head of the annual exhibitions held in the Grand Palais. Last year, under the influence of the slump and a theory that cars could be sold without a costly exhibition, no show was held in France. Later the leading manufacturers became convinced that they had been enriching a private club for ten years; they decided to break off all connections, to hold their own show, to give the Automobile Club of France an honorary position only, and to make the event a purely business exhibition. And it was this exhibition which was thrown open to the public this morning after a formal inauguration by President Fallières attended by practically all the members of the government.

Bloc casting of the cylinders has won its position. After seeing six cylinders as high as 3 1-2 inches bore cast in one bloc, it cannot be denied that this method has the approval of engineers The models are to be found on such important stands as Panhard, La Buire, Delage, etc. From 80 millimeters bore down it has now become the general rule to cast all four cylinders together.

With a view to keeping down length, a few firms have adopted V-casting for six-cylinder motors in preference to bloc casting in Indian file. The most notable example is a Delahaye, with a six-cylinder V-motor. Another example is the Aries Company with six-cylinder motors of 60 by 100 and 75 by 120 millimeters cast in one bloc with their cylinders inclined only 7 1-2 degrees from the vertical.

Although there are more six-cylinder motors than ever before and indeed very few firms that have not adopted a six, there is not a single instance of a four-cylinder model having been dropped to make room for a six, and not a single firm producing sixes exclusively.

Motor Truck Club to Hold Run

The Motor Truck Club, an organization famed for the purpose of conducting and administering reliability and economy tests of commercial trucks has elected the following officers: James Hemstreet, president; F. B. Porter, vice-president and E. A. Levy, secretary and treasurer.

The first contest to be staged by the club will be a run from New York to Boston and return, if the event obtains official sanction. It is planned to have the start during the second week in January and the finish is aimed to be simultaneous with the opening of the second week of the A. L. A. M. show.

The route proposed is about 500 miles long. Under the tentative rules submitted to the Contest Board the cars will carry the minimum catalogue load.

Tollgates Are Disappearing in Maryland

Tourists in Maryland will be more than delighted to know that the Baltimore and Frederick Turnpike has been purchased by the State Road Commission and that the tollgate from Baltimor to Boomsboro will be closed. The tollgates from Boomsboro to Hagerstown are already closed, owing to proceedings against the company for not keeping the road in repair.

It is common knowledge that the Pennsylvania and Maryland Turnpikes are often worse than dirt roads in other States, and the tourist wonders why he is compelled to dig down every few minutes for the privilege of destroying his tires. The spirit of progress has at last reached these benighted States and even in Pennsylvania some of the principal tollgates have been closed, the most notable instance being that at Trevose or La Trappe on the main Philadelphia Trenton Route, No. 221, as given in the Official Automobile Blue Book.

at the Paris Salon

The extension of thermo-syphon cooling is remarkable. Once adopted there is not a single firm having gone back to pump circulation, and the firms that have tried it on their smaller models have gradually extended it to the larger cars.

While abolishing the pump for the water circulation, most manufacturers have taken it up for lubrication.

Since the adoption of the Knight motor on this side, the demand has been for greater silence.

Worm drive and front wheel brakes, two strongly British features, have not met the approval of Continental manufacturers. Outside the English section there is not a worm drive at the show and there is an equal lack of front wheel brakes. Wire wheels are offered when specially requested, but they are not made a standard feature by any firm.

Continental manufacturers who clung to the chain for the highest powered cars have practically abandoned it in favor of shaft drive. There is no uniformity in rear axle construction and just as little in the matter of distance rods and torque stays.

Springs are lengthened, are generally of the three-quarter elliptic type, and in a few cases, as on the Rénault, have their seating under the axle, not above it. It it becoming common to shorten the upper portion of the three-quarter elliptic, in order to avoid side sway. Offsetting of the springs has also been adopted, especially for the platform type, this effectively preventing any tendency to roll when heavy bodies are carried. This method has also been adopted with the three-quarter elliptic type.

Probably 50 per cent. of European houses have adopted four-speed gear boxes in place of three speeds. On the Aries cars a chain-driven gear box has been adopted in place of spur gears. Sautter-Harle has produced a novelty in the form of a patented four-speed gear box with internally meshing teeth.

Will Attend the New York Shows

Detroit, Mich., Dec. 12—At least two large parties will go to New York from here to attend the metropolitan shows, the first leaving December 31 and the second on January 4. The Wolverine Automobile Club, which in the short space of five months has developed into a flourishing and influential organization, has made arrangements to have special cars attached to the regular Michigan Central train leaving here at 3:45 p. m. on those dates, and many of the club members are planning to take advantage of the accommodations.

Virginia Cars Must Be Retagged

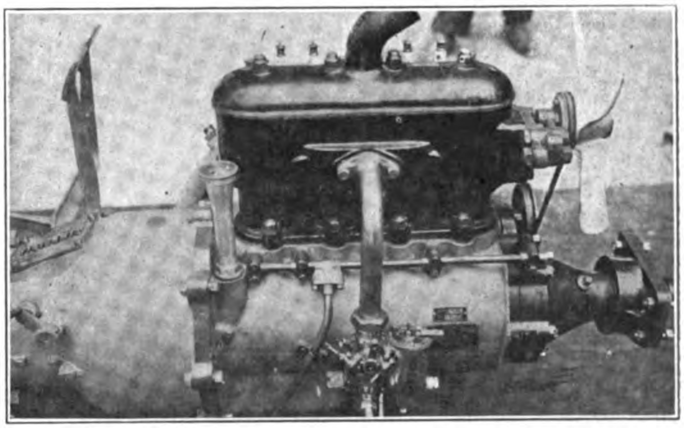
Richmond, Va., Dec. 14—The licenses of all owners of automobiles in Virginia to operate their cars on the State roads or city streets, must be renewed on January 1, 1911, or they will be liable to prosecution. Under the recently enacted State law on the subject, these licenses must be renewed annually.

Grand Rapids Is Optimistic

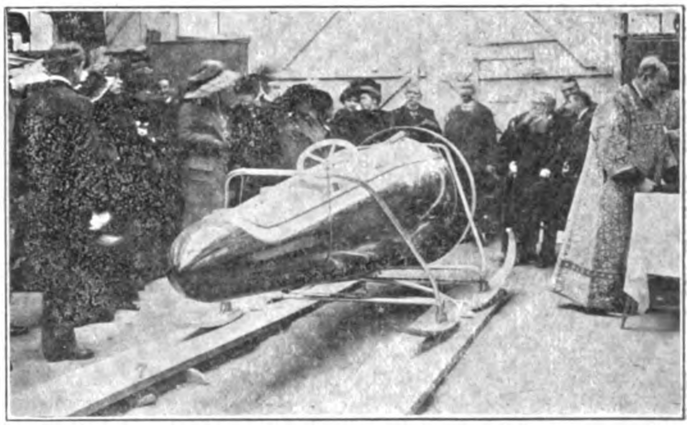
Grand Rapids, Mich., Dec. 12—The second annual automobile show will be held here next February under the auspices of the Grand Rapids *Herald*. Local automobile men are looking for a larger exposition than last year.

The American Locomotive Company, makers of the Alco car will exhibit this year's Vanderbilt cup at the exposition. Last year's show was a remarkable success. It was largely attended, not only by people of this city, but by visitors from all over the country.

Preparing the Brennabor stand



Aster engine in the Simplicia chassis



Popes of the Russian Church blessing a motor sleigh

An example of a polished chassis arriving in the church

Peeps Through Auto Goggles at Distant Lands

AMERICAN makers and exporters of automobiles who wish to build up trade in Rio de Janeiro, South America, cannot hope to compete with European exporters unless they show their goods. This is one of the reasons why the United States has a very small automobile trade in the fine country of Brazil. The Americans do not display their wares in the right way. The majority of the large commercial houses are either German, English or French. Goods of all sorts are dear there. The agent of a foreign house who is a resident of Rio de Janeiro must needs sell his automobiles if he would live. Good American-made shoes, baking-powder and food are high. And so are automobiles. But not five per cent. of the machines owned and registered in Rio de Janeiro—and there are five hundred of them—were manufactured in the United States. One American who operates a machine in that city declares that the American manufacturers will not stand by their automobiles, and that he could not succeed in getting any guarantee from them. As the American cars seen there are not built on the metric system, it is impossible for the local machinists to supply duplicate parts. Americans will not guarantee to keep duplicate parts in Rio de Janeiro. The European manufacturers supply their South American agents with duplicate parts.

Upon his arrival in Germany, the foreign automobile tourist, if not provided with an International passport, is furnished with a special elliptical number-card. A fee of two marks (47 cents) is collected for one day's stay within the Kaiser's kingdom. Taxes on foreign-made automobiles are scheduled as follows: One day's stay, 71 cents; two to five days, $1.90; six to fifteen days, $3.57; sixteen to thirty days, $5.95; thirty-one to sixty days, $9.52; sixty-one to ninety days, $11.90. The days need not be consecutive. The days in which the automobile remains in the garage or in the repair shop or while it is absent from the country are deducted, provided that a card of admission, or a tax-card, has been stamped by the customs officer at the border, when departing from and returning to Germany.

American-made cars cut scarcely any figure in France. The policy of soliciting trade by means of catalogues and circulars does not avail there. The average Frenchman (especially the Parisian) is "from Missouri," and he demands to see the goods before investing his money in an automobile. Besides, the machine must be of the very latest type; and it should be exhibited in an important centre to attract attention. It is vitally essential that the salesman shall be able to describe the machine in the French tongue.

Johannesburg, South Africa, is open for a good, medium-priced type of motor-delivery wagon for city use. In order to enter the field for the sale of automobiles, it is necessary that the business should be carried on through local representatives, the ordinary South African invariably having his suspicion of the stranger.

The demand for automobiles in Great Britain is increasing, 203,227 machines being now registered in the United Kingdom.

A German has invented an armored automobile to fight airships. Technically it is known as an armor-clad automobile. It is fitted with a 60 horsepower gasoline engine. The machine is able to take steep grades. It is equipped with a two-inch rapid-fire gun as armament. The vehicle, including five men, the gun, ammunition and general outfit, weighs 7,350 pounds. One hundred shrapnels comprise the ammunition, each shrapnel containing 128 projectiles of hard lead, in addition to the explosive charge. The double shrapnels are wings of babbitt, in which teeth are cut which revolve outward, their purpose being to tear the canvas of the balloon when it is hit. A one-eighth inch thick nickel-steel armor covers the automobile. A maximum range of about four and three-quarter miles is attained.

The introduction of a new spring-wheel for motor vehicles is about to be introduced in England, it being the invention of a Britisher. Eighteen links comprise the periphery of the wheel. Triangular wooden block comprise the links; and while the bases comprise the periphery each of the pieces is hinged to a piece of metal which is firmly attached to a volute spring, ranging from four to five inches in length, according to the weight of the vehicle that has to be supported. The other ends of these volute springs, eighteen in number, disposed radially, are fixed to the hub, or, rather to a small inner wheel of the ordinary artillery pattern with twelve spokes. The springs are made of slightly tapered strips of special steel coiled spirally in such a way that the greater part of each turn is within the preceding one and that under sufficient compression the whole of the inner coils can be forced to within the outermost one. Blocks of a hard composition of fibre and gutta-percha compacted under pressure are cemented to the surface of the links which roll on the ground. These can be renewed when worn away at a cost of 97 cents to $1.22 for each wheel. The inventor has aimed to imitate the action of the pneumatic tire. An obstacle such as a stone does not cause the whole wheel to rise, as is the case with an ordinary iron-tired wheel, but it is, as it were, swallowed up, the link or links immediately effected yielding by virtue of the hinges and bringing into play the resiliency (re-bound) not merely of one or two of the springs, but of the whole of them round the entire circumference. The object of the invention is to apply the spring-wheel for use on heavy commercial vehicles and motor-buses, to give them the benefits of the pneumatic tire without the employment of a particle of rubber. It is claimed that with this spring-wheel it is impossible for a machine to side-slip, while the amount of dust sucked up is far less than is the case with the pneumatic tire. A pleasure car having these springs attached was run in London for experimental purposes and the wheels showed that they afford a remarkable degree of resiliency, even at high speed.

A very interesting species of sport which is gaining favor in Leicester, England, is tilting at the ring in a motor-car, society having taken to amusing itself by this means in a very lively fashion. The ring is suspended after the mode seen by the side of the merry-go-rounds, and the tilting is done while driving the automobile at good speed.

An automobile ambulance for use in the German army is one of the latest innovations. A frame is constructed, and in place of the covered wagon which prevails in cities there is no cover, the wounded or ill soldier being carried lying on the bunk, over which stand the guards and the surgeons.

Atlanta A. A. Elects Officers

ATLANTA, GA., Dec. 12—The Atlanta Automobile Association recently held its election of officers. The stockholders met first and elected the following directors: R. J. Guinn, L. J. Daniel, F. J. Paxon, Forrest Adair, V. H. Kriegshaber, F. J. Cooledge, J. D. Rhodes, C. E. Caverly, John S. Owens, E. P. Ansley, W. D. Owens, Mell R. Wilkinson, Asa G. Candler, S. P. Turman, Morton Smith, Asa G. Candler, Jr., B. M. Willingham, A. Montgomery, Brooks Morgan and John J. Woodside.

The directors then held an election and the following officers were chosen: F. J. Cooledge, president; John J. Woodside, vice-president; Asa G. Candler, Jr., secretary; W. D. Owens, treasurer.

It is uncertain what will be done with the Speedway. Owing to the fact that the A. A. A. has refused to give the local track the dates that it has wanted and because of the poor patronage on the unseasonable dates which were granted the Speedway, racing in Atlanta looks dubious.

Panama-Pacific Race to Be First of New Year

SAN FRANCISCO, Dec. 8—After months of negotiation and useless talk, it appears at last that San Francisco is to have a second Portola road race. It is to be known as the Panama-Pacific road race, because of the boom here for a Panama-Pacific Exposition in San Francisco, and the date set is January 2d. The course is the same one in Alameda county that was used last year, although it has been cut almost in half. Most of the crack cars that took part in the recent Santa Monica road race will be entered, and in addition there will be plenty of local entries, judging from the present prospects.

The Portola road race was originally scheduled for October, but in the absence of President M. H. de Young of the Automobile Club of California, it was allowed to lapse, after permits and all the general arrangements had been made. Several attempts were made by local dealers to fix up the contest, but without avail until Dick Ferris, of Los Angeles, took the matter in hand.

The Portola Racing Association was formed by the San Francisco dealers, and the Oakland Automobile Dealers' Association is also taking a prominent part, making all the arrangements for the course and raising the greater portion of the money that will be needed to pull off the race successfully.

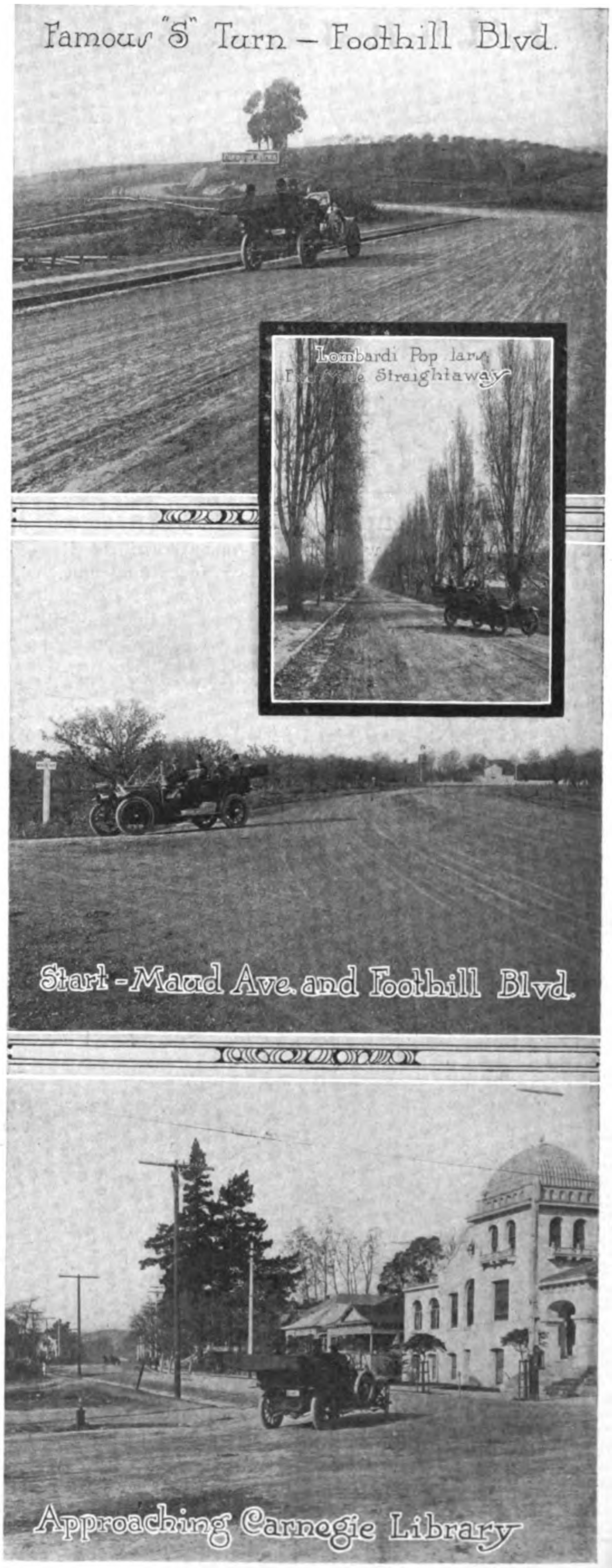
The course chosen is said by some automobile critics to be the finest in the United States. Almost one-half of its 10.923 miles is embraced in the famous Foothill Boulevard, a magnificently constructed piece of roadway that has been called the finest in California. It is as smooth as a billiard table for most of its length, and there is no limit to the speed that may be attained, beyond the capabilities of the cars and the attention that must be paid to the few turns along the course. These turns, however, are few, and are generally so broad and sweeping that they may be taken practically at top speed.

The course is oblong in shape, each of the long stretches being about five miles in length. The two connecting stretches at the ends are very short. One stretch, as described, traverses the Foothill Boulevard, while the second stretch of five miles is virtually a straight line between the towns of San Leandro and Haywards. A good part of this stretch is between two lines of magnificent poplars. The connecting links of the oblong are over well-paved streets in the two towns. There are three or four right-angle turns to be negotiated. It has been decided not to bank any of these, it being Western experience that more accidents are caused by the reckless taking of banked turns than by forcing a man to use his best judgment and slow down for level turns. In several cases turns will be modified along the course; in fact, everything possible will be done to secure the greatest possible speed, which is regarded by the automobile men as the greatest factor in the contest.

There are to be three classes in the race—light cars, heavy cars and free-for-all. The light car race is to be in two divisions, according to displacement. The length of the course for this race will be 98.3 miles. The heavy car race will be for machines from 300 cubic inch displacement up to 600 inches, without weight restrictions. The length of the race will be 152.9 miles.

The free-for-all will be without restrictions, and the distance will be approximately 250 miles. To the winner of the small car class will go 70 per cent. of the entry fees, to the second car 20 per cent. and to the third car 10 per cent. For the winner there will also be the $1,000 trophy donated by the Oakland *Tribune*.

In the big car event there will be the same division of the entry fees among the first three cars, while in addition the winner will receive the St. Francis Hotel trophy, valued at $2,500, one of the handsomest prizes of its kind ever given. The entry fee in the free-for-all will be $250, and this will be divided on the same basis between the first three cars.



News of Maker and Dealer in Many Fields

CONFIDENCE in the continued prosperity and growth of the automobile industry is evidenced in the announcement by The Thomas B. Jeffery Company of the completion of a new giant electrical power plant for the Rambler factory at Kenosha, Wis.

The new engine room covers 6,000 square feet, and the equipment has been so installed that its capacity may be doubled at any time. There are four power units, including a 1,200-horsepower Cross Compound non-condensing alternator, with three other units of 500, 125 and 100 horsepower each.

The boiler room covers an area of 8,000 square feet, and includes three boiler units of 500 horsepower each, with automatic stokers. A complete coal-handling equipment is now being added. Each of the boiler units is equipped with an individual steel stack, five feet in diameter and 126 feet high. The area of the boiler room permits of a future complement of 3,500 horsepower, or seven such units as are now installed.

The construction of the entire group forming the power plant is of concrete and steel trusses, with fireproof tiles for roofs. In addition, five new buildings have been added to the Rambler plant during the year.

Regal Abandons Retail Business

Edward H. Barnum, who has been manager of the Regal-Detroit Auto Company at 1720 Broadway for a long time, has announced that the Regal Motor Car Company of Detroit has decided to give up selling at retail in several of the large cities. In pursuance of this idea, the Regal-Detroit Auto Company has been abandoned and Mr. Barnum has been named District Manager of the parent company with offices in the Randall building.

The territory allotted to Mr. Barnum consists of New York, Connecticut and New Jersey and he is busy at present appointing agents to represent the Regal in various places. The New York agent for the car has not been selected as yet.

Mr. Barnum has secured adequate warehouse facilities to handle and store his line and expects the new plan to work out satisfactorily. The reason for the change is the apparent possibility of economies in the routine of sale.

Electrics Grow in Popularity

SYRACUSE, N. Y., Dec. 12—There are evidences that the electric vehicle trade is being pushed in Syracuse. S. S. Daub, Jr., representing The Broc Electric Vehicle Company of Cleveland, is in the city and intends to establish an agency here. T. E. Willis, the Syracuse agent for the Oldsmobile, has taken over the Baker Electric and it is reported that several other agents, who have not heretofore carried electrics, will take on leading makes in the near future.

Meanwhile, a display of leading electric propelled vehicles, given in the Peerless show room on Noxon street, is attracting considerable attention from the public.

Kelsey Company Widens Factory

HARTFORD, Dec. 12—The C. W. Kelsey Manufacturing Company, builders of the Motorette, have leased the entire north wing of the Cheney silk mills at Morgan and Market streets.

The Kelsey plant was first located on the second floor of the north wing; now the whole wing will be devoted to the usage of the Motorette builders. An inclined runway was recently built, this being of about 28 per cent., and it provides a simple climbing test for the cars. The Motorette is to be shown at Chicago, New York and Boston.

Gramm Factory Is Completed

TOLEDO, Dec. 12—The Gramm Motor Truck Co., has just completed its big $300,000 plant at Lima, O., and General Manager B. F. Gramm, has announced the removal of the business offices from Bowling Green to that city, the change to take place to-day. The plant will be in operation in January.

Tests of the machinery and electrical work are now being made. The capacity of the plant is expected to be one complete truck a day after the first six months.

Buffalo Trade Body Board

BUFFALO, N. Y., Dec. 12—The Automobile Trade Association of Buffalo held its annual meeting, election and banquet at the Hotel Iroquois last week. The following were elected to the directorate: Chas. F. Monroe, John J. Gibson, J. C. Cramer, Ralph E. Brown, A. W. Meyers, E. E. Denniston and George Ostendorf.

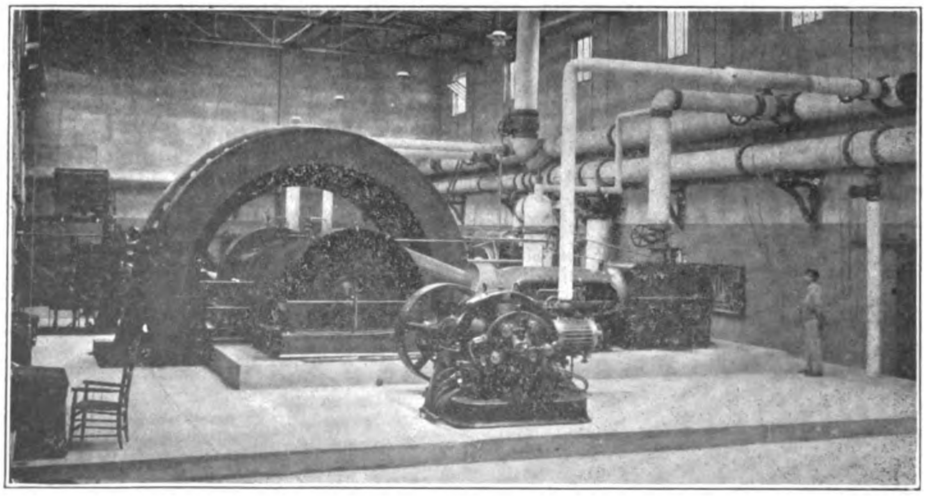
Four New Ohio Concerns

COLUMBUS, O., Dec. 12—The Vickers Motor Car Company of Coshocton, Ohio, was incorporated with an authorized capital of $25,000 to manufacture and sell all kinds of motor cars and accessories by Eugene H. McMasters, Carl B. Vickers, William C. Myers, Homer H. Kline and J. G. Kline.

The Imperial Motor Car Company, of Cincinnati, Ohio, was incorporated with an authorized capital of $150,000 to operate garages and sales agencies and handle accessories by Harry C. Strauss, Frank H. Lamb, Jacob Straus, B. Chatten and Joseph C. Kinze.

The Callen Co-operative Wheel Company, of Cleveland, Ohio, was incorporated with a capital of $50,000 to manufacture and sell vehicle wheels of all kinds and automobile accessories by Charles Callen, Clara L. Callen, Edwin A. Callen, George A. Callen and C. Cole.

The Western Compound Rubber Company, of Cincinnati, Ohio, was incorporated with a capital of $100,000 to manufacture and sell rubber articles by Henry W. Jones, John E. Pitts, J. Albert Mauss, Robert F. Jones and Harry F. Taylor.



New steam power plant at the Rambler factory at Kenosha, Wis.

News in Brief from the East, West and South

Hartford, Dec. 12—The Stearns, heretofore unrepresented in this section, has been taken on by Richard H. Skinner with office in the Connecticut Mutual building.

Hartford, Dec. 12—Harry E. Fields, vice-president of the Hartford Rubber Works Company, has resigned and on January 1 will become manager of the New York office of the Rambler.

New York, Dec. 12—Frederick R. Simms, president of the Simms Magneto Co., returned on the steamship *Campania* and is now actively engaged in the organization of the new works at Bloomfield, N. J.

Akron, O., Dec. 12—John W. Kelly has taken the position of general factory representative with the Swinehart Tire & Rubber Company, and will give his special attention to solid tires for truck and pleasure electrics.

New York, Dec. 12—A. H. Whiting, E. C. J. McShane and Gilbert Burdett have formed a combination to handle the Cunningham line in this city. All three were formerly identified with the Dayton Motor Company.

New York, Dec. 12—The New York home of the Hudson will be removed January 1 from its present location to Fifty-fourth street and Broadway. The A. Elliott Ranney Company, which has the agency, has been cramped for room for many months.

York, Pa., Dec. 12—Belmont S. Walters, who left the Pullman employ some time ago and signed with the Parry Automobile Company of Indianapolis, Ind., has returned to his former position, and will travel through the middle West and Southwest.

Toronto, Can., Dec. 12—The Goodyear Tire & Rubber Company, of Canada, recently acquired the plant of the Durham Rubber Co. of Bowmanville, Ontario, who manufactured an extensive line of mechanical goods, and enjoyed an enviable reputation.

New York, Dec. 12—The executive offices of the Licensed Automobile Dealers of the City of New York have been removed from the Thoroughfare Building to the eleventh floor of Motor Hall, 250 West Fifty-fourth street. Charles A. Stewart is the general manager.

New York, Dec. 12—Ralph DePalma, who has driven Fiat racing cars with much success, has been released from his contract with that company and will act as a free-lance during the coming season. He will drive a car of another make in the 24-hour race at Los Angeles on Christmas Day.

Baltimore, Md., Dec. 12—Among the recent members of the Automobile Club of Maryland are: Messrs. W. A. Fingles, Robert Crain, John Pleasants, George T. Phillips, G. E. Kraft, F. Baurenschmidt, J. Alexis Shriver, Dr. Lewellys Barker, Mrs. Charles M. Lanahan and Miss Dolly C. Fulton.

Seattle, Dec. 12—"Farthest North Evans," of Alberta, Canada, or rather Edmonton, Alberta, has recently completed a trip in a Cadillac car from the last Hudson Bay trading post north of Athabasca to Edmonton, a distance of 200 miles. Mr. Evans is the Coast representative of the Cadillac Company.

Chicago, Dec. 12—The annual century run of Ford cars will be held New Year's day as usual. The start will probably be from the headquarters of the Chicago Motor Club to Elgin and Lake Geneva. Last year 17 cars, not all of Ford make, took part in the run. Luminous confetti to mark the course was a feature of past runs.

Philadelphia, Dec. 12.—George W. Hipple, Philadelphia representative of Chalmers Motor Company, has been elected treasurer of the Automobile Trade Association of Philadelphia This association of motor car and accessory dealers now has a membership of 39 automobile dealers, 21 dealers in accessories and supplies and 90 contributing members.

Indianapolis, Dec. 12—J. P. Primrose has accepted the position of assistant sales manager of the Willys-Overland Company with offices at Indianapolis. This position was formerly held by William D. Myers, who is now assistant sales manager of the Marion Sales Company, also located at Indianapolis.

Los Angeles, Cal., Dec. 12—The world-touring Hupmobile party has arrived in Los Angeles, having made its trip from Detroit here in 36 days. The party was met by W. M. Mason, the local representative, and party in San Bernardino, the escort being augmented in Pasadena by many cars.

Toledo, O., Dec. 12—The Standard Automobile Company has opened a branch on Madison avenue, for the exclusive handling of Packard automobiles. William Love, who for three years prior to his connection with the present company was associated with Kirk Bros. Auto Company, is in charge of the new branch.

Altoona, Pa., Dec. 12—S. I. Fries of this city celebrated his 76th birthday last Wednesday by driving his car about thirty miles over the country roads. Mr. Fries lays claim to being the senior motorist of Pennsylvania. He has driven an early Franklin model for over five years. He and Mrs. Fries are planning to make quite a long tour next Summer.

Richmond, Va., Dec. 12—The Merchants' Motor Delivery Company Incorporated, is the latest automobile concern to secure a charter here. Its principal offices will be at Richmond. Capital stock: Maximum, $25,000; minimum, $5,000. Objects and purposes: to operate a motor transfer for the City of Richmond.

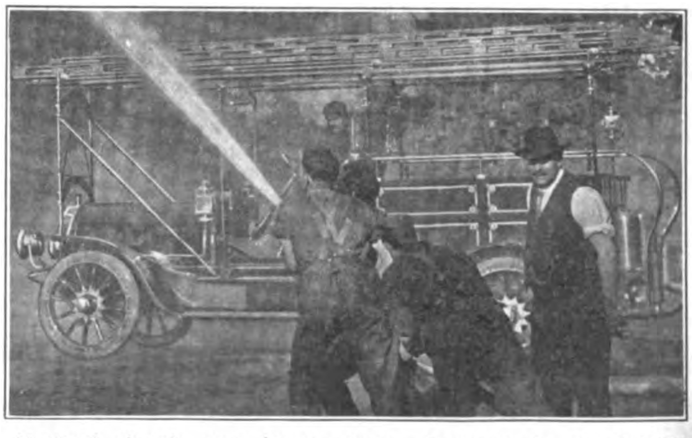
Omaha, Dec. 12—The Marion Automobile Company has started in business in Omaha, and has a garage on automobile row. C. W. McDonald, formerly western manager of the Sandwich Manufacturing Company, resigned his position to become manager of the automobile company. The firm will have the agency for Marion cars for all of Nebraska, Northwestern Missouri, and Western Iowa. It will also handle the Overland cars locally.

National Car Fitted for Fire Fighting

The accompanying illustration is of a National car as made by the National Motor Vehicle Company, of Indianapolis, Ind., showing the same as it is fitted out for fire fighting by the Howe Company and dedicated to service at Paterson, N. J., where it was put to the test, a report of which was made on November 1 last.

For four hours the motor-driven pumps forced 413 gallons of water each minute through the 1 1-4 inch smooth-bore nozzle of the "deluge" set and hurled the water 223 feet.

The wonderful possibilities of the automobile fire engine were recently demonstrated in the presence of Mayor McBride of Paterson, Fire and Police Commissioners Ryan, Hopson and Mallon, Board of Works Commissioner Milson, Chief John Stagg and several other interested officials at East Twenty-fourth street and Eighteenth avenue.



National chassis used by the Howe Company for fire-fighting purposes at Paterson, N. J.

Among the Accessory Makers

THE ROYAL DUPLEX BRAKE; BALZER AIR-ON-TAP; BULLDOG CARBON REMOVER; SELF-CLEANING SPARK-PLUG; THE CASGRAIN SPEEDOMETER

RELIABLE DISTANCE RECORDER

The principle upon which the Casgrain Speedometer (Fig. 5), which is being marketed by the Casgrain Speedometer Co., 53 State street, Boston, Mass., is built is well known in mechanics. It simply utilizes the power of a rapidly moving body of liquid, similar to the manner of the old waterwheel. The application of this liquid force in a speed indicator is original.

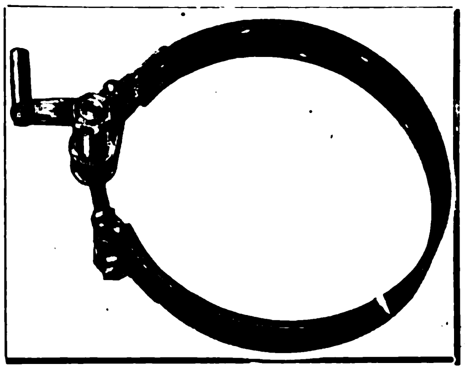


Fig. 1—An effective band brake

The outer casing is of heavy brass, cylindrical in shape. Inside this brass shell the dial, its operating mechanism and the liquid operating medium are all contained in a sealed glass cylinder.

Motion is conveyed to the liquid—a refined mineral oil—by means of four steel paddles which are rotated by the driving mechanism. The amount of liquid is a fixed quantity. The size of the confining cylinder is always the same. There is no possible chance for wear or alteration in the size of the rotated paddles. Therefore the result must always be the same.

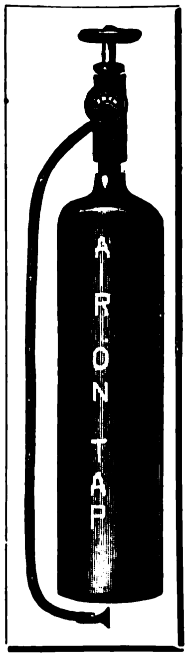


Fig. 2 — Saves time and energy

All road shocks or engine vibrations are absorbed by the liquid. No mechanical connection exists between the driving mechanism and the dial.

A flexible shaft connects the instrument with the front wheel. This shaft gives a positive drive.

It shows on its dial an individual, large black figure for every mile, plainly readable under all conditions.

HANDY CARBON REMOVER

The accessory depicted in Fig. 3 represents a useful and quick method of removing the carbonic deposit that forms on the top of the piston and in the head of the cylinder and is used in the following manner: The flexible coil chain, made from tough soft steel wire, is inserted in the spark plug hole after the latter has been removed and a small quantity of kerosene is then inserted to assist the scavenging. The plug is reinserted and the engine run for several minutes. The ignition in the cylinder in which the operation is being carried out must be cut off and after being run at a moderate speed the motor can be shut off and the wires removed with the hooked tool through the spark plug hole. The chains are made in two sizes and either one or the other of these will adapt itself to any motor with poppet valves. These chains are manufactured by E. S. Michener, Newcastle, Pa.

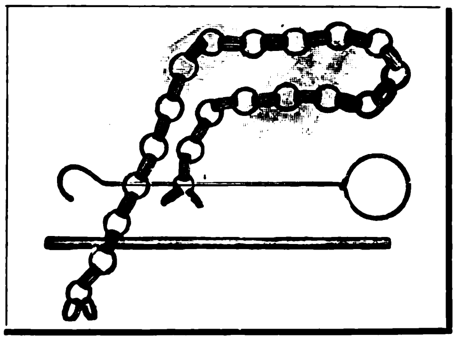


Fig. 3—"Bulldog" outfit for removing carbon

THE NEW DUPLEX BRAKE

The new brake shown in Fig. 1, designed for machinery and vehicles where the braking effect is relatively large compared with the operating force, is manufactured by the Royal Equipment Company, of Bridgeport, Conn. The retarding effect is equal in both directions of rotation of the drum. The well-known wrapping or winding effect of a flexible band surrounding and in contact with a rotating drum is made use of in this brake. One end of the flexible band is fixed, while the operating force is applied to the other end in the direction of the rotation of the drum.

AUTOMATIC CLEANING SPARK PLUG

The principle upon which this plug (Fig. 4) operates is compression of the gases in the brass bushing. A chamber of some depth is constructed, the outlet to which is six small holes at the bottom of the chamber, so drilled as to point toward the tapered mica tube insulation. When the compression takes place in the cylinder an equal amount of compression also takes place in this brass chamber. When the compression is released in the cylinder the gases rush out of the compression chamber of the plug with such force as to drive away all deposits on the tapered insulation. In actual practice these plugs have worked satisfactorily. The New York Mica & Manufacturing Co., Auburn, N. Y., are the makers of this plug.

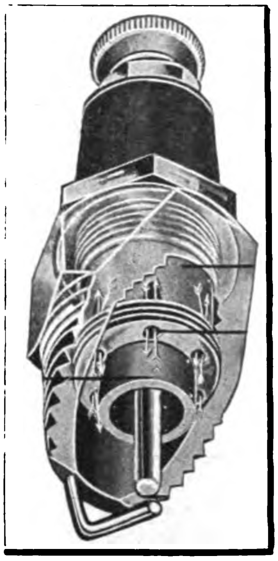


Fig. 4—A spark plug that cleans itself

LABOR-SAVING AIR PUMP

As the name "Air-on-Tap" indicates, the cylinder illustrated in Fig. 2 can be carried on the car to save the labor of pumping while on the road. The tank is tested to 4,000 pounds hydrostatic pressure to insure security. The makers, Gus Balzer Co., 1777 Broadway, N. Y., have a charging plant which should be useful to local autoists.

Fig. 5—The Casgrain Speedometer

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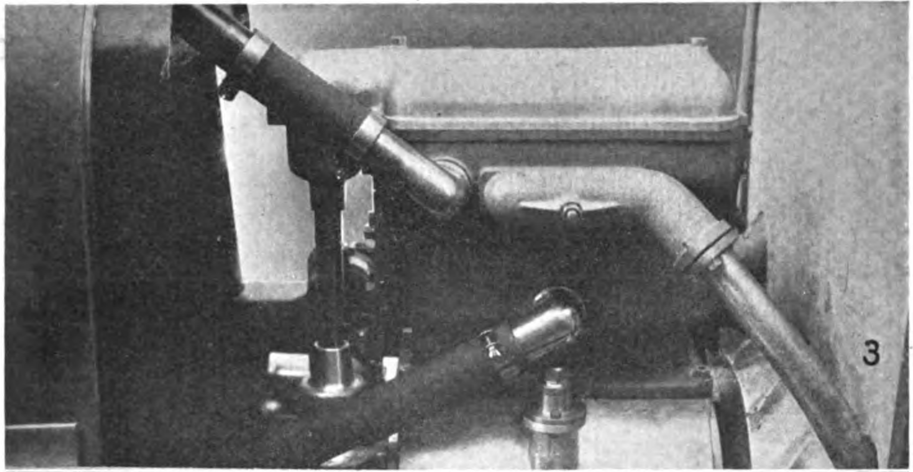
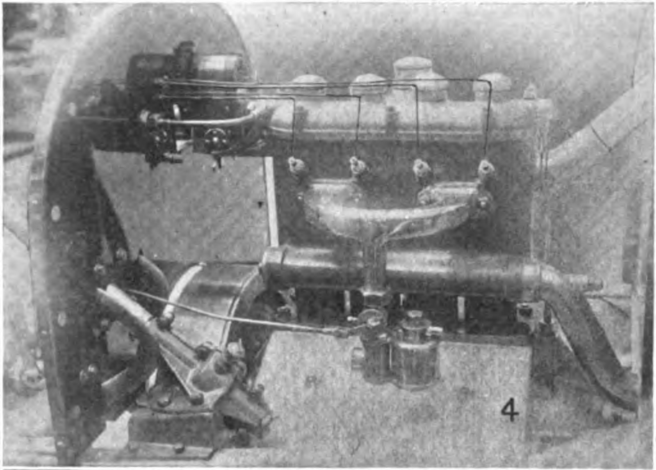
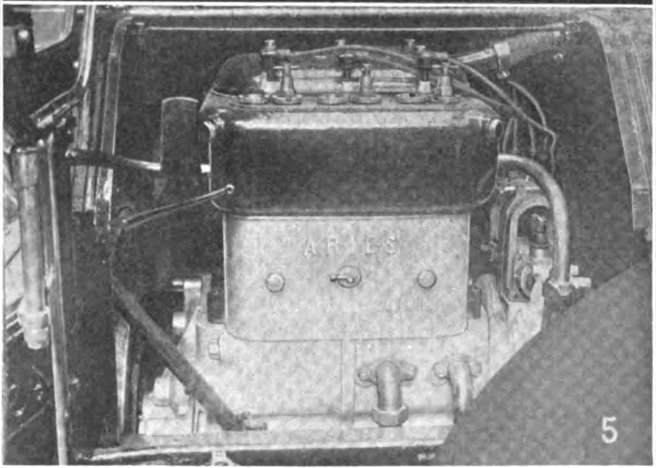
THE AUTOMOBILE

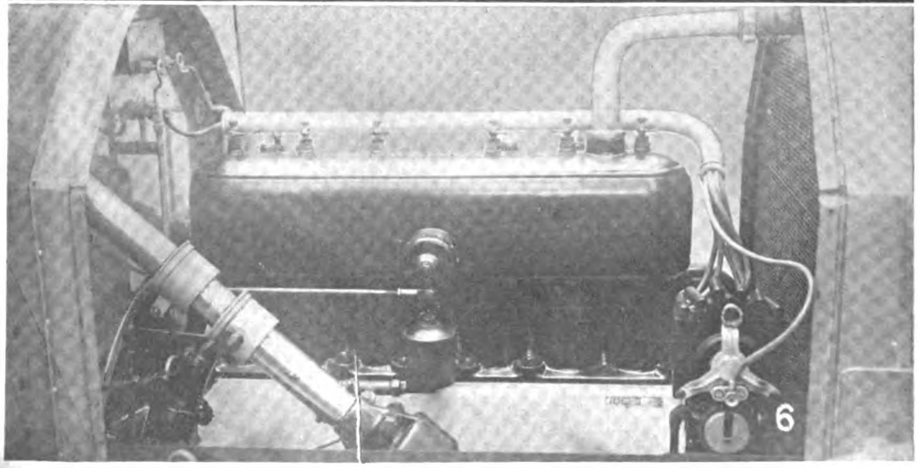
PARIS SALON

PARIS, Dec. 12—The motor at the Paris Salon having the highest ratio of stroke to bore is the new four-cylinder Sizaire-Naudin, the dimensions of which are 2 7-10 by 6 3-5 inches bore and stroke. This gives a ratio of 2.42 to 1. But the long stroke is not the only interesting feature of this motor. The cylinders are a single casting, with valves on op-









posite sides, stems enclosed, and presenting a square box appearance. On the former model, of 2 7-10 by 4 7-10 inches, the valves were superimposed, with a single camshaft. The change to two camshafts has allowed a better position of the sparking plug and an increase of the valve diameter, the area now being 2 1-5 inches. This is probably the largest area of any standard motor on the European market.

It is significant to note that the ball bearings formerly employed on this firm's four-cylinder motors have been dropped for the plain type. The crankshaft is of original design, having only two throws; thus pistons Nos. 1 and 2 are connected up to one crankpin, and are at 180 degrees to pistons 3 and 4. Counterweights are carried on the crankshaft. Tubular connecting rods are employed, and light pressed steel pistons are used. The lower half of the connecting rod bushing is common to two connecting rods. A silent chain is now used for driving the two camshafts. The housing at the forward end of the motor carries two chains, one being on the crankshaft pinion and the two camshaft pinions, and the other taking the drive from the mainshaft to the magneto shaft.

To facilitate timing of the motor, a hole is bored through each pinion and a corresponding hole in the wall of the crank chamber. When the pinions have been locked by a fine bolt passed through these holes, it is only necessary to put on the chain to have the correct timing. Cooling of the motor is by thermo-syphon, but instead of five rows of copper tubes the radiator is now composed of a single row of narrow tubes the full depth of the radiator. Each tube is about 2 1-2 inches in depth, from front to rear. The belt-driven fan is a one-piece aluminum die casting. In place of simple splash lubrication with dippers on the connecting rod ends, as used on the ball-bearing motor, forced feed lubrication is now employed. The pump is driven off the main shaft, drawing its supply of oil from the base chamber and delivering it by internal leads to the two main bearings and through the hollow shaft to the connecting rod ends. The oil filler is on the left-hand or exhaust side of the motor. Attached to the cap is a broad fiber gauge descending into the base, and giving the oil level on being withdrawn. The space between the crank chamber and the side frame is enclosed, and in order to reduce all visible piping to a minimum the intake water

3—Bozier 4-cylinder Monobloc exhaust side

4—Cottereau valveless motor, carbureter side

5—Aries 6-cylinder V-motor in one casting

6—Fiat 6-cylinder motor in one casting. Note entire absence of intake pipe from the radiator is carried under this plate until it reaches the center of the cylinder bloc; thus there is only a 2-inch length of piping visible.

Although rated at 14 horsepower only, the motor is declared to have given 34 horsepower on bench tests.

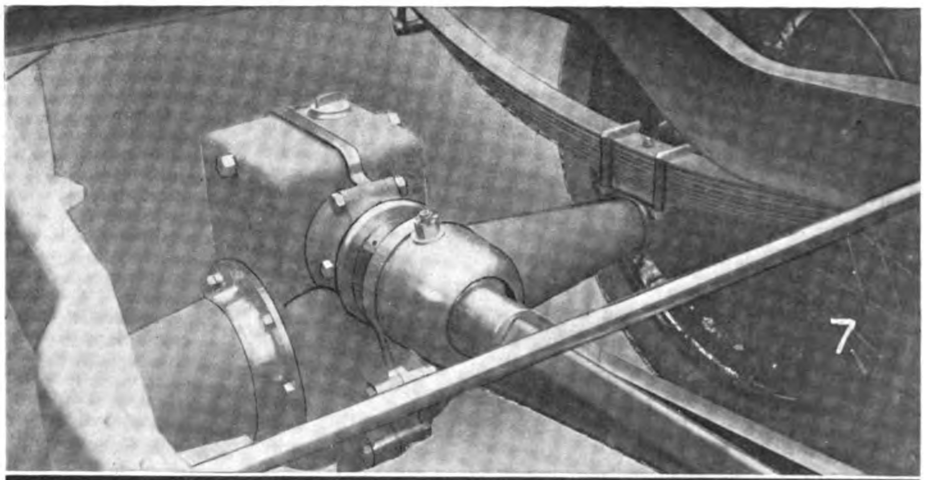
After the Sizaire-Naudin the longest stroke is to be found on the Hispano-Suiza, a motor of 80 by 170 millimeters (3.1 by 6.6 inches bore and stroke) or a ratio of 2.12 to 1. Then follow at least half a dozen makers with a ratio of 2 to 1, prominent among them being Gregoire with 80 by 160 and the Peugeot and Sautter-Harlé with 75 by 150 millimeters. The rest average 1.6 to 1. This is sufficient to prove that the long-stroke motor is accepted unhesitatingly by Continental manufacturers.

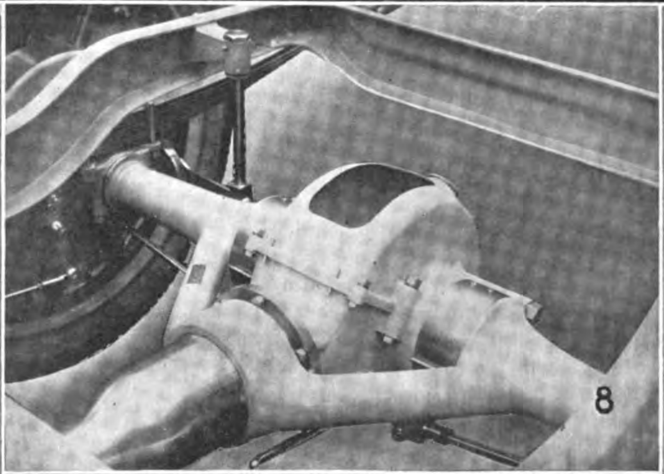
An important feature of the show is the en bloc casting of motors with all water piping and intake and exhaust manifolds. Two years ago the bloc casting was confined to four-cylinder motors of not more than 3 1-4 inches bore.

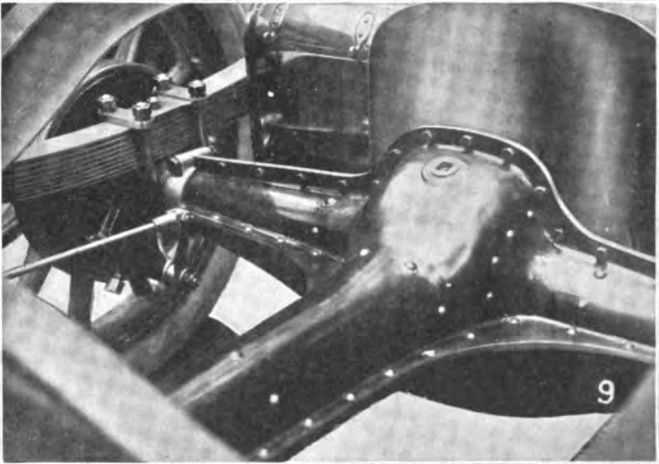
Almost without exception this type of motor is now a single casting, generally with the intake manifold as an integral part, but very frequently with a separate exhaust manifold. But an extension has been made so that this year it is common to find six-cylinders in one casting, some of them having a bore as high as 3 1-2 inches. Examples are to be found on the new Panhard of 80 by 120, the new Fiat of 80 by 130, a Delage of 65 by 125, a new La Buire of 90 by 130 and a Rochet-Schneider of 95 by 130 millimeters bore and stroke. This motor is the largest six-cylinder in one casting to be found in the show.

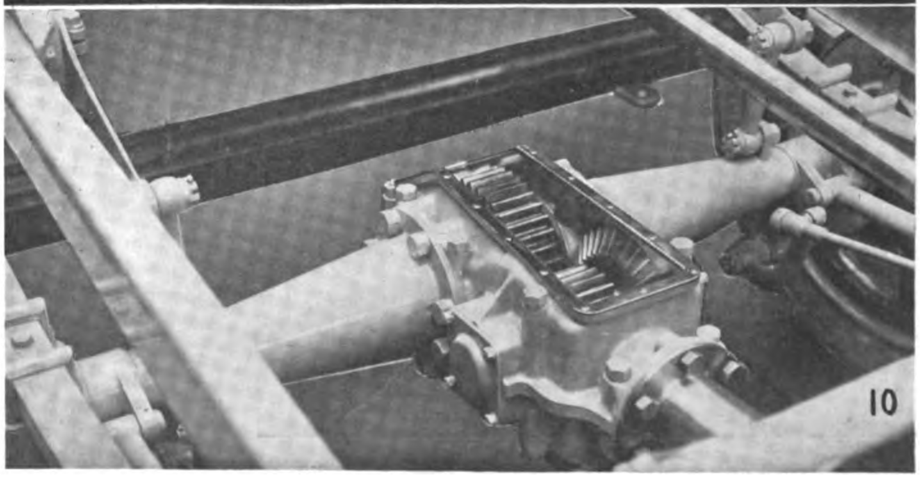
Generally, a single length of piping connects the carbureter with the water-jacketed gas passage cast with the cylinders, and it is a very common practice to place the carbureter on the side opposite to the valves. This is found on the new Rochet-Schneider, the La Buire and on the Fiat. But the Fiat people have gone further than any other maker by abolishing all intake piping.

A remarkably united movement is shown towards carrying the magneto and water pump across the front of the motor, the two being worked off one shaft. This is the system adopted on the six-cylinder Fiat, on the Berliet models, on the Rochet-Schneider, Lorraine-Dietrich, Mors, Sautter Harlé and others. The change appears to have been made with the object of giving greater accessibility to the valves and carbureter.









7—Darracq worm-drive rear construction

8—Rear axle on the Peugeot car

9—Rear axle on Isotta Fraschini car, rear housing and torque rod in two stampings

10—Double reduction rear axle on Lion Peugeot light car

On the smaller models produced by Charron a couple of years ago thermo-syphon circulation was employed with a belt-driven fan in the radiator. This has been abolished for all models. Another firm having made the same change is Bayard-Clement, all the touring cars now having thermo-syphon, no fan, and Renault type of bonnet. Another notable example of the abandonment of the pump is to be found on the new six-cylinder Leon-Bollee. Here the radiator remains the same, and a belt-driven fan is employed to assist the cooling. Although there are plenty of firms having followed the Renault lead in the matter of cooling, very few have made the additional change of placing the radiator back of the motor.

Evidence is not difficult to find of the growing popularity of forced feed lubrication. There are two main systems, one in which the oil is pumped from the crankcase sump to a sight feed or feeds, and then allowed to drip to the main bearings and the connecting rod ends, as on the Charron and the long-stroke Gregoire, or the increasingly popular method of delivering it to all parts under pressure. It is this latter method that has just been adopted by Renault for all 1911 models. The crankshaft is bored to allow the oil to be carried to the connecting rod ends. When this method is adopted all external oil pipes are abolished, examples being the new Sizaire and the latest type of Renault, the oil pump in each case being within the crank-chamber and the oil leads internal. Renault has even abolished the lead to the pressure indicator on the dash by placing a sight tube on the front of the motor. Easy dismounting of the pump has frequently been taken into consideration, as is shown by the removal of this organ from the rear to the front of the camshaft on the Charron models. Although within the crank chamber, provision has generally been made for dismounting the oil pump from the base by a trap in the undershield, as on the Gregoire and the F. L. In a few cases, however, the pump is external, and yet at the base of the crank chamber, as on the Sautter-Harlé six-cylinder model and the Chenard-Walcker new four. The claim made is that in such a position the pump has oil to draw upon until the last drop has been consumed, and that it is more readily examined and dismounted than when within the chamber. There appears to be a tendency, too, to supply oil under pressure to the gearbox and rear axle. This is done on the Hispana-Suiza cars and on the Charron. In this latter case the oil is delivered under pressure to the sight feed, then allowed to drip to the gearbox, from which there is a direct connection through and a constant level maintained with the rear axle. Renault, on the other hand, has preferred to provide for separate lubricating of the gearbox and rear axle by placing large and easily opened fillers on each of these organs. The gearbox filler on the side of the frame member, with a suitable lead, has been abandoned, and the same system has been taken up by Berliet, who has an oil box on the frame with leads to the universal joint, gearbox and rear axle and instructions to fill every day.

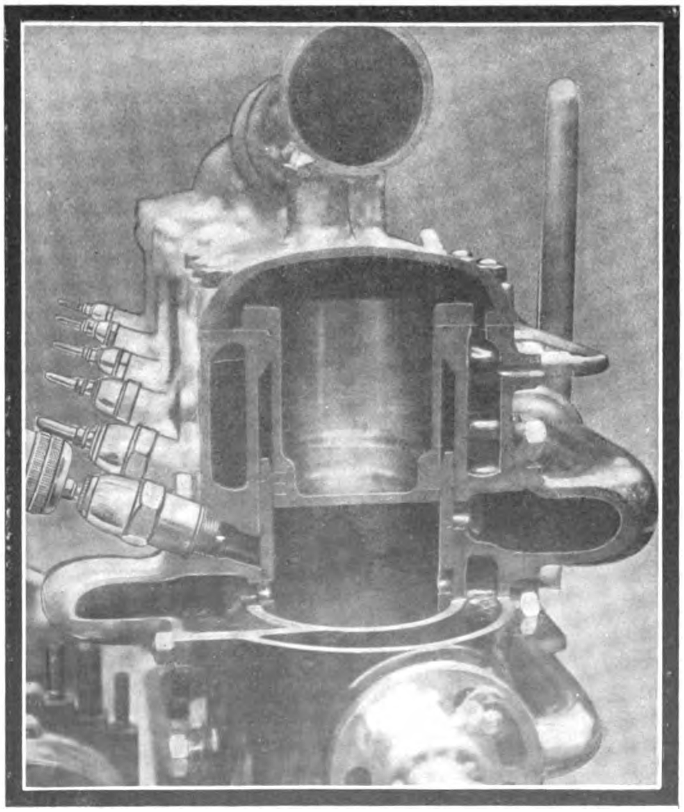


Fig. 11—Section of the Rolland Pilain sleeve-valve motor

Makers are moving rather cautiously toward the adoption of ball-bearing crankshafts. Where they have been taken up it has generally been for small motors, and with the object of gaining space. Thus, Delage has fitted a central ball bearing on his compact six-cylinder because he has not sufficient space for a plain bearing. Darracq has adopted ball bearings for the popular 80 by 120 millimeters model; Sautter-Harlé, a firm producing a small number of very high-grade cars, employs two-ball bearings and a central plain bearing for a six-cylinder motor of 75 by 150 millimeters.

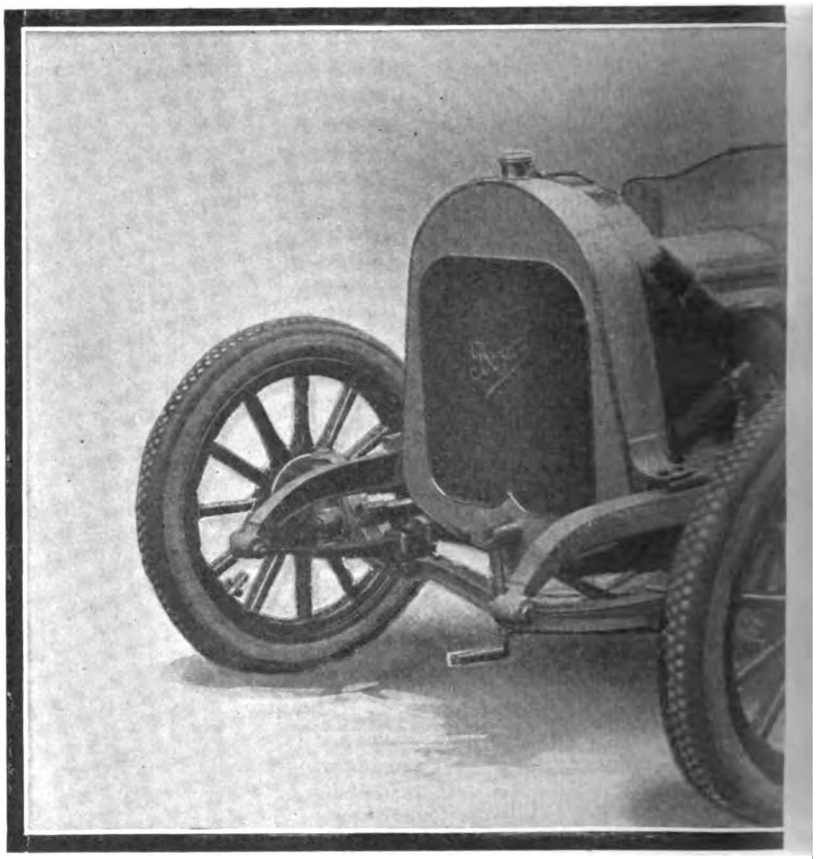
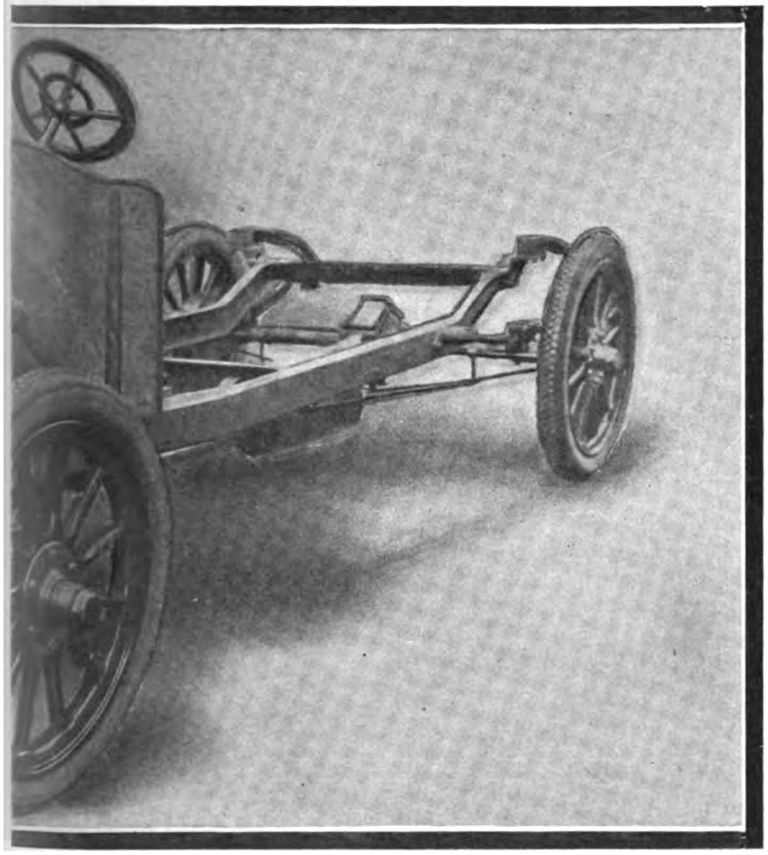


Fig. 12—Bozier four-cylinder light chassis.

Berliet has made an attempt to get away from the poppet-valve motor by adopting piston valves, there being two for each cylinder, one serving for the intake of the charge and the other for the exhaust. The model shown is a four-cylinder in one casting of 3.9 by 5.5 inches bore and stroke. The eight piston valves are connected up to a secondary crankshaft driven by spur gearing off the mainshaft. Everything is enclosed; intake and exhaust manifolds being cast with the cylinders and all water pipes being integral.

A motor on somewhat similar lines has been brought forward by Sautter-Harlé. It is a four-cylinder, two-cycle, with the lower portion of each piston acting as aspirator and compressor. For this purpose it is of greater diameter than the upper portion. The motor carries eight piston valves, connected up to an auxiliary crankshaft. The charge is aspired through an intake piston valve and on the compression stroke passes through a second piston valve into a compression chamber from which the cylinders are fed. During this stroke the intake valve has, of course, been closed to prevent the charge being driven back into the carbureter. A patented feature of this motor is that the piston valves only operate at half engine speed, whereas poppet valves when employed for two-cycle motors generally work at engine speed.

Considerable interest was shown in a slide valve motor shown by the Rolland-Pilain Company. Within the cylinder is a single sleeve fitted with three deep compression rings, and having two ports, one for the intake and the other for the exhaust. In addition to the two openings in the cylinder wall communicating with the intake and exhaust, there is a third one entering into a pocket carrying the sparking plug. The cylinder head differs considerably from that employed on the Knight motor. It is really a cylindrical shaped head descending into the body of the cylinder and of slightly less diameter than this latter.



ith encased valves and upswept frame

On the Mustad motor, instead of the concentric sleeves of the Knight, there are two semicircular sleeves, serving respectively for the intake and the exhaust, and operated independently.

The Henriot is a rotary-valve motor, an example of which is shown in a small four-cylinder monobloc.

In the Cottereau is to be found a slide valve similar in its underlying principle to the Reno.

The Knight motor was represented by Panhard, Daimler, Minerva and Mercedes, the holders of this license in France, England, Belgium and Germany. At the Panhard stand was a large scale working model with a bore of not less than 34 inches, and which never failed to attract the attention of the visitors.

The present show marks the end of the chain drive. In the treatment of rear axles there is probably more variety than in any other part of the car.

Generally on the French cars the casing of the propeller shaft fulfills the function of torque tube, and this appears to be a solution that is gaining ground. Delahaye has slightly modified his design by using two radius rods from a hanger under the frame member to the axle housing, and a torque rod from the top of the differential housing to a cross member of the frame. The pivoting joints on the rods are enclosed in a leather boot.

Outside the English section of the show, there is only one worm drive shown—it is on the Darracq six-cylinder chassis.

There is a new mechanism giving four direct drives in the Miolans. On the crown wheel are screwed three sets of spur pinions, and on the opposite face a single set of teeth. The driving pinion has a sliding movement on the extremity of its shaft, allowing it to come into engagement with any of the three sets of gears.

German Auto Trade

Teuton Is Clannish, but American Maker Has a Field There

GERMANY'S demand for self-propelled vehicles is almost entirely supplied by the home manufacturers. It is worth recording that the Germans have within the last decade wrested the home trade from the French manufacturers. There are some facts which the American who has an eye on the German territory may profit by if they are brought to his notice, facts which are at the present time to his disadvantage. At least twenty German firms producing machines which seem to satisfy the Teuton already have the trade well in hand, inasmuch as they turn out automobiles at prices that suit the people. These firms advertise liberally; and in the event of their having a large output, their selling agents carry a generous stock of accessories. There are hundreds of miles of splendid roads in the Kaiser's dominions, and particularly in the vicinity of Thuringia, where the scenery is of a character to cheer the automobilist's spirits. In spite of this, the question worth while for the American manufacturer to consider is whether the extent and trade of this section of Continental Europe is not such as to warrant him in going to the expense of introducing his machine.

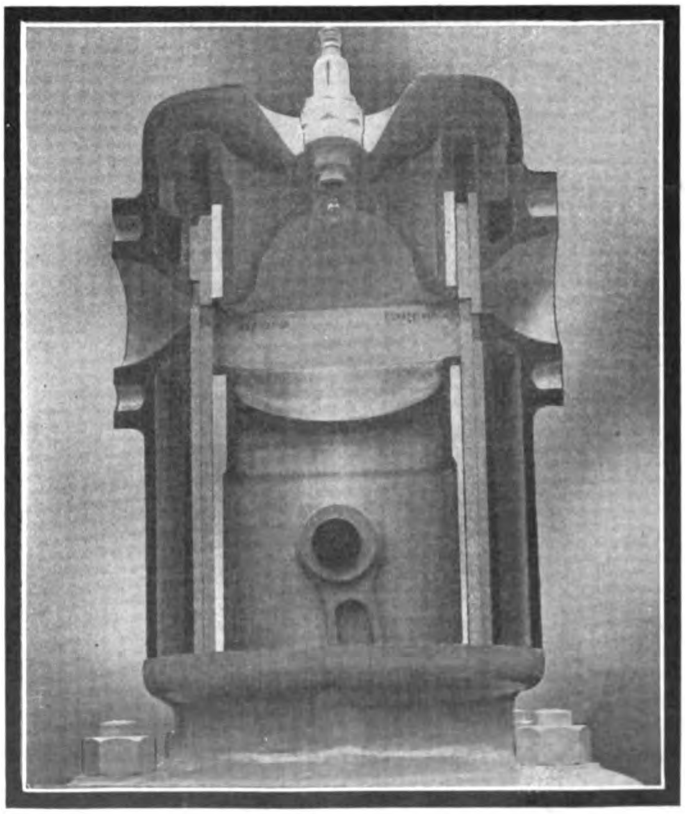


Fig. 13—Working model of the Knight-Panhard motor

Motoring in Winter

THE AUTOIST WHO CONTEMPLATES PACKING HIS CAR AWAY IN COTTON WOOL JUST NOW IS GIVEN SOME COGENT REASONS WHY HE SHOULD NOT DO SO

STIMULATED so that his blood races, skin tingles and appetite is whetted like that of a boy who has enjoyed a daybreak plunge in the ocean, the owner of an automobile who uses it 12 months in the year, particularly in the winter months, has all the advantage in the world over those who lay-up their cars at the first snow flurry.

Winter propounds no problem that cannot be answered by modern automobile construction. There is no intrinsic reason why the autoist may not ride in January as well as in June. In fact, January has a lot of favorable elements that do not exist when the beautiful greenery of the fields and woods seem to be in specially inviting mood. In the first place, a good road is no worse in winter than in summer. If it is good at all it will prove passable in the dead of winter, and very frequently the freezing of a bad road makes it much better for traffic of all kinds, particularly the travel of automobiles.

Given a clear, bracing day, with temperature well below the freezing point, a stout car and a route that passes through a picturesque country, such as the Connecticut hills, the valleys of Jersey or nearly any other favorite summer touring ground, and the result of a day's excursion will not prove disappointing.

Of course, exposure to the elements must be guarded against. No man would think of appearing on Broadway in duck trousers and a Panama in Winter time, and neither would he consider motoring dressed in the same clothes worn in summer. Let him don clothes of sufficient warmth and thickness, paying special attention to feet and legs, and hands and wrists. It is surprising how little extra clothing will be found necessary if the extremities are adequately protected.

During the ride there are a number of simple little expedients, advantage of which may be taken to promote comfort. In the first place, a sensible windshield is a requisite. The motorist who rides behind a good windshield need wear no goggles, because dust is not one of the difficulties that will be encountered in winter. If the day be snowy goggles would prove a distinct disadvantage to the man who drives. The windshield has the further advantage of breaking the force of biting breezes to passengers as well as driver.

A person who lacks actual experience on the roads in mid-Winter might make the mistake of thinking that an undue amount of tire trouble occurs, but such is not the case. In fact, the records tend to show that if anything the percentage of such mishaps is less, if due care is used to keep sufficient pressure within the tubes.

Those who ride in the tonneau will find that if the upper layer of boarding is removed from the flooring over the exhaust pipes the misery of cold feet will be obviated, and when the feet are comfortably warm the whole body is warm.

In dry, cold weather, where the roads are clear, a January ride in a good car is something to dream about. The music of the motor, the tonic of the pure, cold air, the exhilaration of motor motion are all accentuated by the season. To the office man returning to his home in the suburbs such a ride is better than anything ever devised by the learned physicians to bring a healthy appetite. To the invalid such an experience will excel in its effects the action of all the drugs in the Pharmacopeia. To the average owner of an automobile it is simply one more delightful attribute of the car. All told, those who have tried it, and their number is growing by leaps and bounds, unite in paraphrasing Sancho Panza by saying, "God bless the man who invented January—and the automobile."

Brooklands as a Testing Ground—Besides the regular meetings that take place about every two months at Brooklands Autodrome the track can be used for speed tests for manufacturers and those members of the Brooklands Automobile Club who are desirous of indulging in bursts of speed that are impossible on the road for obvious reasons.

The Cost of a Tour

BEING THE FINAL INSTALLMENT OF THE LOG OF A LEISURELY SUMMER AUTOMOBILE TRIP FROM THE JERSEYS TO THE FAR WEST AND RETURN

THE completion of the initial installment of this log of a long and leisurely automobile journey across country from New Jersey to Montana left the travelers in Chicago, where they arrived on July 1, after having been on the road for nine days. They had covered 1,122 miles, having used 154 gallons of gasoline—7 1-4 miles to the gallon. The log continues:

July 2. Scoured Chicago for information about the Western roads and for maps of the States through which we intended to travel. These helped us in the general direction but not with the roads. Left Chicago late in the afternoon. We followed a beautiful road through Elgin to Rockford, Ill. Ran into a thunderstorm later in the evening. Had more trouble with the chains. 95 miles.

July 3. Discovered that a number of the balls and part of the inside ring of the thrust bearing in one of the front hubs were smashed. Telephoned immediately to the Fiat Repair Company in Chicago, who sent a messenger to Rockford that afternoon with a new part.

July 4. Went on over a very sandy and hilly road to Clinton, Iowa. Stopped at Sterling for a little while to have lunch. Crossed the Mississippi at Lyons, going South a short way to Clinton. Some of us had never seen this river before and admired it very much. The scenery for the whole day had been very beautiful. 87 miles.

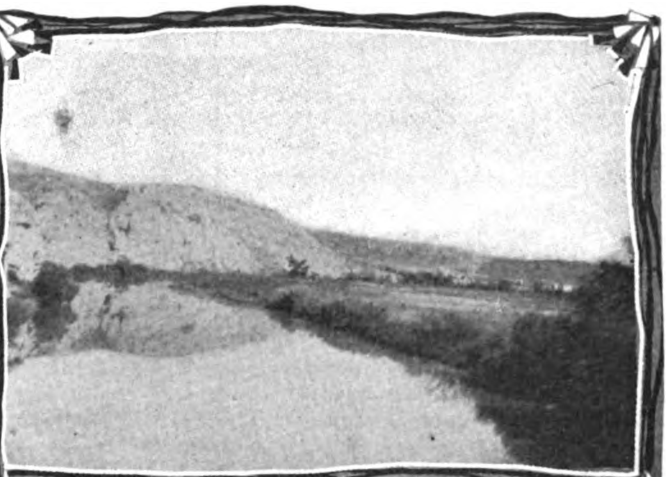
July 5 and 6. Delayed in Clinton by rain.

July 7. Finding it all but impossible to drive an automobile through the Iowa mud, we ran the machine on a freight car and went across the State by rail to Sioux City on the Missouri river, which is at that point the boundary between Iowa and South Dakota.

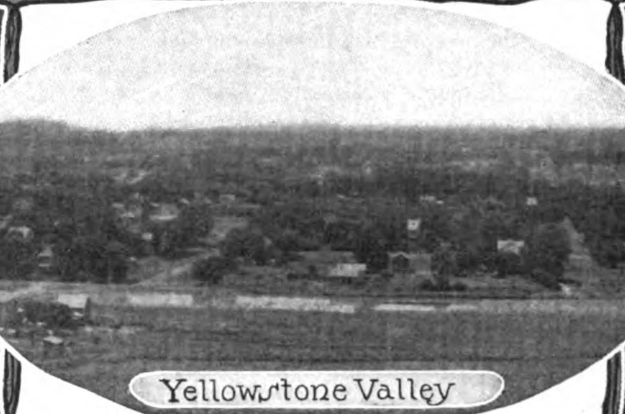
July 8 to 11. Remained in Sioux City on account of rains and floods. This town is built on the side of a rather steep hill, and by climbing this one can obtain a beautiful view of the whole place with the river in the distance.

July 12. Made a desperate attempt to get out of the flooded district. We ploughed through a continued mudhole for three or


In Camp near Yellowstone Park


Along Yellowstone River


A Great Elm on the Route


Yellowstone Valley


Rest After Lunch


Rosebud Creek

four miles, only to find all bridges and culverts washed away. It was all we could do to get back to the city and we were very much discouraged. Leaving the car and chauffeur in Sioux City, we boarded a Burlington train for Billings, Mont.

July 14. Arrived in Billings.

July 16. Two of us went back to Sioux City.

July 19. Provided ourselves with a block and tackle, 100 feet of rope, a shovel and an axe and left Sioux City in the machine. Excepting for occasional mudholes, the roads were not as bad as we expected. Time and again we would make a vain attempt to dash through a mudhole, but would get hopelessly fast in the center of it. It usually took about two hours to get out. We would jack up the rear wheels as best we could and put planks under them. Sometimes the car could get out without the help of the block and tackle, but we usually had to drive a stake in the center of the road and fasten the tackle to it. Went through Akron and Sioux Centre to Rock Rapid, Iowa, where we spent the night. Two punctures. 80 miles.

July 20. Went on through Sioux Falls to Farmers, S. D. The roads were the sauce. Were fast in the mud four times. This day we carried two-inch planks along with us to avoid hunting around for some. Once the car slipped entirely off the road into deep mud. 100 miles.

July 21. The roads were better than the last few days. Found very little mud. The only difficulty we had was in crossing a graded railroad track. Went through Mitchell and Redfield to Aberdeen, S. D., which is quite a large town. 140 miles.

July 22. The roads continued good except for an occasional mudhole. In the midst of one of these we found a small car unable to move. We helped it out, and, as we did not know the way, followed it to Mowbridge, S. D. The roads were now changing from roads to trails which were good but did not permit of fast time. In many places the grass on each side was as tall as the car. Went by way of Ipswich and Jacksonville. 105 miles.

July 23. Before leaving Mowbridge we employed the services of a native to guide us across the Cheyenne Indian Reservation which we were about to cross. Drove the car on a little boat which ferried us over the Missouri River. This day was the hardest one we had so far. There were frequent mudholes to bother us. I thought one of them would be the end of everything. It was impossible to raise the rear wheels by jacks, but we finally thought of placing a log behind the wheels and using a strong piece of wood as a lever. We went down into a brook, but the bank was so steep that the car could not ascend it by its own power. Crossed prairie and bad lands all day and were very fortunate to have the services of a guide. It was getting dark when we came to the cabin of a rancher who very kindly kept us overnight. Only a trail all the way. 92 miles.

July 24. Went on to Lemmon, S. D., for dinner and in the afternoon to a little place in North Dakota called Scranton. Had fair roads all the way except for the proverbial mudholes. These we could not escape. They delayed us for hours. The country was much the same, just prairie. One puncture. 125 miles.

July 25. Went on through Bowman, where we had breakfast. almost to Marmouth, N. D. Here a thrust bearing in the transmission was broken. So we walked into Marmouth and sent a couple of teams out after the machine. Immediately telegraphed to Chicago for a new part, which was not in stock and had to come from New York. The roads were very hilly and rough through the same kind of country. 60 miles.

July 26 to August 1. In Marmouth, N. D. New bearing arrived August 1.

August 2. Went on through Baker and Ismee to the Powder River. We followed trails wherever possible, but they were so rough and hilly that we were forced very often to abandon them and cross country. A rock sticking up in the road took the petcock off the gasoline tank, but we fortunately had a cock to hold in the gasoline. As it was dark when we came to the Powder River and we could not see to cross it, we built a fire and slept in the car. 100 miles.

August 3. Arrived safely in Miles City, Mont., where we had breakfast and fixed the gasoline tank. Went on to Forsythe, Mont. The roads were bad beyond description. They were hilly and rough and full of mudholes caused by flooded irrigating ditches. Went very slowly all the way. 80 miles.

August 4. Went on to Huntley, Mont. The country and roads were the same. One hill was so rough and steep that it was out of the question to climb it. We therefore tried to go around it. In attempting this we encountered a graded railroad track. We got on top of this but were stuck there, for the rear wheels kicked out the cinders so as to let the flywheel down on one of the rails. We were now in a bad way as a train might happen along any minute. We jacked up the wheels, putting rocks and planks and anything we could find under them, until the whole car was raised up sufficiently to clear the rail. Then the chauffeur managed to run the car off and down the other side. There were difficulties in store for us every foot of the way. 125 miles.

August 5. Made short run from Huntley to Billings, Mont. The roads were very good and the country beautiful. No trouble of any kind. 15 miles.

Freehold, N. J., to Billings, Mont., by the route we took is approximately 2,176 miles. We covered it in 20 running days; average, 108.8 miles per day.

August 6 to 22. Remained in and about Billings, taking many beautiful drives through the country. One trip took almost to Yellowstone Park. We followed the Yellowstone River through Park City to Columbus, where we had lunch. Here the river was crossed and the Stillwater River followed through Absorikee, over the most beautiful country imaginable, with snow-capped mountains on three sides. On August 19 we freighted the machine over the bad lands to Jamestown, N. D., going by train ourselves.

August 24. Left Jamestown in the rain and went over a fine road through Valley City, where we had lunch, to Fargo, N. D. During the whole day we crossed one continuous wheat field and passed many lakes. Both fields and lakes were covered with thousands of snipe and duck. Every few miles was a tremendous grain elevator. Near Fargo the road was very muddy and for 15 miles we ploughed through it on low gear. 125 miles.

August 25. Left Fargo at noon and followed a fine road through Barnesville to Fergus Falls, Minn. This whole country is a mass of small lakes. The road winds between them, giving beautiful views. One puncture. 150 miles.

August 26. Beautiful run over fine roads through Alexandria to St. Cloud, Minn. The country was much the same as on the day before. 160 miles.

August 27. Good road to Minneapolis, where we arrived in time for dinner.

August 28 and 29. In Minneapolis. Beautiful drives around lakes to St. Paul.

August 30. This part of the country is made like a checker-board by the roads which are about three miles apart. We lost our way often but could keep the general direction. Crossed the Mississippi and followed it some distance through Faribault, where we had lunch. Went on through beautiful country to Cresco, Iowa. 170 miles.

August 31. The roads were slippery on account of rain, but we went without accident through Independence and Delwein to Dubuque, Iowa. 150 miles.

September 1. Proceeded through Freeport to Rockford, Ill. The roads were very poor, full of rocks and steep hills, some of which it was all the car could do to climb on low gear. 100 miles.

September 2. Beautiful macadam road through Elgin to Chicago, where we arrived in time for lunch. One puncture. 95 miles.

September 3. Across the Kankakee swamps to Lafayette, Ind. The roads were wonderful except in this swamp. Here they were so slippery that we covered the whole distance at about five miles an hour. Blew out a tire that lasted from New York. 125 miles.

September 4. To Indianapolis in time for dinner. The road all the way was a regular race course. 75 miles.

September 5. Went on through Richmond and Dayton to Columbus, Ohio. We followed the National Road and had no trouble. 176 miles.

September 6. Still on National Road through Zanesville to Wheeling, W. Va. Road still good, but the last few miles brought up to the edge of the Allegheny Mountains. 120 miles.

September 7. Arrived in Pittsburgh in time for lunch. The roads were very hilly and covered with high water bars. On account of the small clearance of the car these gave a lot of trouble. 75 miles.

September 8. Leaving Pittsburgh in the afternoon we made a short run to Johnstown. I will not attempt to describe the hills in Pennsylvania. 79 miles.

September 9. Went on through Bedford Springs to Chambersburg. Roads same as on preceding day. 96 miles.

September 10. Through Gettysburg, where we spent an hour on the battlefield, and York to Lancaster. Roads good. 78 miles.

September 11. By way of Philadelphia and Camden to Freehold, N. J., the place of starting. 135 miles.

Jamestown, N. D., to Freehold, N. J., by our route is 1,980 miles, which distance we covered in 17 working days. Average. 116 miles per day. During the entire trip we covered 4,309 miles in 39 traveling days. Average, 110 miles per day. This mileage does not include numerous short rides taken in the West, nor the 900 miles over which the car was freighted. These would bring the total mileage up to some 5,700 miles. This, of course, is approximate.

Altogether we had about 10 punctures and blowouts. Found the pneumatic tires very satisfactory. Much of the success of the tour was due to the untiring efforts and care of the chauffeur, Louis Colauer.

EXPENSE ACCOUNT.

June	22	Baggage expressed to Chicago	$4.60
"	"	Ferry fares	1.50
"	"	Lunch in New York	5.40
"	"	Sundries	1.25
"	23	10 gal. gasoline at 20c	2.00
"	"	3 quarts oil at 25c	.75
"	"	Storage for car	1.00
"	"	Chauffeur's expenses	2.25
"	"	Lunch	3.85
"	"	Blue Book	2.75
"	"	Chauffeur's expenses	1.10
"	"	Supper	3.80
"	"	Sundries	1.20
"	24	Breakfast	3.65
"	"	Tail lamp	3.50
"	"	20 gal. gasoline	4.00
"	"	Storage	1.00
"	"	Hotel bill	18.00
"	"	Lunch	3.40
"	"	Supper	3.25
"	"	Sundries	.82
"	"	Oil	1.90
"	25	Gasoline	2.60
"	"	Storage	1.00
"	"	Oil	2.60
"	"	Chauffeur's expenses	.90
"	"	Hotel bill	11.00
"	"	Meals	11.00
"	"	Sundries	2.01
"	26	Gasoline	2.10
"	"	Oil	1.20
"	"	Garage expenses	2.50
"	"	Chauffeur's expenses	1.00
"	"	Hotel bill	14.80
"	"	Supper	5.00
"	"	Sundries	.83
"	27	Tires	41.35
"	"	Meals	6.60
"	"	Sundries	7.10
"	28	Meals	5.35
"	"	Gasoline	3.35
"	"	Oil	1.85
"	"	Storage	1.50
"	"	Washing car	1.00
"	"	Hotel bill	33.60
"	"	Sundries	3.40
"	"	Sundries	.45
"	29	Gasoline	2.34
"	"	Oil	.75
"	"	Hotel bill	15.50
"	"	Gasoline	2.95
"	"	Sundries	2.23
"	30	Oil	1.30
"	"	Storage	.75
"	"	Hotel bill	10.00
"	"	Dinner	3.25
"	"	Gasoline	1.50
"	"	Sundries	.95
July	1	Hotel bill	10.50
"	"	Garage bill	2.95
"	"	Dinner	3.00
"	"	Supper	2.30
"	"	Garage bill	3.50
"	"	Sundries	.60
"	2	Meals	11.85
"	"	Hotel bill	19.00
"	"	Garage bill	6.50
"	"	One shoe	27.80
"	"	Maps	4.00
"	"	Chauffeur's expenses	1.50
"	"	Sundries	8.35
"	3	Hotel bill	31.50
"	"	Gasoline	2.60
"	"	Tire lugs	8.00
"	"	Vulcanizing	1.10
"	"	Oil	.90
"	"	Storage	1.00
"	"	1 bearing and 1 speedometer cable	14.90
"	"	Expenses of messenger	4.50
"	"	Sundries	1.45
"	7	Freighting auto	30.00
"	"	Garage bill	1.74
"	"	Railroad tickets	58.24
"	"	Hotel bill	74.98
"	"	Sundries	7.05
"	8	Meals	8.65
"	"	Expressing baggage	17.40
"	"	Sundries	8.95
"	9	Meals	7.70
"	"	Chauffeur's expenses	2.00
"	"	Sundries	2.40
"	10	Meals	10.80
"	"	To chauffeur	10.00
"	"	Meals	6.85
"	"	Auto supplies	1.83
"	"	Sundries	3.75
"	11	Meals	9.90
"	"	Gasoline	3.00
"	"	1 pair Chains	11.00
"	"	Gasoline	1.05
"	"	Storage	1.50
"	"	Axe and shovel	2.00
"	"	Railroad fare	124.50
"	"	Hotel bill	28.00
"	"	To chauffeur	40.00
"	"	Sundries	4.30
"	12	Meals	11.15
"	"	Hotel bill	7.50
"	"	Pullman tickets	25.50
"	"	Sundries	1.55
"	13	Meals	9.75
"	"	Sundries	.75
"	14	Breakfast	2.50
"	"	Sundries	6.00
			$981.49
Aug.	18	Meals	4.15
"	19	Meals	9.55
"	"	Garage bill	14.11
"	"	Hotel bill	39.00
"	"	Railroad tickets	108.00
"	"	To chauffeur	9.00
"	"	Sundries	.85
"	20	Breakfast and sundries	3.10
"	22	Sundries	5.00
"	23	Freighting car	95.00
"	24	Garage bill	7.00
"	"	Expressing trunks	15.40
"	"	Hotel bill	45.00
"	"	Dinner	2.50
"	"	To chauffeur	9.00
"	25	Hotel and garage bills	18.75
"	"	Dinner and sundries	3.60
"	26	Hotel and garage bills	15.35
"	"	Dinner	2.50
"	27	Hotel and garage bills	8.90
"	29	Sundries	2.00
"	30	Hotel bill	82.55
"	"	Garage bill	8.55
"	"	Dinner	2.60
"	"	To chauffeur	10.00
"	"	Supper	1.50
"	31	Hotel and garage bills	10.90
"	"	Dinner and to chauffeur	5.50
Sept.	1	Hotel and garage bills	16.05
"	"	Meals	4.25
"	2	Hotel and garage bills	12.18
"	"	Supper	5.50
"	3	Meals	10.00
"	"	Hotel and garage bills	17.30
"	"	New shoe	17.70
"	4	Hotel and garage bills	11.40
"	"	Sundries	1.20
"	"	New shoe	34.70
"	"	Garage bill	2.35
"	5	Hotel and garage bills	29.00
"	6	Hotel and garage bills	18.20
"	"	Meals	6.60
"	"	Sundries	7.00
"	7	Meals	9.00
"	"	Garage bill and to chauffeur	9.25
"	8	Hotel and garage bills	14.00
"	"	Meals	6.00
"	"	Sundries	4.05
"	9	Hotel and garage bills	13.54
"	"	Meals	7.75
"	10	Hotel and garage bills	17.50
"	11	Hotel and garage bills	22.59
"	"	Dinner	4.50
			$1807.55
		Approximate expenses from July 14 to Aug. 18	1700.00
			$3507.55

In the Building of Balloons

PROFESSOR WILLIAM B. ENNIS PRESENTS TECHNICAL INFORMATION UPON AERIAL SUBJECTS FOR THE PURPOSE OF CLEARING UP SOME OF THE PROBLEMS THAT DEFY SOLUTION BY A CUT-AND-TRY METHOD—FIRST INSTALLMENT

WHILE one group of men traveled from Paris to London faster than the trip had ever before been made, and that through the air, six other men started on the world's record flight of 1,000 miles in three days over the Atlantic Ocean. These reached no destination and for the most part held to no course. Yet no one would now venture to say that within a year or two, with more adequate preparation and sounder planning, some more successful explorer—or even these same men—may not accomplish what has this time failed of success: in spite of the assertion, made not many months back, that before men would travel through the air at pleasure there must first be discovered either some new metal or some new force.

Aerial Statics

A cubical block of wood measuring 12 inches on a side floats on water because it is lighter than water; it weighs (yellow pine) 38 pounds, while the same volume of water weighs 62.4 pounds. Any substance weighing more than 62.4 pounds per cubic foot would sink in water. If our block of wood be drilled (Fig. 1) and *lead* poured in, the total size of wood and lead block being kept constantly at 1 cubic foot, the block will sink as soon as its total weight exceeds 62.4 pounds. Ignoring the wood removed by boring (as compared with the lead which replaces it, an insignificant amount), the weight of lead plugged in may reach 62.4 — 38 = 24.4 pounds before the block will sink. This figure, 24.4 pounds, then represents the *maximum buoyant power* of a cubic foot of *wood in water*. If any weight *less* than this is added to that of the wood, the block will float, projecting above the water surface more or less, according to the amount of weight buoyed up (Fig. 2). It will not rise entirely from the water because to do this it would need to be *lighter*, not only than water, but *than air*.

Buoyancy in Air.—There are *gases* lighter than air, among the best known being coal gas and hydrogen. A bubble of any of these gases if isolated from surrounding air cannot sink, but must rise. At equal pressure and temperature hydrogen is fourteen and one-half times lighter than air. If a bubble of hydrogen be liberated in the atmosphere it must continually rise just as wood immersed in water would rise when set free. But the wood will stop when it reaches the surface of the water, while there is no sufficient reason to suppose that the gas bubble will stop. The hydrogen bubble can be made to remain stationary in equilibrium if it be weighted down with something of thirteen and one-half times its own weight (Fig. 3). (Strictly speaking, it will still rise slowly because that additional something would itself displace some additional air; but if the added weight is a solid body its own buoyancy in air is practically negligible.) We then have our first principle: At the same pressure and temperature, a confined volume of hydrogen has a maximum lifting power in air of thirteen and one-half times its own weight, the substance considered to be lifted including the containing vessel for the hydrogen itself.

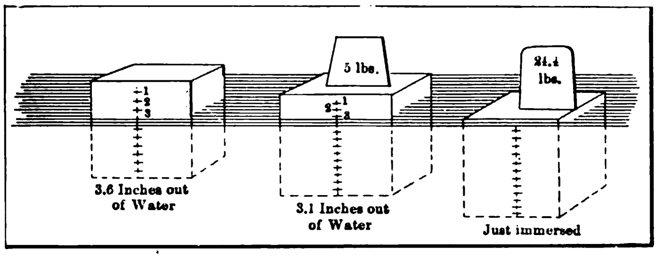


Fig. 2—Illustrating the relating buoyancy of bodies

Variations in Buoyancy.—The two fundamental equations

$$P_hV_h = R_hT_h;\quad P_aV_a = R_aT_a;$$

in which P = pressure in pounds per square inch, measured above a perfect vacuum.

V = volume of one pound of gas in cubic feet,

T = Fahrenheit temperature + 460,

R = a constant, having the value 5.347 for hydrogen and 0.3706 for air, and the subscripts *h* and *a* refer respectively to hydrogen and air; enable us to determine the relative densities (weights per cubic foot $= \frac{1}{V}$), and consequently the buoyant power, of the hydrogen when it and the air are at different pressures and temperatures; for we have, D standing for the weight of a cubic foot in pounds,

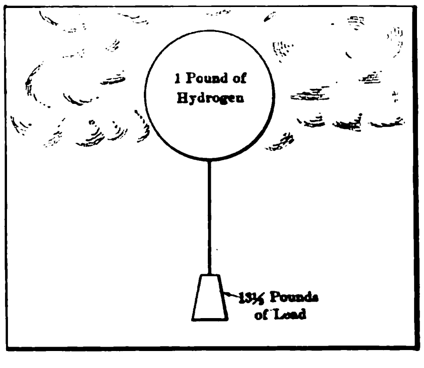


Fig. 3—Indicating the lifting power of hydrogen in air

$$D_h = \frac{P_h}{5.347\ T_h} \text{ and } D_a = \frac{P_a}{0.3706\ T_a} \qquad \text{(Equations A)},$$

$$\text{and} \quad P_h = 5.347\ T_hD_h,\quad P_a = 0.3706\ T_aD_a \qquad \text{(Equations B)}.$$

Thus, let a gas bag or envelope, at sea level, where the atmospheric pressure is 14.7 pounds per square inch and the air temperature at the moment is 32° F., be filled with hydrogen at a gauge pressure of 2 pounds per square inch and a temperature of 60° F. Then,

$$P_h = 14.7 + 2.0 = 16.7 \qquad T_h = 60 + 460 = 520$$
$$P_a = 14.7 \qquad T_a = 32 + 460 = 492,$$

and

$$D_h = 16.7 \div (5.347 \times 520) = 0.00604,$$
$$D_a = 14.7 \div (0.3706 \times 492) = 0.0806;$$

So that the lifting power of each cubic foot of hydrogen under these conditions is

$$0.0806 - 0.00604 = 0.07456 \text{ pounds.}$$

If the gas bag, car, etc., weigh 2,000 pounds, we must have

$$2{,}000 \div 0.07456 = \text{about } 26{,}820 \text{ cubic feet of hydrogen.}$$

Altitude, Pressure and Temperature.—The pressure of gas in the balloon is usually kept down (especially at starting) to a very small fraction of a pound. Its temperature may be about the same as that of the air. The balloon is always provided with excess of lifting power above its load when completely manned. This excess buoyant power must be counteracted while the bag is in the hangar by the use of extra ballast or holding-down ropes (Fig. 4). When liberated from these the great gas bag at once flies aloft. To bring it to equilibrium on an even keel somewhere in the air there must be a readjustment of pressures and temperatures. The normal pressure of the atmosphere *decreases about 1 pound, for each 2,000 feet of ascent**; its weight per cubic foot, assuming the temperature to remain constant, is accordingly decreased about $\frac{1}{14.7} = \frac{2}{29}$ for this amount of ascent; but this decrease is somewhat offset because of the fact that the temperature of the air decreases as we ascend. For moderate elevations, however, the temperature does not change greatly. This decreased density of the air with elevation attained tends, of course, to decrease the buoyant power of the balloon.

Meanwhile, the reduced external pressure has permitted the gas bag to expand somewhat, as a result of which the pressure of the hydrogen falls, its weight per cubic foot of space occupied slightly decreases and (which is most important) the strain on the gas bag, on account of the now greater difference between internal and external pressure, has decidedly increased. Further, the sun shining on the heat-absorbent material of the gas bag may increase the temperature of its contents above that of the surrounding non-absorbent atmosphere, again increasing the gas pressure, while possibly decreasing the weight per cubic foot of space occupied and thus tending to increase the buoyant power. Will this tendency suffice to offset the change in density of the air? Here, in a word, is the whole problem of what may be called BALLOON REGULATION. Air has no *surface*, like water, limiting the upward rise of the gas bubble. We must find a means of controlling our vertical position irrespective of pressure and temperature conditions.

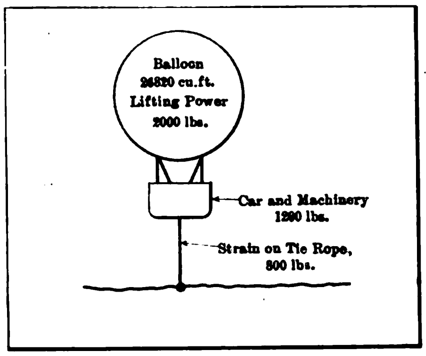


Fig. 4—Depicting the strain on tie rope under given conditions

Illustration.—Suppose under the pressure and temperature conditions previously considered a margin of lifting power for ascent is obtained by keeping the total load on our 26,820-cubic foot balloon down to 1,900 pounds instead of the 2,000 pounds which it is just able to support, and suppose it to be desired that we maintain an elevation of 1,000 feet with air at 20° F., gas at 70° F. At the required elevation,

$$P_a = 14.7 - 0.5 = 14.2,\quad T_a = 20 + 460 = 480,$$
$$T_h = 70 + 460 = 530.$$

Let us assume in advance that the decreased external pressure, coupled with any change which may take place in internal pressure, will expand the gas bag and its contents by 1 per cent., so that

$$D_h = 0.00604 \div 1.01 = 0.00598,$$

while from Equation A

$$D_a = 0.3706 \times 480 \times 14.2 = 0.0798.$$

The buoyant power per cubic foot of gas is now

$$0.0798 - 0.00598 = 0.07382 \text{ pound;}$$

or for the whole balloon,

$$26{,}820 \times 1.01 \times 0.07382 = 1{,}990 \text{ pounds.}$$

Since the load is only 1,900 pounds, we still have a surplus of lifting power, and the balloon will continue to ascend. It will rise until the buoyant power per cubic foot of gas becomes (assuming no further stretching of the bag to take place)

$$1{,}900 \div (26{,}820 \times 1.01) = 0.0701 \text{ pounds;}$$

And if we assume (merely for the purpose in hand and not in accordance with the necessary facts) bag expansion and atmospheric temperature to be the same for all altitudes, the rising will continue until the weight of a cubic foot of air becomes

$$0.0701 + 0.00598 = 0.07608 \text{ pound}$$

at a pressure of (Equation B)

$$0.07608 \times 0.3706 \times 480 = 13.6 \text{ pounds per square inch,}$$

when the altitude is

$$2{,}000\ (14.7 - 13.6) = 2{,}200 \text{ feet.}$$

The pressure in the gas bag is now, from Equation B,

$$5.347 \times 530 \times 0.00598 = 16.9 \text{ pounds per square inch.}$$

The net bursting pressure (difference between internal and external pressures) is 16.9 — 13.6 = 3.3 pounds, whereas at starting it was only 2 pounds. The *stress on a linear inch of fabric* (in a cylindrical balloon) is obtained by *multiplying this net pressure by half the diameter in inches*. Suppose the balloon to be 20 feet in diameter. The stress on each inch of fabric, tending to split it longitudinally, is $2 \times \frac{240}{2} = 240$ pounds at sea level and $3.3 \times \frac{240}{2} = 396$ pounds at our 2,200-foot elevation. No such stresses are actually attained in fabricated envelopes, as the pressures are kept low; but the variations in stress with altitude are serious, and with such fabrics as are now available a stress even as low as 40 pounds per linear inch (with the diameter in our illustration, equivalent to a pressure of $40 \div \frac{240}{2} = \frac{1}{3}$ pound per square inch) would leave little margin of safety.

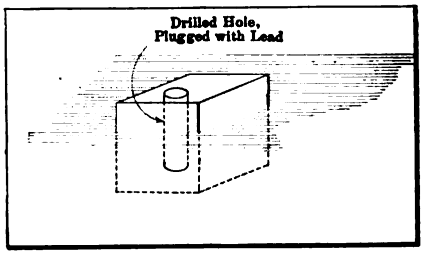


Fig. 1—Presenting a problem in buoyancy, indicating effect of loading a buoyant body

Methods for Altitude Control

First Method: By Venting Gas.—Our balloon is now in equilibrium at an altitude of 2,200 feet, although in order that we may encounter more favorable wind conditions we prefer a 1,000-foot elevation. In addition, it is dangerously stressed. In some way we must quickly bring about a new equilibrium condition. The only way at once apparent is to allow some of the gas to escape. We wish the buoyant power to be exactly 1,900 pounds at a 1,000-foot elevation. To compute the amount of gas to be allowed to escape in order to accomplish our pur-

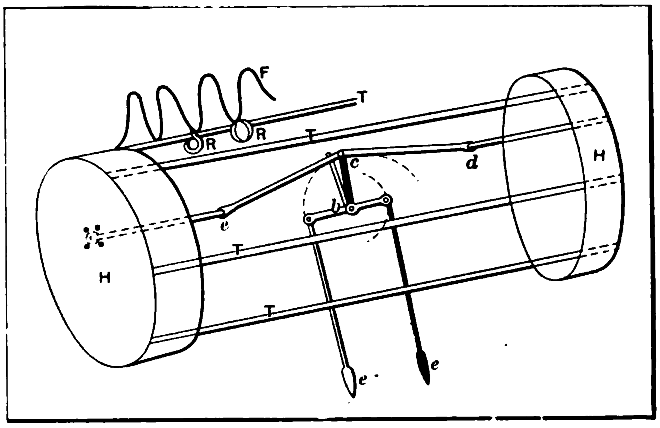


Fig. 5—Scheme for varying the density of the gas bag by changing the volume within

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*This rough figure has been used for simplicity in the balance of the calculations. More accurately, the relation of altitude to pressure is about as follows:

Altitude in miles	Atmospheric pressure pounds per square inch
0	14.7
¼	14.02
½	13.33
¾	12.66
1	12.02
1¼	11.42
1½	10.88
2	9.80

pose involves some difficulties, but that the operation is practicable may readily be shown. The weight of gas in the bag, based on our sea-level density and volume, is

$$26{,}820 \times 0.00604 = 162 \text{ pounds.}$$

Let the escape valve be opened, while at an altitude of 2,200 feet, so that 5 pounds of gas may escape, the gas bag partially collapsing in consequence. Suppose the elasticity of the bag to be such that the gas pressure now becomes 16.7 pounds per square inch. Equation A gives

$$D_h = P_h \div 5.347\ T_h = 16.7 \div (5.347 \times 530) = 0.00589,$$

and the volume of the partially collapsed bag is now

$$157 \div 0.00589 = 26{,}740 \text{ cubic feet.}$$

The necessary buoyant power being $1{,}900 \div 26{,}740 = 0.07105$ pounds per cubic foot, the external air must weigh $0.07105 + 0.00589 = 0.07694$ pounds per cubic foot, and Equation B gives

$$P_a = 0.3706 \times 0.07694 \times 480 = 13.64 \text{ pounds per square inch,}$$

corresponding to an altitude of

$$2{,}000\ (14.7 - 13.64) = 2{,}120 \text{ feet.}$$

We have descended 80 feet and have reduced the net pressure on the bag to 3.06 pounds per square inch, but at the cost of 3 per cent. of our gas. By letting out more gas we may descend further. The method seems adequate; but what are we to do if we should wish to rise again? We are wastefully throwing away the life blood of the balloon, its gas; and this in spite of the fact that there is a constant dangerous leakage through the fabric itself which is alone sufficient to bring about disaster and which we should counteract rather than encourage.

Three Chimerical Methods.—A writer of romance has equipped his aeronautic heroes with a complete gas generating plant so that all losses might be made up. This plan need scarcely be considered here; the supplementary device of heating the contents of the bag in order to dilate the latter and consequently decrease the value of D_h is more interesting, and would be practicable if a sufficiently elastic bag of proper strength could be obtained. At present the fabrics necessarily employed to secure strength are not very elastic, in spite of their lightness, so that this method of varying the density of the gas seems impracticable. Another method which has been contemplated is shown crudely in Fig. 5. The stiff dished heads H, H, say of aluminum, are connected by a fabric shown in part at F, which is attached to rings R, R, free to slide on telescopic rods T, T, T, T. The fabric then corresponds with the expansible part of a bellows. By means of the leverage a b c d e, actuated from outside the car, the ends may be caused to approach or recede, the fabric folds being correspondingly flattened up or straightened out, and the volume of gas decreasing or increasing, so that if its weight be kept constant, the density will vary inversely, and the altitude directly, as the distance between the two movable heads. The objections to the plan are obvious.

Don'ts for the Autoist

GENERAL INJUNCTIONS TO THE WISE—AND THE OTHERWISE —NOT ALONE AMONG THE AUTOMOBILE FOLK, BUT IN OTHER WALKS OF LIFE AS WELL

Don't forget that the foundation of success is deep down in the strata of concentration.

Don't trade off the power to fix the mind upon some one thing for a mess of pottage in the form of scattered thoughts.

Don't fight with your neighbors when the pugnacious desire comes on; go after yourself; ply the gloves valiantly; let yourself know that you will stand very little nonsense.

Don't allow your vividity of mind to settle upon your stomach and prey upon your telegraph system; place all excesses of vividity in cold-storage, lock the door and throw the key away.

Don't risk having the truth come to you in a violent form, as it will if you do not study moderation of thought.

Don't achieve blasé notoriety, nor allow the mind to petrify.

Don't drift along or float; flap your fins; churn up the seas of activity, have a wake, but trace it over a straight course in deep water.

Don't go on fudging up your future; have a real object in life; be prudent, but be active.

Don't be a drifting derelict; swim!

Don't allow the world to write your epitaph in lying charity; compel the general tongue to articulate.

Don't ever get the idea that you must have a flying start to get anywhere; the greatest enemy to sound progress lies in a friendly push; he who pushes must have pay.

Don't court the clock, caress the thermometer, or allow visions of beauty to lull you to sleep; sting the mind if it refuses to obey the dictates of industrious concentration—make it unconscious of the buzz of the house-fly, not by sleep, but by a determined effort along fixed lines.

Don't dream beautiful sonatas; they are heavier-than-air bodies, and, unfortunately, they lack motive power sufficient to get you anywhere.

Don't let time get away from you, nor forget that it goes on ceaselessly; if you desire to keep up, imitate time.

Don't forget that he who makes the giants, strangles them.

Don't awaken from a period of inactivity and omit to say, "I have been ill—I am better now!" and straightaway engage the mind in serious wrestle with some likely problem.

Don't forget that the ordinary pretext of those who make most of the misery of others is that they wish them good.

Don't forget that rogues are communicative; their thoughts are of no use to themselves; the chance of gain lies in having someone add the pollen.

Don't plunge back into the crowd once the feet have disentangled you from the maze of the commonplace.

Don't, oh modest hypocrite, peddle wares in the market-place of stalking intelligence.

Don't be the soundless tenor in the choir of real voices.

Don't dart forward when some wag calls out for a fool.

Don't tackle a job unless fraught with determination.

Don't be a pointless commonplace; better be a bland surprise.

Don't forget that they who lag late on the road may want money for supper.

Don't be an ill omen; color the worst thought; make it vie with the spectre of the brightest rainbow.

Don't console yourself with the thought that a live dog is better than a dead lion; it is the lion who lives on forever.

Don't overlook the fact that the devil himself would not support an attorney with a bad brief.

Don't write "private" and "confidential" across the paper that discloses a secret; burn it.

Don't forget that the tool is broken after it serves in a poor cause; dodge the part of tool; let a fool play it.

Don't be mild, indolent, irresolute; some calling such crimes by the kindly appellation, "meditation."

Don't forget to baffle the ingenious swindler; all that he wants is your money—lock it up.

Don't gather the notion that you are a slave because you are made to work; why do you wait for someone to tie a stick of dynamite to your tail?

Don't obey the impulse: rather keep company with reflection.

Operation and Care

HANDY TRAVELING HOIST; QUESTIONS THAT ARISE; PRACTICAL REPAIRING; LINING UP WHEELS; LETTERS; CANTOR LECTURES; DON'TS; LUBRICATION PROBLEMS

THIS is the season of the year when the average automobilist considers the laying up of his car, due, perhaps, to his lack of appreciation of the fact that the automobile does not labor under any of the disadvantages of the horse. True, the automobile has its own peculiar failings, but they, such as they are, will bend to intelligent treatment, and it should be the business of the user to find out what they are and apply the right treatment in every instance. Take, for illustration, the question of the freezing of the cooling water. There is no occasion for risking it; water will freeze at 32 degrees Fahrenheit; do not use this cooling solution. The best plan is to mix with the water such a quantity of denatured alcohol, or other efficacious compounds, as will prevent the solidifying of the solution, but care must be exercised not to use substances that are not suitable in view of the several conditions. It was only the other day that an automobilist of much discrimination put corn-meal into the radiator, and he is now trying to discover some way of getting corn bread out of the cooling system. THE AUTOMOBILE, however, much as it has tried to help automobilists along the pathway of roses and pleasant dreams, 'fesses that it labored under the impression that everyone knows how to make bread; but this particular automobilist, even in a dire extremity, might have consulted his wife about this particular matter.

The great question is to remember that an automobile will run in cold weather even better than it will go during Summer's heat, and it is during the inclemency of Winter-time that the greatest good should be experienced. There is nothing to fear from the cooling question; just use a suitable mixture; the ingredients have been exploited repeatedly in THE AUTOMOBILE, but if there are some of the readers who may have failed to grasp the situation, it will be easy for them to purchase a quantity of denatured alcohol, and to each gallon of water used in the system add three pints of the alcohol—the freezing temperature will then be about five degrees Fahrenheit above zero.

Perhaps there is another angle to this question; most automobilists seem to labor under the impression that "technical" literature, so-called, is not for them. It would come as a great surprise were they to be told that there is no literature that is worth reading if it is so mysterious that it fails to convey the intended impression, and the class of technical literature, so-called, that cannot be even looked at is like the *news* in the paper which, not so long ago, made the editorial announcement that it was a newspaper; the editor of this *novelty* was the only person who was conscious of the news value referred to.

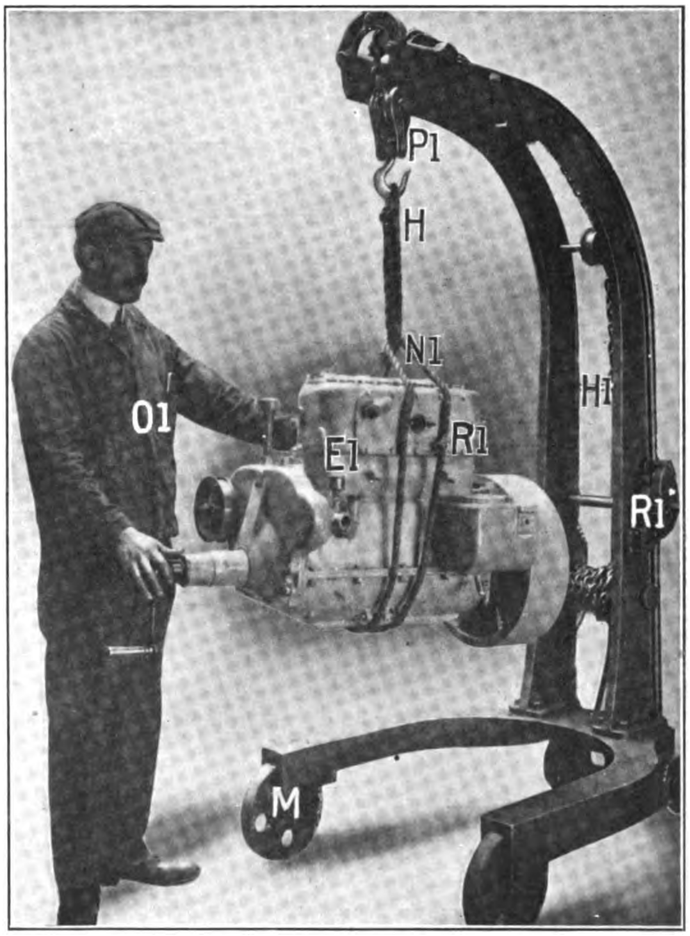
Traveling Hoist

Showing a White Motor Ready to be Fitted in Chassis After Overhauling

NO garage or repair shop can claim to be completely equipped unless it possesses a traveling hoist. It is surprising the multifarious duties such a shop adjunct can be made to perform, from lifting out a motor to raising the chassis to insert grease or oil between the leaves of the springs. With this convenience installed, there is no necessity to call several men off their jobs to come over and lend a hand at this or that, and it is not an unknown occurrence that a part has been damaged through an unlucky fall or a man has had his fingers badly pinched and been compelled to remain in that position till more men could be summoned to release him. The part to be lifted is bound around with the rope R1, forming a loop knot N1 just above and suspended from the hook H1. A crank is attached to the ratchet R1 and wound up or down as may be required. In this case a motor in the White Company's New York garage had undergone a complete overhauling in the repair shop and was carried thence to the chassis in the main assembly room in such a state that it only required bolting *in situ*. This saves a lot of valuable space in any repair shop, doing away with the congestion that occurs through lack of the means of transporting heavy parts.

Pressure-fed Gasoline.—In order to obviate the ridiculous operation of pumping up pressure for several minutes before starting by sending air into the gasoline tank, in the case of cars thus fitted, this pumping can be avoided and the following may be of service to those autoists who have pressure feed supply:

Start the car with the gasoline contained in the float chamber; there is usually enough to give a few explosions. Then run to the back of the car and block up with the sole of the shoe the exhaust pipe outlet, and the pressure having only one outlet left, viz., through the relief valve in the pressure circuit, the pressure in the gasoline tank will rise quickly. It will not be necessary to stop up the hole long and there is no likelihood of burning the shoes. This method of obtaining pressure can be resorted to in case the pressure pump gets out of order.



A most useful tool for garage work generally. It can be used in multifarious ways

Questions That Arise

SOME OF THOSE THAT COME UP IN EVERY-DAY AUTOMOBILING ARE ANSWERED BY THE MATTER WHICH IS BEING PREPARED BY FORREST R. JONES IN THE NEW EDITION OF THE "AUTOMOBILE CATECHISM" THAT WILL SOON GO TO PRESS

[314]—What precautions should be used in charging the acetylene gas generator?

It should not be filled more than two-thirds full. When lump carbide is used it expands as the chemical change produced by dropping water on it takes place.

[315]—How can the burner tips of an acetylene gas burner be cleaned sometimes?

By picking the carbon deposit out of the orifices with a small pointed instrument such as a sewing needle. If the deposit is too hard to be picked out in this manner a small drill can be used. The tips should not be treated roughly since they are brittle and weak.

[316]—Give the events that occur in a two-stroke cycle (usually called two-cycle) engine in the order of their occurrence.

As a convenient method for a beginning, it will be assumed that there is a compressed charge in the combustion chamber, and the piston in its position nearest the combustion chamber. When a charge is fired the piston is driven out on the impulse stroke by the pressure caused by the combustion until the stroke has been nearly completed. A number of small port holes arranged circumferentially around the cylinder walls and previously covered by the piston are then uncovered by its motion. The gases in the cylinder still being under considerable pressure rush out through these openings which form the exhaust port. Still further motion of the piston on the impulse stroke uncovers another row of port holes circumferentially arranged, which connect with the crank chamber. When the piston starts on the impulse stroke the crank chamber is filled with a combustible mixture at about atmospheric pressure. The impulse stroke compresses this mixture so that when the inlet ports—just referred to as being uncovered by the piston—are open a charge passes from the crank chamber to the cylinder and combustion chamber. The next stroke (up-stroke in a vertical engine, in-stroke in a horizontal engine) of the piston closes first the inlet port, then the exhaust port, and finally compresses the charge in the cylinder. On the compression stroke, mixture is drawn into the crank chamber. This completes all the operations related to the cycle. As the name indicates, the complete cycle occurs in the two strokes of piston corresponding to one revolution of the crankshaft.

[317]—Does the gasoline engine main shaft reverse its direction of rotation when the car changes from forward to backward motion?

No. The change-speed and reverse gears provide for this.

[318]—Will a four-stroke cycle engine run its main shaft in either direction?

No. Except in very unusual designs.

[319]—Can a two-cycle engine be run in either direction?

Yes. By moving the timer to ignite properly, it will run equally well in either direction of rotation—clockwise or counter clockwise. This applies especially to one which has no mechanically operated valve, such as the valve in the crankcase.

[320]—How are the cylinders placed in a two-cylinder opposed engine?

On opposite sides of the crankshaft.

[321]—How do the pistons move in a two-cylinder opposed (horizontal) engine?

They move toward each other during one-half revolution of the crank and both recede during the remaining half-revolution.

[322]—How is compression produced in the crank chamber of a two-cylinder opposed engine?

By the motion of the pistons toward each other.

[323]—How do the pistons move in relation to each other in a four-cylinder vertical engine of the four-stroke cycle type?

The front and rear pistons move upward together at the same time that the intermediate ones move down together. This is the usual construction.

[324]—In what order are the successive charges exploded in a four-cylinder four-stroke vertical engine whose pistons move as just described?

Starting with the front cylinder they come in the following order: (1) Front cylinder; (2) one of the intermediate cylinders; (3) rear cylinder; (4) remaining intermediate cylinder.

[325]—Where is the gasoline tank placed in relation to the carbureter?

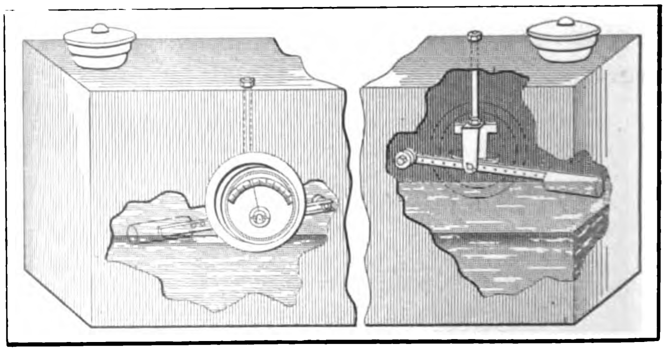
Either high enough above it for the gasoline to flow by gravity into the carbureter, or it is placed below the level of the carbureter.

[326]—What precaution should be taken for allowing free flow of gasoline from the tank in the gravity system?

There should be a small opening (vent) in the top of the tank. It is usually in the plug; 1-32 inch diameter is sufficient. It is advisable to have the metal raised in a hump or knob where the vent hole is made. This will prevent stoppage by collected dirt.

French Gasoline Gauge for Fuel Tanks

A gasoline gauge has been devised by the use of which perforation of the side wall of the gasoline reservoir is entirely avoided, thereby eliminating the possibility of leakage and forestalling accidental fire losses. From the top of the tank and contiguously to one of its walls there is suspended a magnet bar, to one end of which a float is attached. The magnet turns around its central point of suspension as the float goes up or down with the level of the gasoline. A cup-shaped dial is soldered to the outside of the same wall of the tank and a thin bar of steel—also magnetized, says the account—is mounted under it so as to turn freely around a point exactly corresponding to the pivot of the interior magnet, whose movements it will closely follow, and a band attached to the exterior magnet points at an index scale, telling the exact quantity of fuel in the tank. Automobilists who pass in and out of Paris are required to have their supply of gasoline measured at the excise district boundary—the *banlieue*—and the gauge facilitates the work of the excise officers, particularly as the moving parts may be readily sealed and prevented from acting.—*La Pratique.*



Gauge devised to enable French excise officers to quickly ascertain quantity of gasoline in an automobile tank

Communication in Relation to Formula

In relation to the A. L. A. M. formula for estimating the horsepower of a 4-cycle internal combustion motor, as discussed on page 879 of The Automobile, November 24, it would seem that for reasons that should be well understood this formula fails of its purpose, as it is hopelessly inaccurate in comparing motors whose strokes differ widely. The reason for this failure lies in the fact that the A. L. A. M. rating is based upon a piston speed of 1,000 feet per minute and therefore upon the fallacy that the number of revolutions per minute varies in the inverse ratio to the stroke.

In Europe almost all the 1911 models have ratios of stroke to bore varying from 1 1-2 to 1 up to 2 to 1.

PRINCIPAL DIMENSIONS OF LONG-STROKE FOREIGN MOTORS

	Millimeters		Millimeters		Inches		Inches
Mercedes	70	by	120	or	2.75	by	4.72
Mercedes	80	by	130	or	3.14	by	5.11
Mercedes	90	by	140	or	3.54	by	5.51
Mercedes	100	by	130	or	3.93	by	5.11
Wolseley	90	by	130	or	3.54	by	5.11
Peugeot	70	by	130	or	2.75	by	5.11
Panhard	90	by	130	or	3.54	by	5.11
Panhard	100	by	140	or	3.93	by	5.51
Napier	82	by	127	or	3.22	by	5.00
Mors	75	by	120	or	2.95	by	4.72
Metallurgique	90	by	140	or	3.54	by	5.51
Metallurgique	101	by	150	or	3.97	by	5.90
Le Gui	75	by	150	or	2.95	by	5.90
La Buire	75	by	130	or	2.95	by	5.11
Germain	106	by	180	or	4.17	by	7.08
Germain	80	by	130	or	3.14	by	5.11
Fiat	80	by	130	or	3.14	by	5.11
De Dion	90	by	150	or	3.54	by	5.90
De Dion	75	by	130	or	2.95	by	5.11
Deasy	80	by	130	or	3.15	by	5.11
Darracq	75	by	120	or	2.95	by	4.72
Darracq	80	by	120	or	3.14	by	4.72
Darracq	100	by	140	or	3.93	by	5.51
Daimler	69	by	114	or	2.71	by	4.48
Daimler	80	by	130	or	3.14	by	5.11
Daimler	101	by	130	or	3.97	by	5.11
Calthorpe	75	by	150	or	2.95	by	5.90
Calthorpe	90	by	150	or	3.54	by	5.90
Brasier	70	by	120	or	2.75	by	4.72
Brasier	80	by	130	or	3.14	by	5.11
Brasier	90	by	140	or	3.54	by	5.51
Argyll	72	by	120	or	2.83	by	4.72
Argyll	90	by	140	or	3.54	by	5.51

This list is sufficiently comprehensive to indicate the tendency to long-stroke motors. That long-stroke motors can be built to turn fast is clearly demonstrated by the results of the Coupe des Voiturettes. It is calculated that many of the motors in that event had a piston speed of 3,000 feet per minute.

An examination of the table will be sufficient to convince anyone of the prominence that is being given long-stroke motors, and taking as a typical example the Gregoire with a bore and stroke of 80 x 160 millimeters (3.14 x 6.28 in.), by the use of large valves, light reciprocating parts, etc., these motors give from 50 to 100 per cent. more power than the A. L. A. M. formula would denote.

In my opinion a formula that is infinitely more accurate than the A. L. A. M. rating is $\frac{D^2SN}{12}$, in which D = bore, S = stroke, N = number of cylinders, 12 = a constant arrived at by considering 1,000 as the number of revolutions per minute. If the dimensions are in millimeters the formula reads, $\frac{D^2SN}{200{,}000}$.

According to this formula the horsepower of the Gregoire motor above mentioned would be 20 1-2 at 1,000 r.p.m. or 30 3-4 at 1,500 r.p.m., while according to the A. L. A. M. rating the horsepower would be somewhat less than 16.

For four-cylinder motors my formula is simply $\frac{D^2S}{3}$, and for six cylinders $\frac{D^2S}{2}$, while the A. L. A. M. rating is $\frac{D^2}{.625}$ and $\frac{D^2}{.4166+}$. As whole numbers are more easily dealt with by the average man than fractions I think that my formula also scores on the count of simplicity.

A Reader.

Graphite Paint.—Graphite mixed with pure, boiled linseed oil in which a small percentage of litharge, redlead, manganese or other metallic salt has been added at the time of boiling to aid in the oxidation of the oil, forms a most effective paint for metallic surfaces as well as for wood.

Practical Repairing

DEFINING THE PROCESS OF REPAIRING ALUMINUM CASTINGS BY THE OXY-ACETYLENE FLAME, ILLUSTRATING THE STAGES OF THE WORK STEP BY STEP

The principle of the working of the oxy-acetylene flame was dealt with in last week's issue in so far as the equipment itself goes and its adaptation to cast-iron welding, and it may be stated that there is a great similitude between the processes as applied to all metals, the main difference being the handling of the metal by the operator. Until quite recently aluminum defied the repairman, and, although some solders were claimed to join aluminum parts that had been broken, yet its utility rested in filling cracks and holes on which there was no strain and where there was no attempt to approximate the strength of the metal. The difficulty to be overcome with soldering aluminum is the electrolytic action set up by the small amount of oxide which it contains and the attending difficulty in coating the surfaces without having an intervening layer.

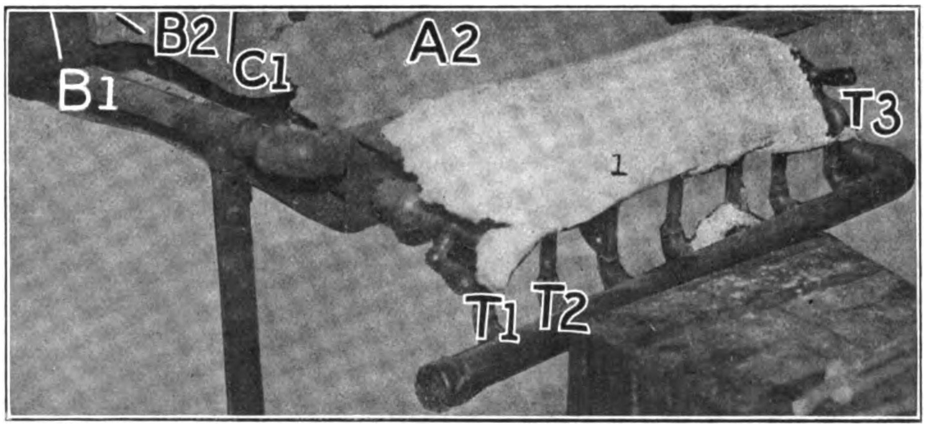


Fig. 1—View of gas burner heater over which the job is placed

This difficulty can be overcome with the acetylene flame, as when the surface of the aluminum is reduced to a molten state the fusion that takes place has a coating of oxide, and this can be broken up by puddling with a steel tool, allowing the metal to run together, thus producing a weld that is to all intents and purposes a recasting. In the process here described there is no flux of any description used.

Fig. 2 represents the part over the fire with the charcoal F1 and the steel bar S1 in place. The cracks C1 and C2 are easily noticeable, also the parts that have already been repaired, R1 and R2.

The first operation (see Fig. 3) after the parts have been heated in the manner above described is to cut a V-shape slot W1 with a chisel C1 so as to allow the operator better access to the crack and start the melting from the base upward and so build in a new part on clean material. The heat from the flame is diverted from the operator by means of asbestos strips A1. For reasons above stated, to counteract the sudden contraction of the metal after the intense flame is withdrawn, a second operator O2, as shown in Fig. 4, heats the opposite side of the job with an ordinary gas blower B1, directing the flame F2 on the work C1. The operator O1 will be seen using a steel rod P1 to puddle the metal into shape while melting the part to be repaired with the acetylene flame F1. After a good foundation is thus made a stick of aluminum is held in the flame F1 and the molten metal allowed to run in the V-shape slot to a little above the height of the casting itself, and, as will be seen in Fig. 5, this is molded with a flat-ended tool T1 in the manner shown. This particular part of the casting is very thin and practically has to be rebuilt with new metal, for as soon as the flame touches it, it crumbles away.

During the whole operation the heating is continued underneath, and for this purpose the asbestos boards are placed over the fire to protect the operator. It will be seen that he is wearing two pairs of glasses G1 and G2; G1 he happens to wear in the ordinary way, but the second pair have dark-blue lenses to protect the eyes from the intense light given off by the flame despite the fact it is not above one-half to three-quarters of an inch in length.

Though aluminum fuses at a comparatively low temperature (1,200 deg. Fahr.) its high conductivity for heat, which has a ratio of 31.3 as compared with 11.9 for iron, makes it a necessity to use more heat in welding than is required by metals having a much higher melting point. The heat is conducted away from the weld into the surrounding metal to such an extent that when the surface to be welded becomes molten the metal for a considerable distance around is close to the point of fusion and liable to collapse if great care is not exercised.

It can be readily seen that one of the principal features of carrying out this work is the amount of time taken, as the longer the flame takes to fuse the metal the greater the amount of heat that is conducted into the surrounding parts; therefore, the hotter the flame the less the time and the conduction of heat. This is the reason why it is necessary to use a flame of such a high temperature (6,300 deg. Fahr.) as that produced by burning acetylene with oxygen to obtain satisfactory results on a metal of such a low point of fusion as aluminum. The amount of contraction of aluminum from the point of fusion to atmospheric temperature is three-sixteenths of an inch per foot, and from this it can readily be understood that unless great care is exercised there is a chance of the part cracking, due to the metal shrinking in cooling.

To overcome this the part is placed as shown in Figs. 1 and 2 over a gas fire with a charcoal base, and the part is heated uniformly, the amount of heat being regulated by the amount of gas by the taps T1, T2 and T3, in Fig. 1. To keep the heat in, a strip of asbestos A2 is placed over the entire job, and in this particular case of a half of a base chamber C1 that had several cracks, a bar of steel B1, the same size as the bearing B2, is placed under these to prevent warping. Fig. 6 shows the half of the crankcase that has been repaired at the points R1, R2, R3, R4, R5 before being cleaned up. This is part of a crankcase of a four-cylinder motor, and is virtually as good now as when originally turned out from the factory. The repairer is sometimes confronted with the problem that in some accidents parts

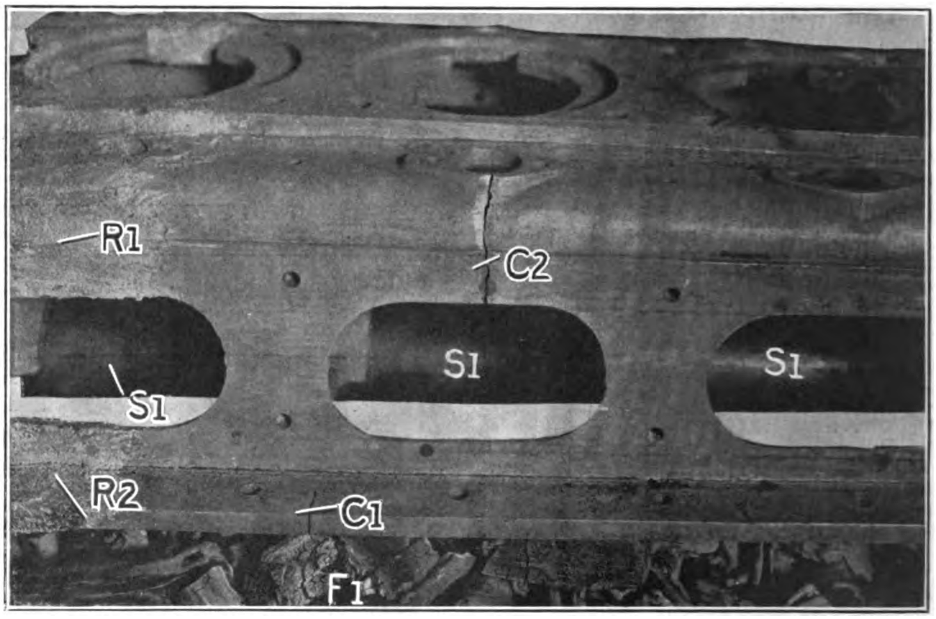


Fig. 2—Top half of aluminum base chamber, showing cracks and charcoal fire

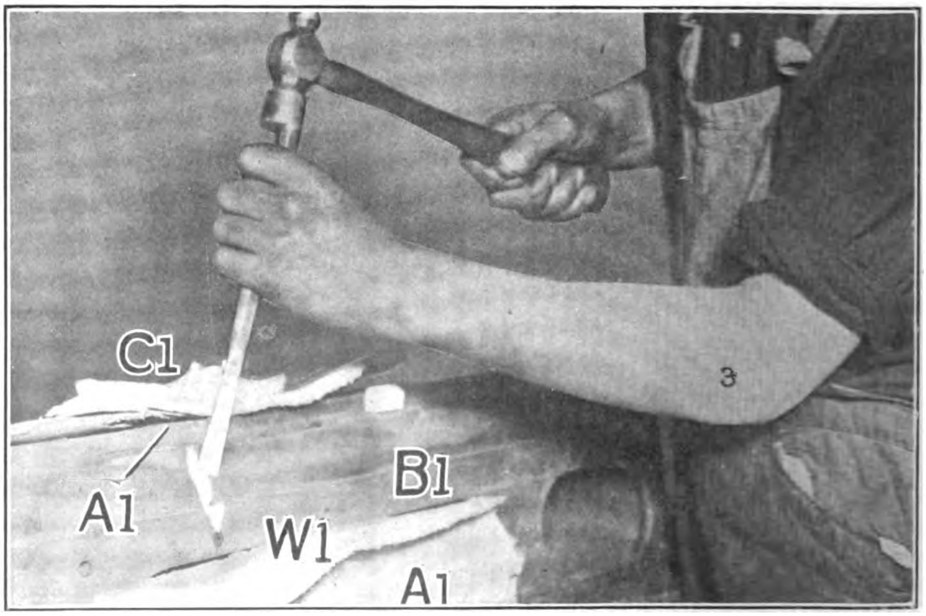


Fig. 3—Slotting crack with chisel so as to allow the new metal to run in freely

are lost or so damaged that they no longer resemble the original; but this is not really a drawback, as the broken parts that remain are pieced together and the missing parts are remade by filling the blank spaces with new metal by a building-up process, which consists of adding layer after layer till the gap is filled, and with the aid of a file afterward any unevenness is smoothed off level.

If a crankcase ruptures in service and it is due to an accident of some kind, the chances are that the quality of the aluminum found in the crankcase will be above suspicion, but if the rupture cannot be traced to some violent physical exertion, it will be futile to undertake a repair without first ascertaining whether or not the material in the crankcase is sufficiently good to warrant considering its further use. The mere fact that a crank case does rupture in service in the absence of violence will suffice to indicate that the material of which it is made is below a substantial standard. If this is true, the autogenous welding process, if it is invoked, will be for the purpose of joining the disrupted members of such inferior material that it would be inviting further trouble, but under more accentuated conditions.

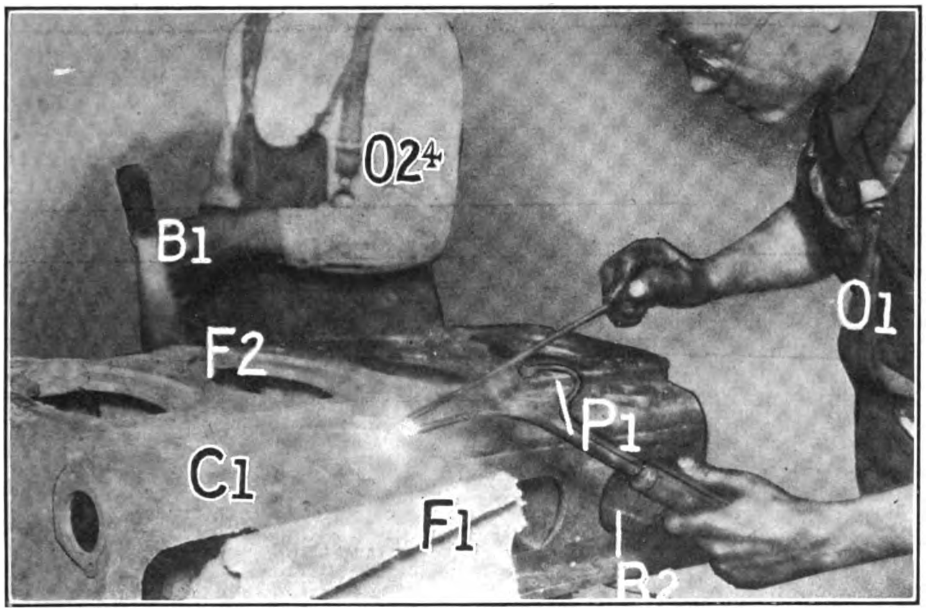


Fig. 4—Running in new metal to fill crack while the second operator heats the opposite side

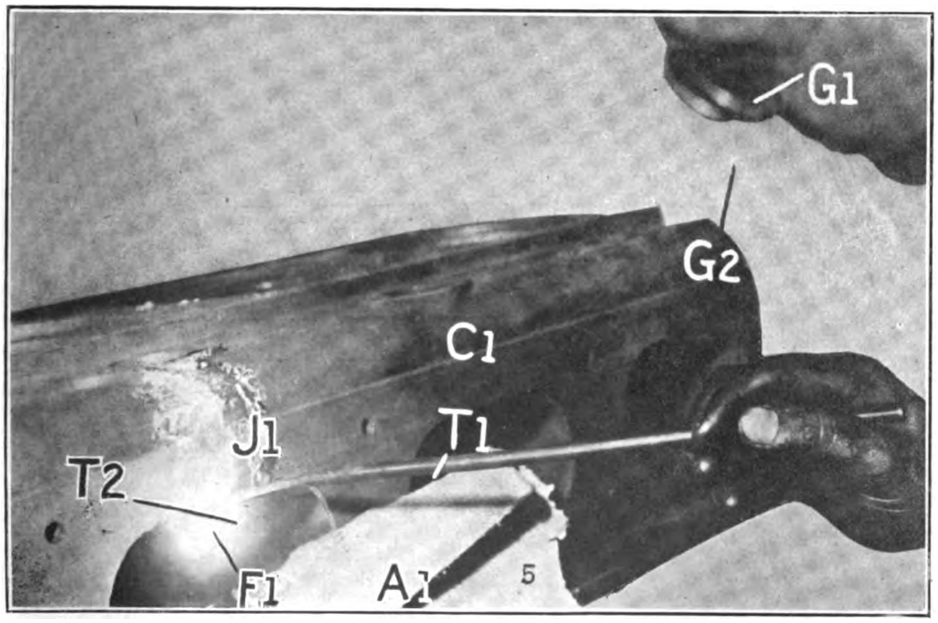


Fig. 5—The metal at this point is very thin and will melt at the slightest touch of the flame

The owner of an automobile, if he is confronted by the necessity of having the crankcase or the transmission gear case repaired or replaced by a new one, should find it to his advantage to be able to decide for himself, unaided by the repairman, which course to pursue. If the material in the broken member is so poor that it will not sustain under the work, it will not require the deliberations of an expert in the reaching of the conclusion that the re-joined parts by a welding process will not even be as strong as the original inferior member. If the owner of the car will take an ordinary machinist's hammer and strike the crankcase at a point near the fracture, if the material is inferior, provided it is of aluminum, the sharp blow will probably have the effect of breaking off one or more additional pieces, and a little more investigation along this line will soon prove to the unfortunate owner than an autogenous repair will be of no service to him. Should the broken case behave well under the rain of sharp blows, thus proving that it is not "cold-short," it will be time enough to call upon the repairman and ask him to join the broken parts.

The reason why it might be better for the owner of the car to conduct the primary investigation with a view to purchasing a new case rather than the making of a repair if necessary, is because the repairman would probably be able to autogenously weld the inferior material quite as efficaciously as if it were good, and he would consider no doubt that his responsibility is limited to the mere joining of the broken members, nor could he be expected to assume responsibility for the quality of the metal.

It is not to be expected that builders of automobiles will sanction the use of certain grades of aluminum castings for motorcases and transmission gear housings. Take for illustration the aluminum alloy known as No. 3; it is used in good automobiles for running boards and trim work; the composition of this alloy is substantially:

Approximate Chemical Composition of No. 3 Aluminum Alloy

Aluminum	65.0 per cent.
Zinc	35.0 per cent.

The impurities in this product would probably be very high. Silicon, which is fatal to good work, might readily reach over 1 per cent., and iron would probably go above ¾ of 1 per cent., but the worst crime of all would lie in the use of scrap, much of which would be devoid of a history.

A better aluminum alloy is that known as No. 2, with an approximate chemical composition:

Approximate Chemical Composition of No. 2 Aluminum Alloy

Aluminum	84.0 per cent.
Zinc	14.0 per cent.
Copper	2.0 per cent.

In this product, the aluminum should not be less than that as above given, and the copper should range between 2 and 3 per cent. Of the impurities, as silicon and iron, it is scarcely to be expected that the sum of these elements present will be below 1.25 per cent, and it is highly improbable that this alloy would be worth considering in exacting service, particularly if "scrap" is put

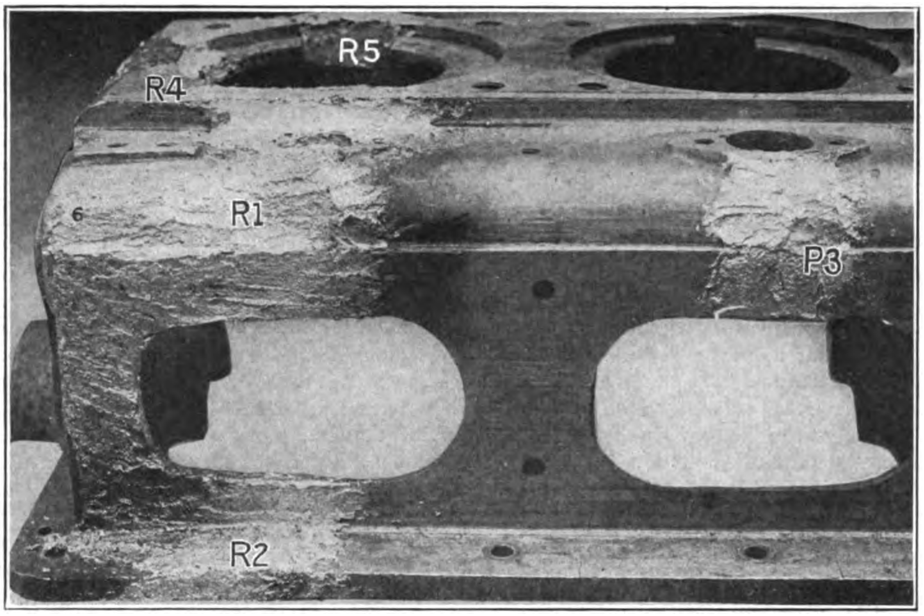


Fig. 6—Completed repair before filing and cleaning off

into the charge. An ordinary machinist's hammer in the hands of a man of no great strength will disclose the presence of excess of silicon and iron or the use of "scrap" in the charge, if the part is given a sharp blow—the pieces will fly with almost explosive force, this being a sign that the material of the case is so bad that a repair is not worth while.

Relatively good transmission gear and crankcases are composed of aluminum having properties—

Approximate Chemical Composition of No. 1 Aluminum Alloy

Aluminum	91.5 per cent.
Copper	8.5 per cent.

In this product, both aluminum and copper contents vary a little, and impurities are mainly copper and silicon, the sum of the two not exceeding 1.25 per cent. This alloy is supposed to be from heats using new metal only, and while the silicon and iron content is a little too high for the very best result, the castings resulting are nevertheless good, but even castings from such good alloy may fall short of the requirement, due to overheating and other foundry miscalculations. To some extent the responsibility for bad work is to be charged to inferior designing methods.

While the subject is up, considering the importance of fine castings in motor work, it is not too much to say that the best possible results obtain when the foundry uses virgin metal, limiting iron to less than 0.40 per cent. and maintaining the silicon content within 0.50 per cent.

The photographs illustrating this article, as well as that referring to cylinder repair in last week's paper, were taken at the plant of W. R. Smith & Co., 304 and 306 West 52d Street.

Lining Up Wheels

ALTHOUGH TIRES ARE CARED FOR AS INDIVIDUAL UNITS, YET A SMALL INACCURACY IN ALIGNMENT WILL IN ALL CASES CAUSE UNDUE WEAR

THERE are times when one has to utilize what one has on hand to carry out a repair, and a stray piece of metal or string is often very welcome. But when it comes to tires only the best is good enough. Makeshift methods of lining up the wheels should be given a back seat and the autoist will do well, if he has not the necessary appliances, to consult some competent repairer if he finds his tires do not give the service the makers guarantee. Unless the road wheels of a car are perfectly in line with the chassis—and themselves, which must follow if the former is the case—there is added to the rolling and driving strains a side dragging or uneven wear on the part of the tire not intended to come in contact with the road. To better illustrate this, if reference is made to Fig. 1 it will be seen that the wheels W1 and W2 have a decided inward inclination—what is known as toeing inward. This is not such a frequent occurrence as when the wheels have an opposite inclination; that is, the front of the rim is farther from the chassis than the rear part. The consequence is that the dragging will take place at A and B, and instead of wearing even the tires will be treated in a similar manner as when they are put on a buffing machine to take off superfluous rubber before repairing, the only difference being that in this case the road acts as the buffer and remains stationary while the tire takes the place of the buffer and rotates. The effect, however, is the same on the tire, which is the point at issue.

While on this subject of toeing it would be as well to relate the experience of the driver of a truck who had the misfortune to strike a slippery incline in New York and found it impossible to avoid sliding to the curb off the crown of the road

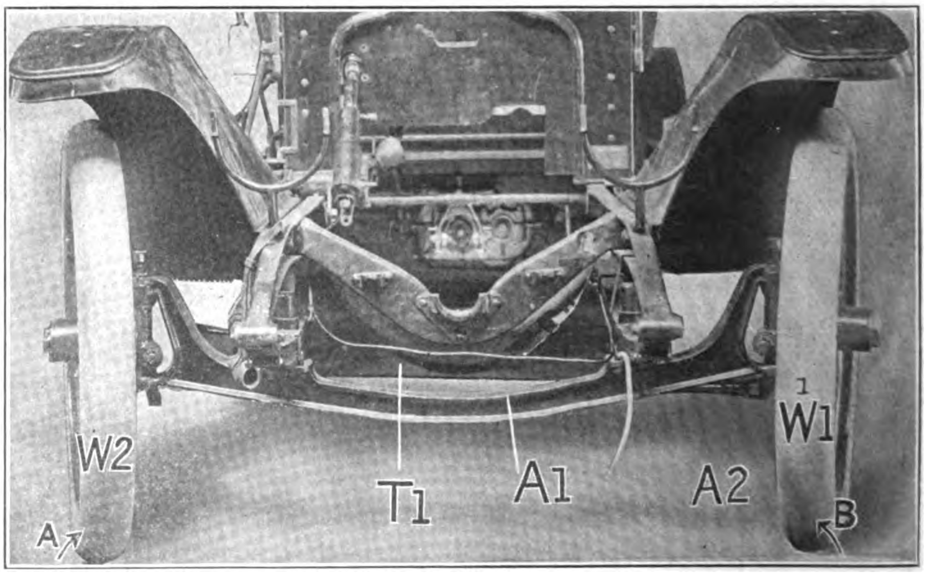


Fig. 1—Showing front wheels toeing in too much, inducing extra tire depreciation

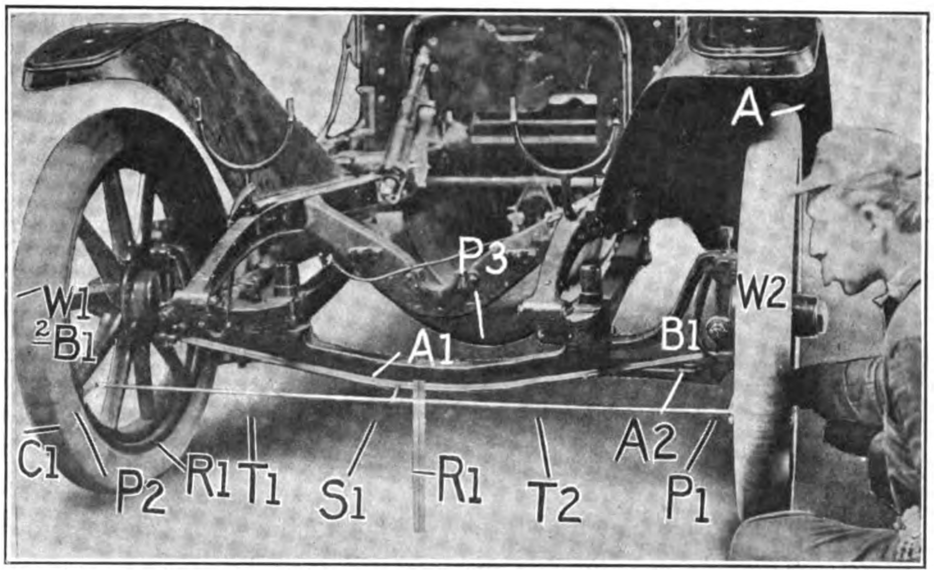


Fig. 2—Showing method of aligning the wheels, using rule and telescopic pointing tool

when the brakes were applied at a cross-road half-way down the incline. The man was a good driver and had been in the employ of the company for some time. When asked to explain the reason and cause of the accident he said that it was impossible with that particular car to keep it on the road at that particular spot if the brakes had to be applied and the roads were at all skiddy. And he went on to say further that if he had to negotiate it again under similar conditions the result would be the same; but if he might fix the car up as he wanted to he thought it was possible to eliminate 50 per cent. of the skidding. In order to test the first half of his statement, that it was impossible to avoid the skid, another driver was told to take the car out and disprove what seemed to be bad driving, and the principal awaited the result. It was not long in coming and was in the nature of a telephone call to send a new wheel out, as the car had skidded badly and struck the curb and could not proceed without the new part. The first man was then allowed to do what he wanted, and it was to toe the front wheels inward at the front a matter of one-fifth of 1 degree, which on a 36 x 5 wheel would be equal to 3-16 inch; but should the tires be smaller the amount of toeing might be increased to, say, one-fourth of 1 degree for 34 x 4-inch tires.

This represents a fraction over the point where lost motion starts through non-parallelism of the wheels, and consequently places a resistance on the forward motion not sufficient to appreciably stop the momentum. Besides this he contended that it was necessary to allow a small amount of power to remain on while braking, so that the rear wheels had a better purchase on the ground. This solution solved the difficulty and the car was driven over the same road again without the semblance of a skid.

The accompanying illustrations were taken at the White Company's New York garage and clearly show the practical way of realigning the wheels should they become out of line through accident, wear of bearings or spreading of the axle, which in most cases can be put down to overloading.

There are three ways a wheel can be out of line—firstly, in the manner indicated in Fig. 1, known as toeing, which, as previously stated, may be an inclination to the front or rear; secondly, undue splaying, when the top of the wheel is farther out of a perpendicular line drawn through the axle pivot than 5 per cent., unless, of course, the makers originally make this setting more; 6 per cent, is an outside limit. Unless the rear axle is specially constructed so as to allow for splaying, the wheel should be a true perpendicular to the road, the above percentage of splay being applicable to the front wheels only.

The third way is that the parallelism of the two axles is upset and causes the wheels, although parallel to the chassis when facing forward, to take a wrong angle when turning a corner, causing a drag and consequent undue amount of wear on the tires. The usual causes of this are either a bent axle or the spring center pin breaking and allowing the spring to slide on the axle plates. One cause, which cannot be remedied by the following methods of alignment, is when the frame becomes twisted.

The method of finding out whether the wheels toe can be seen by referring to Figs. 2 and 3. The operator is compelled in this case to take a point on the rim C1 10 inches above the floor (which must be level), the reason for this being that the pan P3 prevents him taking the measurements at the point where the difference is likely to be greatest, viz., a point midway between the floor and the top of the wheel B1. The calculations, however, will be just as accurate, for if the differences at this point C1 are more than they should be (as stated above), the difference at the point B1 will be increased.

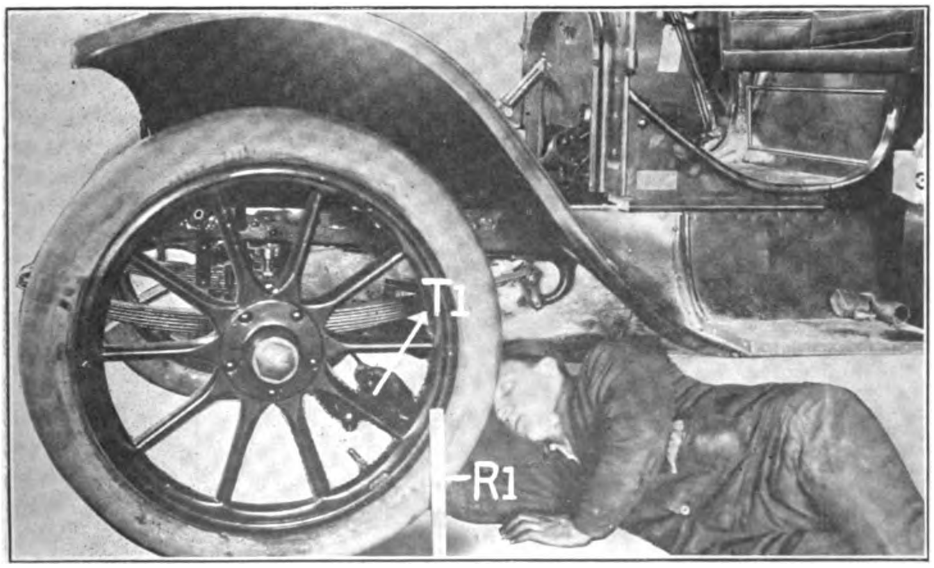


Fig. 3—With the same tools the rear of the wheel is trued and adjusted on the connecting bar

The instrument used in this case is a telescopic tool T1 and T2, with a set-screw S1 to lock the parts in a fixed position. The part T1 slides inside T2 and the ends P1 and P2 are turned over and pointed to form a scribing tool. The rule R1 is marked with chalk to permit easy reading of the measurement. The rims R1 are also marked off at the same height C1. The tool is then extended to touch the rim R1 at the point C1 on the wheel W1 and a point at the same height on the wheel W2 and the set-screw S1 locked. The instrument is then taken in the manner shown in Fig. 3, and after the height markings have been made, as in Fig. 2, it can be determined how much the wheels toe, if at all.

Most cars have the tie bar T1, in Fig. 1, fitted with adjustable ends, and it only remains to tighten or loosen the adjustment A2 in order to set the wheels.

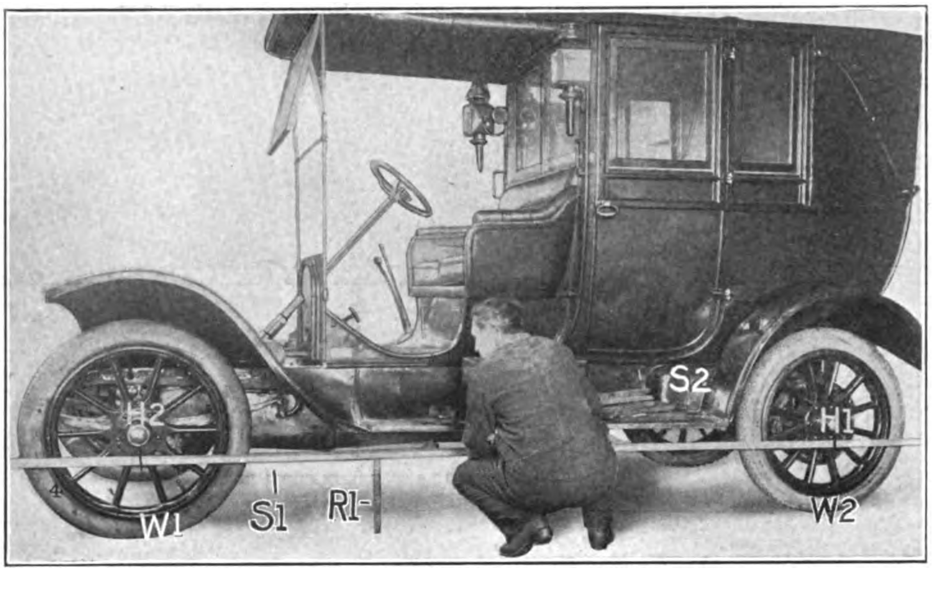


Fig. 4—Using a long square edge and a rule the alignment of all four wheels can be verified in the manner shown

Splaying of wheels can be treated in a similar manner, only in this case the measurements are taken at the top and bottom. It must be remembered that measurements must be made at the rims and not at the tires.

In order to keep the axles of the car at right angles to the chassis the springs have a center pin through them which is fixed in a recess on the axle boss, and provided the spring clips do not work loose this angularity should be retained. There is a possibility of this pin, however, being broken. Should this happen the springs have nothing to hold them in place, and the axle is free to move backward or forward. This will be noticed by the altered position of the spring clips on the springs, and the remedy is to fit new pins. A bad jar on the axle may twist it slightly—an amount hardly perceptible to the eye, but sufficient to put the wheel out of line. Fig. 4 shows the means of finding this out without taking them off.

In Fig. 4 the operator will be seen holding a straight edge S1 resting on a Rule R1 (it requires two men to effectively manipulate the long tool). The center of the hubs are marked off; or, better still, remove the hub caps H1 and H2, and as the axle ends are usually centered, the centers can easily be found. The opposite side wheels should have the same distance measurements as those first measured if the car is fitted with a live-axle type transmission. With a chain-driven car the procedure is different, as the tension rods to tighten the chains are seldom equal in length. The sprocket case S2, in Fig. 4, must be removed, and the distance taken from the center of the front axle to the center of the jackshaft axle will give the alignment of the front wheels. With the tool used in Fig. 2 it is possible to find out which tension rod is the longer, caused by the stretch of the chains.

To find out if the chassis has taken a twist it is necessary to remove the body and measure up for height and parallelism with a straight edge. This is not an undertaking that the average automobilist should consider too difficult to undertake, but some care should be exercised in the process.

Letters from Subscribers

THIS DEPARTMENT IS DEVOTED TO THE ANSWERING OF LETTERS FROM SUBSCRIBERS ON ANY SUBJECT RELATED TO THE RUNNING OF AUTOMOBILES

Floating Piston Pins Do Much Damage

Editor The Automobile:

[2,456]—A few days ago my motor suddenly shut down, and when it was taken apart in the repair shop the repairman discovered that one of the piston pins went adrift, and I am now awaiting a new cylinder from the maker of the car, but the problem which confronts me is: How will I prevent the recurrence of this type of trouble?

Camden, N. J. Subscriber.

Referring to Fig. 1, four methods of holding piston pins in place are given, and of the four it is possible that (A) is the least desirable; (B) represents a very good plan in which one

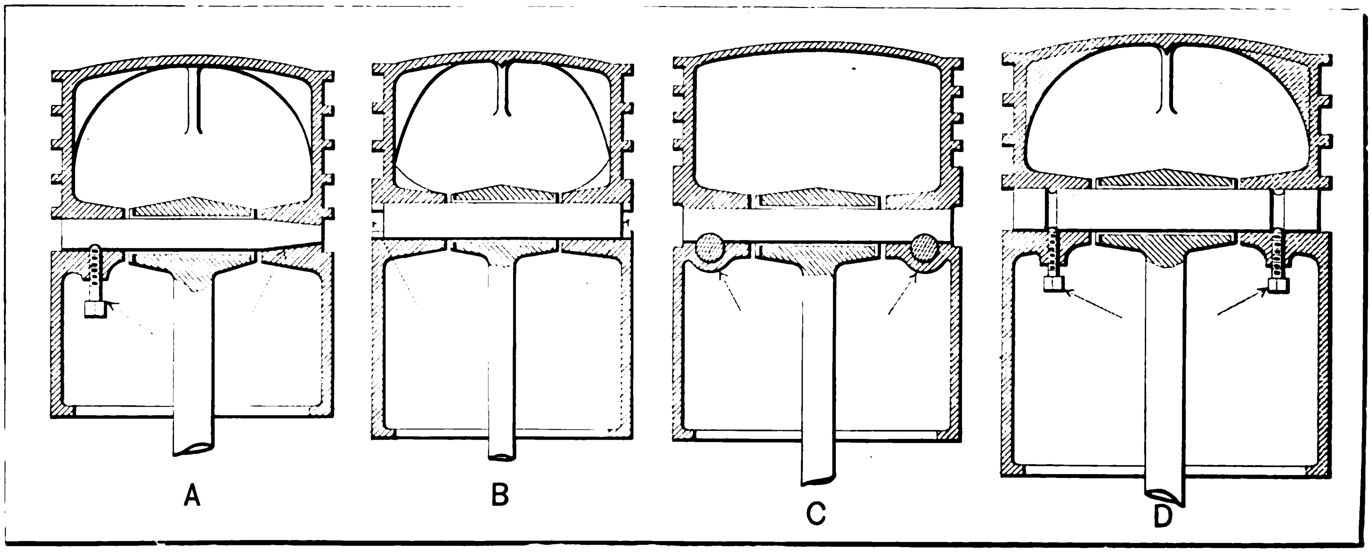


Fig. 1—Sections of pistons, showing four ways of so fixing the piston pins that they will not float out

of the piston rings is put on in a groove in a plane of the piston pin after the pin is inserted into place, so that the section of the ring would have to be parted before the pin would be free to float out. (C) shows a very good way, utilizing two bolts, cutting through the diameter of the pin at two points, so that it is prevented from floating out through the interference of the bolts. (D) shows a very common method of holding the pins, utilizing studs with a fine taper-thread with grooves cut in the pin so that when the studs are fetched up tight the ends thereof register in the grooves.

Wants to Increase the Cooling Effect

Editor The Automobile:

[2,457]—I am a great believer in air-cooled motors, and I have in mind the idea of experimenting upon a type of air-cooled motor with a view to increasing the cooling efficiency without adding to the complication. The enclosed sketch will give you a rough idea of the method I propose to employ, and I would like to have your criticism of it. Reader.

St. Louis, Mo.

Your sketch (Fig. 2) is very interesting, but it is not believed that there is anything very practical about the plan. In the first place, when the car is standing still and the motor is running it will heat up unduly, and much smoke will be generated, due to the burning of lubricating oil, and this smoke instead of passing out of the exhaust orifice to the rear will be distributed so that some of it will pass out through the front and envelop the car to the annoyance of the more æsthetic of its occupants. You also propose to have the cylinders with a smooth exterior and the probabilities are that the radiating surface will be insufficient. It takes 40 square inches of water-brushed surface to handle 1 square inch of flame-swept surface for proper cooling of an automobile motor, and this fact is sufficient to indicate that your problem will be a difficult one to handle, especially since you make no provision for the enforced delivery of air on an equality basis to the respective cylinders.

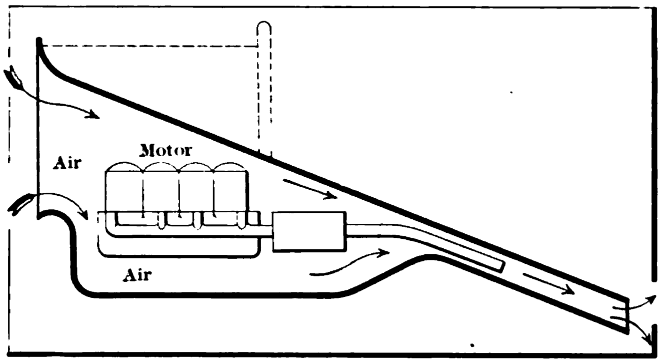


Fig. 2—Showing a plan of ventilation and cooling of an air-cooled motor that looks too attractive to be good

Pressure of Clutch Springs

Editor The Automobile:

[2,458]—I have had trouble with my clutch for some time past and have thought of fitting a new spring to overcome the slipping that I cannot cure, although I have had a new leather. I have dressed it well with castor oil, and while it was slightly rough from the turning it held, but now it has become smooth the slipping has started again. I should be obliged if you will tell me how I can calculate the strength of spring required and what the angle of the cone should be.

Montpelier, Vt. Leather Clutch.

The angle of the cone of the clutch should be about 12 to 14 deg. The formula to find the strength of spring is as follows:

Let T_w = the pull in pounds exerted at a mean radius to transmit the required power,

N = the number of revolutions per minute.

r = mean radius of the clutch in feet.

H. P. = the power to be transmitted at the required revolution,

then

$$T_w = \frac{H.P. \times 33{,}000}{2\pi \times r \times N}$$

Draw a sketch of your clutch after finding the exact dimensions in the manner indicated in Fig. 4 and let AD be a center line coinciding with the axis of the driving shaft. From a point A on the line AD draw AC normal to the face of the clutch, and from C draw CB at right angles to AD. Then if AB to scale represents W, the force pushing the inner part into the outer part of the clutch AC to the same scale equals R, the pressure exerted between the faces of the clutch.

Produce CD to cut the center line AD at point A and let a = angle ADC.

Then

$$\frac{AB}{AC} = \frac{AC}{AD} = \frac{W}{R} = \sin a$$

$$\therefore W = R \sin a$$

and

$$R = \frac{W}{\sin a}$$

If μ = the coefficient of friction of the rubbing surface, then to transmit the horsepower required $R\mu$ should be equal to T_w. Hence

$$W = \frac{H.P. \times 33{,}000}{2\pi r N \mu} \sin a$$

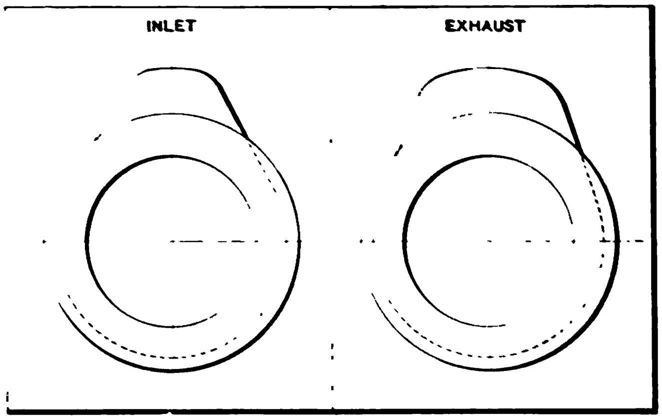


Fig. 3—Inlet and exhaust cams, showing that they are not of the same contour

Inlet and Exhaust Cams Not of Same Shape

Editor The Automobile:

[2,459]—In examining my motor I find that the inlet and exhaust cams are not of the same shape, and my lack of familiarity with the subject makes it impossible for me to know whether or not the builder made a mistake. Will you put me right?

Memphis, Tenn. A. L. M.

An examination of the inlet and exhaust cams, as shown in Fig. 3, will suffice to indicate to you that the respective cams are definitely shaped to different angles, although in this case the lift is the same for both. The reason why the two cams do not shape to the same combined angle is because the inlet and the exhaust valves are not held in the open position during the same number of degrees of rotation of the camshaft or of the crankshaft.

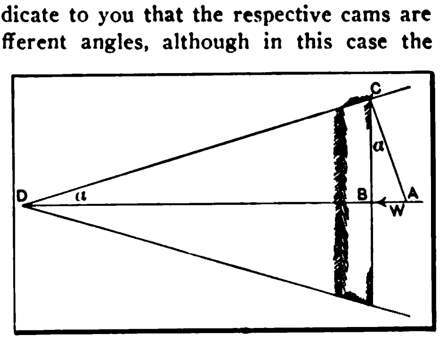


Fig. 4—Diagram of a cone clutch used to show what the spring pressure must be under "holding" conditions

Cantor Lectures on Motors

PROFESSOR W. WATSON, D.S.C., F.R.S., DELIVERED A SERIES OF LECTURES ON THE GASOLINE MOTOR, OF WHICH THIS IS THE FINAL INSTALLMENT—BY PERMISSION OF THE ROYAL SOCIETY OF ARTS

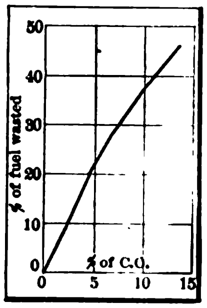


Fig. 34—Showing heat wasted for different percentages of carbon monoxide in exhaust

FROM the numbers which have been given it will be evident that the loss of efficiency due to heat losses in the cylinder is not very great, the reason that the efficiency falls so much below unity being that, owing to the cycle of operations in which the engine works, only a fraction of the heat supply can possibly be converted into work. In order to see how nearly the actual engine approaches the performance of the ideal engine, we may calculate what is called the relative efficiency, that is, the ratio of the efficiency of the actual engine to the efficiency of the ideal engine having the same compression ratio, the working substance being supposed to have the same properties as in the actual engine, that is, the specific heat being taken as variable. Such a comparison for three values of the compression ratio is here shown:

Compression ratio	Compression pressure in lbs. per sq. in. above atmospheric pressure at a speed of 1,000 revolutions per minute	Actual efficiency (maximum at speed of 1,300 revs).	Ideal efficiency	Relative efficiency
4.71	86	.275	.367	.749
4.35	77	.272	.354	.769
3.92	68	.263	.337	.780

It is evident from this table that as long as we confine ourselves to the Otto cycle, however much we reduce the thermal losses in the engine, we cannot improve the efficiency more than about 20 per cent.

I now return to the discussion of the manner in which the efficiency of an actual engine changes with the strength of the mixture. Starting with a mixture containing 14 parts of air to 1 of petrol, and decreasing the strength of the mixture, we see that the efficiency increases; that is, for a given heat supply per cycle the losses are reduced. The reason for this is that as the strength of mixture is reduced the temperature reached after combustion is also reduced. This has a beneficial effect in two ways. In the first place, the lower the temperature of the gases during the working stroke the less is the loss of heat to the walls of the cylinder. In addition, since the temperature is lower and the specific heat of the gases increases with temperature, the mean specific heat of the gases for the range covered by the rise of temperature during combustion will be decreased. Now, the lower the mean specific heat of the gases, the greater the rise of pressure produced by the communication of a given quantity of heat. Since it is the increase in pressure which forces the piston down, and hence does work, it is obvious that the greater the increase in pressure produced by a given heat supply the greater the work done during the cycle, and hence the greater the efficiency. The efficiency does not, however, increase indefinitely as the mixture gets weaker, but, instead, decreases somewhat rapidly for mixtures weaker than about 17 parts of air to 1 of petrol. The reason for this decrease is the very slow burning of such weak mixtures, so that even by advancing the spark more than usual we are unable to arrange that the whole charge shall have burnt before the piston has appreciably moved down on the working stroke. The greater the speed of the engine the further will the piston have moved before the combustion is complete, so that we should expect the efficiency curve to drop more rapidly at high speeds than at low. This effect is, in fact, quite evident from the result of the experiment shown in Fig. 30.

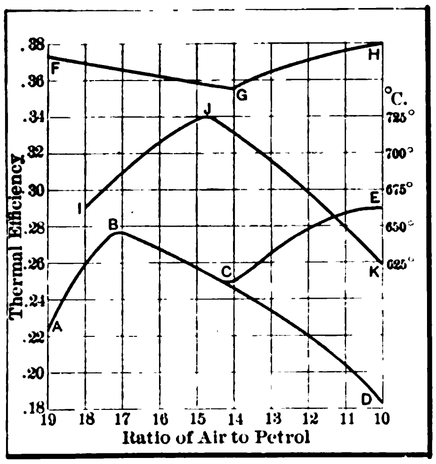


Fig. 35—Diagram showing thermal efficiency with varying percentages of gasoline and air

In the case of mixtures richer than 1 of petrol to 14 of air the combustion is not complete, some of the heat of the fuel not being liberated. By considering the quantity of heat which could be obtained by burning the carbon monoxide, hydrogen and methane found in the exhaust, and deducting this from the calorific value of the fuel supplied, we can calculate the heat actually liberated in the cylinder and then, using this value, obtain the efficiency of the engine after allowing for the effect of incomplete combustion. The amount of heat wasted for different percentages of carbon monoxide in the exhaust is shown in Fig. 34. It will be observed that when there is 10 per cent. of CO in the exhaust, 37 per cent. of the heat in the fuel is wasted on account of incomplete combustion.

On working out the efficiency, allowing for the heat not liberated, the efficiency curve for mixtures richer than 14 of air to 1 of petrol has the form shown at C E, Fig. 35. The rise from C to E is due to two effects. In the first place, as the petrol becomes more and more in excess the temperature falls, and thus the losses due to conduction to the cylinder walls decrease. In the second place, as is shown in Fig. 25, there is a rapid rise in the increase in volume on combustion for mixtures richer than 1 of petrol to 14 of air. Now this increase in volume produces an increase in pressure in the cylinder, without any corresponding increase in temperature with its accompanying losses, and, therefore, has a marked effect on the efficiency. If the efficiency for an ideal engine (variable specific heat) is worked out for different strengths of mixture, *i. e.*, heat supply per cycle, and the results plotted, we obtain the curve F G H (Fig. 35). The rise from G to F is due to decreased maximum temperature, while the rise from G to H is partly due to decreased maximum temperature and partly due to increasing expansion on combustion.

Although there is very little doubt that the temperature reached will be higher for a mixture of 1 of petrol to 14 of air than for both weaker and stronger mixtures, it would be a good thing if direct experimental proof were obtained. Now, owing to the very high temperatures reached during the explosion, temperatures sufficient to melt a platinum wire, the direct measurement of such temperatures is impossible. Owing to the expansion which takes place during the working stroke, as well as to loss to the cylinder walls, the temperature at the end of the working stroke is so much reduced as to be measurable. Hence we can measure the temperature of the exhaust gases directly after they leave the cylinder, and the values obtained by means of a platinum resistance thermometer, with different strengths of mixture, are shown in the curve, I J K, Fig. 35. It will be noticed that the temperature rises to a maximum for a mixture of 1 of petrol to 14.7 of air. Now, if the exhaust temperature is a maximum for this strength of mixture we may infer that the temperature throughout the stroke is also a maximum, and hence the explanation of the shape of the efficiency curve given above is supported.

Since it has been shown that if we restrict ourselves to the Otto cycle it is not possible to obtain any very striking increase in efficiency, it is interesting to see whether it seems likely that greatly improved efficiency could be obtained by employing a different cycle.

A study of the numbers already given shows that more than half the energy supplied in the form of fuel is discharged in the hot gases of the exhaust. One way of decreasing the loss on this account would be to carry the expansion on the working stroke further than is done in the Otto cycle. We are limited, of course, as to the amount of expansion possible since the pressure must not be allowed to drop below atmospheric pressure. If we continue the expansion till the pressure in the cylinder falls to atmospheric pressure, then the indicator diagrams obtained on an ideal air-cycle engine, an ideal variable specific heat engine and in an actual engine would have the form shown in Fig. 36.

The efficiency obtained and the heat distribution in such a case are shown in the following table:

	Final volume	Mean effective pressure lbs. per sq. in.	Efficiency	Work per cycle ft. lbs.	Work per cycle, Otto ft. lbs.	Difference ft. lbs.
Ideal engine, variable specific heat.	3.5	38	.47	538	410	128
Actual engine......	2.7	30	.30	344	285	59

Expansion carried to atmospheric pressure.
Compression ratio = 4.7.
Heat supply per cycle = 1,150 ft. lbs.
Initial volume of charge taken as unity.

It will be seen that carrying the expansion to 2.7 times the original volume only gives an additional 59 foot-pounds of work. Hence it is quite certain that, allowing for the increased friction, such an engine would not give as high a brake-horsepower as it would if the expansion had been stopped at the original volume. A further practical objection is that an engine having such a large expansion would be very heavy for the power developed, the mean effective pressure only being 30 pounds per square inch as against 84 pounds per square inch on the Otto cycle. It is conceivable that some way of obtaining increased expansion other than by means of a piston, say in a turbine, may be developed in time, but even then, as the above calculations show, the gain cannot be very great.

One method of obtaining increased efficiency is to employ higher compression; but, as has already been mentioned, it is impossible to compress a mixture of air and petrol above a certain amount without producing pre-ignition. Hence if we wish to use higher compressions it will be necessary to compress the air alone and then add the petrol at the top of the stroke, just as is done in the Diesel engine. It is very doubtful, however, if any very material increase of efficiency would be obtained in this way, and the complication introduced into the engine, as well as the increased weight, would preclude its adoption either in a motor car or aeroplane. It would thus appear that such modifications of the Otto cycle as I have considered do not promise to afford much improvement, and, as we have seen, the present-day engines working in the Otto cycle do give about 75 per cent. of their maximum efficiency, so that at most an improvement of 25 per cent. is possible. It must in this connection, however, be remembered that it is only when an engine is well designed and run with a correctly proportioned mixture of air and petrol and with a properly timed spark that such relative efficiencies as 75 per cent. are attainable. There is no doubt that, in the case of the majority of petrol engines which are in general use, these conditions are by no means fulfilled and hence the efficiencies obtained are much lower.

I have, in these lectures, given a somewhat rapid account of the methods by which we can obtain some insight into what goes on inside the cylinder of a petrol engine, and have given some of the results obtained so far. Much remains to be done before our knowledge is at all complete, but the subject is one attracting much attention, and many workers, both engineers and physicists, are attacking the problems, so that before long I have no doubt much that is now doubtful will be cleared up.

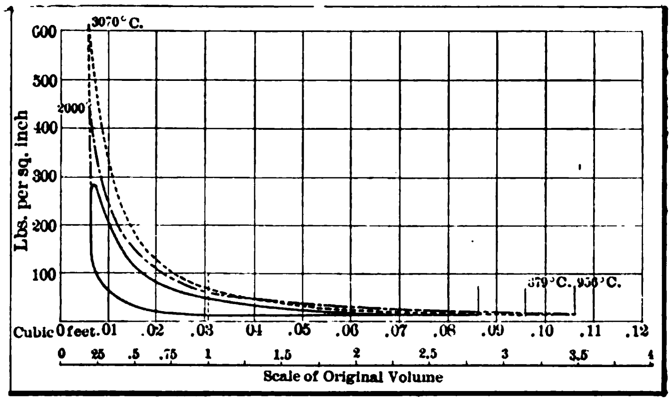


Fig. 36—Resultant pressures due to compression, explosion, and expansion for given volumes as shown, with equivalent volumetric measurements in cubic feet.

Radiator Trouble

Determining the Size of the Radiator Based Upon the Horsepower Rating of the Motor Is Futile

EARLY practice, guided by synthetic formulæ and a surfeit of inexperience, led to the use of radiators on many automobiles, which in after service proved to be a decided misfit. The conditions that must govern the wise engineer when he fixes upon the size of a radiator for a given motor may be set down briefly as follows:

(a) The thermal efficiency of the motor must be known.

(b) The amount of fuel that can be burned to carbonic acid and water is a factor.

(c) The stray heat units must be traced to their destination.

Since the value of the fuel is measured in heat units and all of the energy so measured, if it is not turned into mechanical work, must be disposed of in such a way as not to cause trouble, it remains to find out how much of this energy falls to the lot of the radiator to handle and the difference in sensible temperature under which the heat must be disposed of. For every 100,000 heat units furnished by the fuel and burned to finality it is a good motor that will turn 16,000 of them into mechanical work. It is not a bad motor that sends 50,000 of these heat units into the cooling water, in which event the radiator must unload 50,000 heat units to the willing air as it glides over the surfaces in the interstices of the radiator. The early mistakes in cooler practice followed the assumption that the thermal efficiency of all motors is substantially the same. After events proved that there was a wide divergence; moreover, there is considerable opportunity for serious trouble, even if the thermal efficiency is, say, 16 per cent., which means that 84,000 mischief-making heat units must be watched and guarded against.

These very possibilities show ample reason for wanting to know more about it. If a radiator is designed for a motor that only delivers 30,000 out of each 100,000 heat units to the cooling system and this radiator is transferred to a motor that permits 60,000 out of each 100 000 heat units to go to the water, the figures show that the radiator will be just half big enough.

The reason why some motors deliver more of the stray heat to the water jacket than is transferred in other examples is due to the difference in flame-swept surface influenced by other thermic relations. Restricting the internal surface of the combustion chamber of the motor reduces the path of transfer of heat units to the water jacket and vice versa.

Lubrication Problems

THE CAMEL MAY GO EIGHT DAYS WITHOUT LUBRICANT, BUT THE AUTOMOBILE IS CONSTRUCTED ON SOMEWHAT DIFFERENT LINES

THERE is nothing so disconcerting to the autoist as to hear a persistent squeak, and one that cannot be located, coming from beneath the hood of the car. Of course, it may not come from the hood at all, and nothing less than the stethoscope would seem to be able to discover the fault. No doubt if this instrument were placed on every square inch of metal of the car the cause might be located. But there is no necessity for this on a well-built car provided the lubrication is properly carried out. The body and its fittings are often the cause of these mysterious squeaks: for instance, the mud guards may rub against the frame, or the top sockets, having become rusty with exposure, may give out sounds as the bumps of the road move the upright arms in them. Such trivialities are easily remedied and once put right will not occur again.

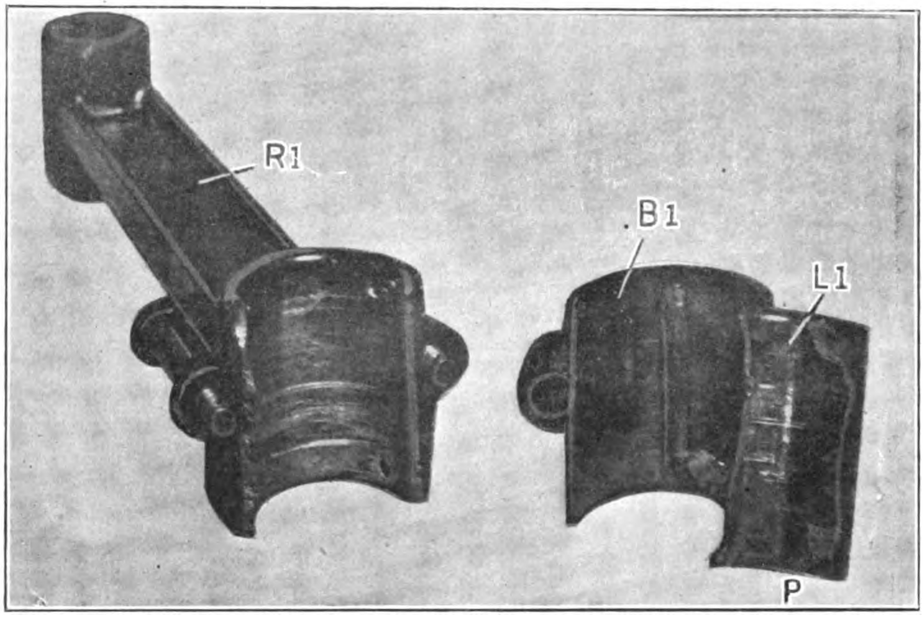


Fig. 1—Showing burnt-out bearings due to insufficient lubrication

A squeak is an ominous sign and should never be disregarded; it is like some great event casting a shadow before it. Should it emanate from some such cause as above instanced it is no reason why it should be disregarded the next time it occurs. The rule the autoist should lay down for himself is that it emanates from want of lubrication. Such noises do seem to have the knack of putting themselves in evidence at inopportune times—perhaps just a few miles from home and when one is least inclined to get down to attend to it. Procrastination is going to be a thief if the Good Samaritan neglects his duty. As plainly as any dumb animal can ask, the car is craving for oil. And why deny it? If a car that starts out lively in the morning shows signs later in the day of sluggish digestion there is one patent remedy known to all, and that is oil. One has but to drop into the first repair shop to discover that the majority of repairs can be traced to one cause—want of oil. There is no excuse for the novice if he has trouble through underlubrication, and the first thing that the maker of a car will ask if a part is broken is: "Did you lubricate it properly?" In the majority of cases this is the root of the evil. It is not sufficient to oil up a car regularly on the off chance that the oil "gets there": it is necessary that the channel should be free and the oil of the right consistency for the size of the pipe. A pipe that may be large enough to convey gasoline to the carbureter would be altogether too small if heavy oil were used for engine lubrication; and, again, should the vent to allow the gases that find their way to the crank chamber become partially stopped up, some of this back-pressure may find its way up the oil pipes and stop the flow of oil down them.

The majority of engines of the present day have some anti-friction metal liners in the main bearings, and these serve two purposes—the first being to reduce friction; the second, that should the friction become too great through the heat generated by want of oil, this lining metal, having a low melting point, will run and incidentally cause such a knocking that it will be impossible to drive unless one is deaf. If it were possible to drive with the eyes shut, there is no finer way to tell how a car is pulling; and it is really a pleasure, after the rudiments of driving have been mastered, to listen to the rhythmic beat of the motor. Then you begin to think of the car as a friend of man and fondly pet the part that makes the wheels go round rather than pat it externally and groom its glossy coat and count the number of scratches on the varnished panels. There is a saying that the way to a man's heart is through his stomach, and to get the best out of the car, "feed the brute" with oil. The gasoline motor has different ways of showing its displeasure, and two of these may be seen in the accompanying illustrations. Fig. 1 represents a connecting rod R1 and the lower half B1, and half the liner L1, or rather all that is left of it. The remains of the bearing were found in the lower half of the base chamber without a drop of oil in it. Here the metal had melted from the white metal linings and run almost in a stream, as the particles were found in a lump A, besides several small particles B, Fig. 2.

This is a mild form of trouble comparatively speaking. For instance, Fig. 3 represents the same trouble in a different light. In this case there must have been a sudden seizure of the bearing on the shaft which burst the bolt B1 and lower half of the bearing B11, and as something had to go, the weakest part gave way. In this case the manufacturer could not be held responsible for the omission of the driver. Had he had oil in his engine there would have been no seizure and consequently no hole in the base chamber. This was caused by the connecting rod C1 being freed from the crankshaft and being hit by same on the next revolution, the force being such as to drive it through the base E1, and a very lucky break, too. The connecting rod has been bent out of the perpendicular to the amount shown, allowing for the small amount of side-swing.

While it is the aim of every designer of an automobile to so contrive that the lubricating problem will be minimized, the fact remains that no method has as yet been discovered by means of which it will be possible to turn a car over to a user and say to him, "Forget all about the oiling question." It was hoped at one time that annular type ball bearings would thrive in the absence of lubricant, and so they will, to a greater or lesser extent, but they will last very much longer if they are lubricated than they will if they are permitted to run dry. It was found in the course of events that plain bearings will sustain under pressures as high as 1,500 pounds per square inch if the service is intermittent, as it is in the motor, due to reciprocation of the members rather than to continuous rotation. Even the camshaft belongs in the class involving intermittent pressures, because the load comes on intermittently. Persistent experimenting seems to have evolved a substantial array of data that proves quite conclusively that the real problem of lubrication has to do with an unbroken oil film rather than with pressure.

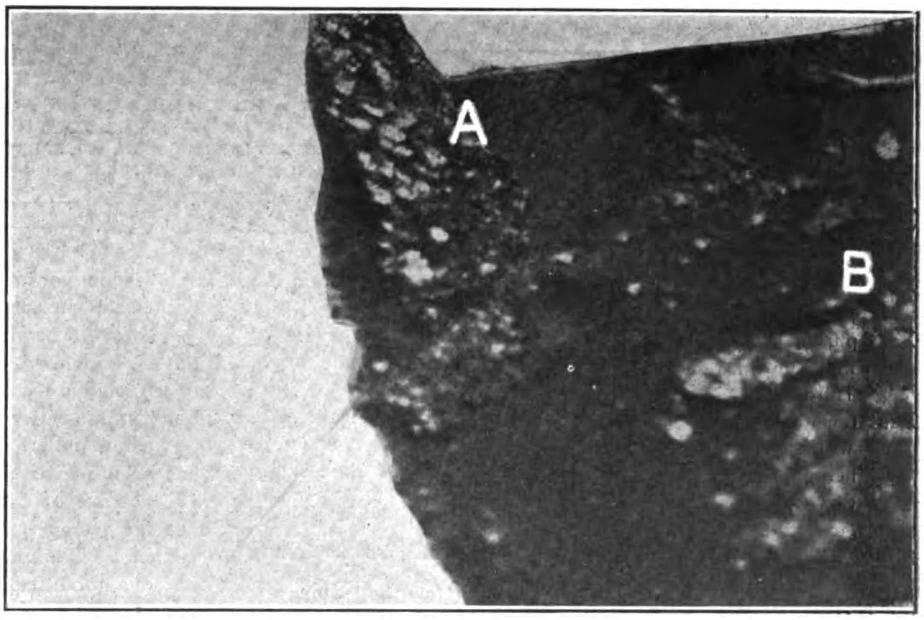


Fig 4—Showing the metal run out of the bearing into the base chamber, whence it was recovered

It is the duty of the automobilist to supply a sufficient quantity of good lubricating oil to assure that the film will not be broken. It is also necessary to appreciate the fact that even with good lubricating oil the film will be broken if a little water squeezes in. Following along this line of reasoning for a moment, it leads rather forcibly to the conclusion that the practice of cleaning out cylinders, using kerosene oil, or other liquids that are not good lubricants, leads to the contamination of the lubricating medium and to the very difficulty which it is necessary to avoid if the motor's bearings are to be kept free from harm. But a very few drops of kerosene oil will be required to so reduce the value of the lubricant that the oil film will be ruptured and the spindles will be let down on the journal brasses, which they will seize.

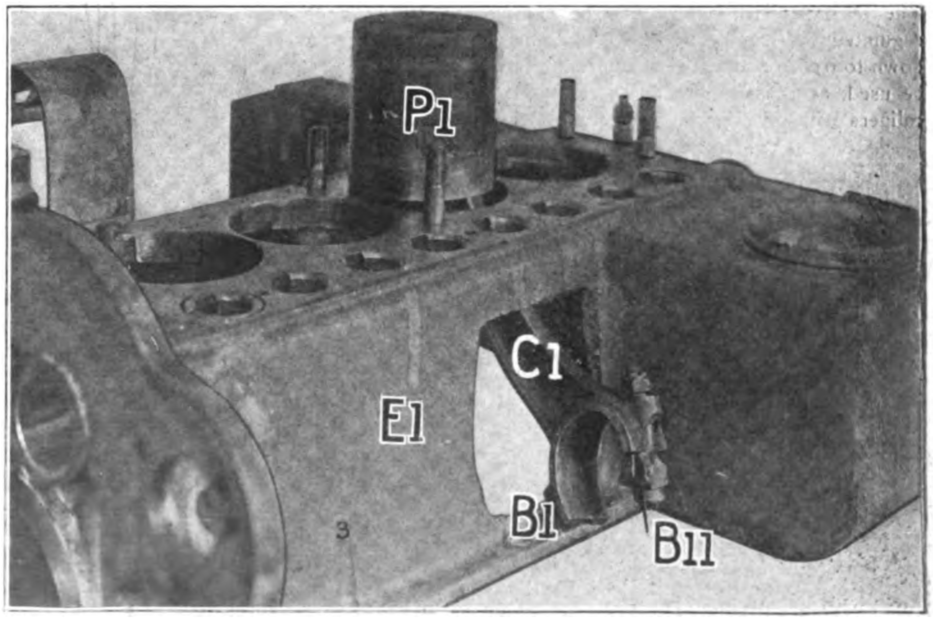
Stray Thoughts

On "the Ambitions of the Automobile Industry" or What They Ought To Be

SOME very fine problems are involved in making 10,000 automobiles with a capital of $10,000 and making them all alike and selling them at a profit at $1,000 for each and having each of them better than anything that could be bought for four times more money four years ago, and all those things. But there has to be division of interests in this world, just as there has to be division of labor, unless one is willing to split oneself up into atoms. An individual's interests cease distinctly when nearly all the things that are done are aimed at money-making for the other fellow and every improvement is pushed aside because it interferes with the regular routine of manufacture. The other fellow is vitally concerned, of course, as are all those who are to share in the profits. A little glow of satisfaction can even be derived from reflecting that the time is drawing nearer when every farmer and every expressman will be able to buy a car to help him out in his business, and any one can appreciate that every now and then this automobile production under high pressure uncovers some new way of mixing or of working steel which eventually may be of benefit to the engineer, who is doubtless willing to pick up and utilize these incidental gains as soon as they are ripe.

Meanwhile it would doubtless interest the public—the motoring portion, at least—much more to learn that, for example, a plan had been devised for doing away with the gasoline tank. Some one might get up a standard size of gasoline can—to hold three gallons, say—and have that sold all over like sugar, only sealed; and provide a couple of cradles with clamps for holding these cans in each car and an attachment with a nut and a pipe or anything to enable one to draw direct from either can. When one can was empty one could start drawing from the other and at the next stopping place simply exchange the empty can for a full one.

There would be decidedly less bother pouring gasoline or getting it dirty or full of water, and there would always be some on tap. The cans could be removed at home and the owner could store his car where he pleased without getting into trouble with the insurance people.



Disastrous effects may be caused by the bearing seizing and breaking a bolt, with results similar to those here depicted

It Stands to Reason

THAT A PURCHASER OF AN AUTOMOBILE IS IN THE GRAVEST DANGER OF TAKING TITLE TO WHAT HE CANNOT GENERATE A PERMANENT LIKING FOR WHEN HIS MIND BECOMES WRAPPED UP IN A SINGLE THOUGHT

That a tomato-can may be a satisfactory carbureter, but that the price to be paid should be on a tomato-can basis.

That purchasing an automobile is like venturing on the sea of matrimony; the sterner side is hidden; the smile might rub off.

That the idea of the mother-in-law being an index of the wife works out in automobiles; look at the service which is being rendered to ascertain the character of the service that you will experience.

That wisdom goes on a vacation while a man of little sense purchases an automobile based upon the envy that his neighbors will be able to support.

That the neighbors get the laugh on the man who wants them to coddle the envy that he pays so much to deliver.

That it is far better to purchase a modest automobile and reserve a few dollars for purposes of maintenance.

That a high-powered motor, so-called, is a mess of junk in the absence of a good carbureter.

That the average purchaser is over-awed by size; why not invest in a mountain; it comes by the acre.

That one good magneto is worth a bushel of poor ones.

That there are hundreds of automobiles delivering poor service for want of a good spark-plug.

That automobilists fail to appreciate what it means to keep a high voltage from jumping out of bounds; keep the spark-plugs clean; keep oil away from the wiring.

That excesses of lubricating oil are at the bottom of a large number of motor troubles.

That even the muffler will foul up in time if too much lubricating oil is used.

That it is a shame to pay so much for lubricating oil and then waste nearly all of it.

That profuse lubrication, while it sounds good as a phrase, is likely to end in a spree.

That it is not good for bearings to go on a spree.

That the excesses of lubricating oil dissolve the tires, accumulate dirt, and invite the owner of the automobile to keep from soiling his garments.

That simplicity does not consist in leaving some of the parts off an automobile and then going around bragging about the good qualities that it has a monopoly of; the best of the good qualities might reside in the parts that are left off.

That the "extras," so-called, may be necessities, in which event they are only to be classed as extras when the purchase is being made.

That things thrown in for good measure might just as well be left out as far as good value in them is concerned.

That it is better as a rule to buy what is needed; the quality will then be what is wanted, and the price, all points considered, will be the lowest.

That it is proper to include everything for comfort and convenience; when a trip is to be made in an automobile, it is just as desirable to be comfortable as when a journey is to be endured in a house-boat.

That it is a simple matter to dismiss the purchase of necessities until a later date; but it might be too long deferred and the cost of neglect would then have to be faced.

That proper lighting facilities must be procured whether they come extra or regular; get the best; make the purchase while the subject is up; why make two bites of a cherry?

That a lighting dynamo is a very desirable adjunct to a good automobile; it is a constant and reliable source of an adequate supply of electrical energy.

That acetylene lighting is admirably accomplished when a gas-tank is used; the cost is low enough; facilities for exchanging filled for emptied gas-containers must, of course, be near at hand.

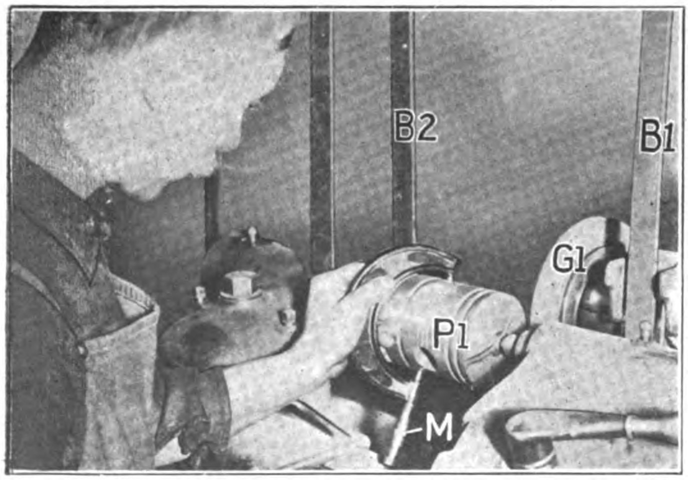
That acetylene generators are so much refined that any automobilist of ordinary intelligence will be able to make them work satisfactorily—get a good generator.

Fitting New Pistons

Explaining How the Pistons Are Treated from the Blank to the Finished Article

IT avails about as much to run an engine with the pistons a bad fit in the cylinders as to attempt to play "Hamlet" with the principal character left out. The life and soul of the motor lie in proper compression, which can only be attained if the pistons are a snug fit. Opinions differ as to the exact amount of clearance between the cylinder and piston required to arrive at this, but if the clearance is more than the outside estimate nothing will rejuvenate the motor unless new pistons are fitted.

As a temporary remedy new rings are often tried, but it is so much money thrown away to thus fuss around. Go to the root of the trouble, and if the car is to be used at all get new blanks from the makers, if possible 1-4 inch more in diameter than the old ones. Presuming the cylinders have been lapped—that is to say, evened up to a uniform diameter—this measurement should be carefully taken and the piston fitted up for grinding in the manner shown in the illustration. The polish given by the grinding method does away with the long process of running in the part if ordinary turning is resorted to. The grinding wheel G1 rotates clockwise, driven by the belt B1, while the piston P1 turns in the opposite direction, driven by the belt B2. The travel of the wheel can be set automatically or can be regulated by hand. For this class of work, where precision down to 0.001 of an inch is required, micrometer calipers M1 must be used, as it is impossible to ascertain with the ordinary bow calipers with any degree of exactness the thickness of the work.



Showing method of grinding pistons for cylinders that have been lapped out

Paint and Varnish Refinements

M. C. Hillick Discusses the Problems of Finishing for 1911

PUBLICATIONS devoted to the interests of automobile manufacturing and marketing have during the past few weeks been busy imparting information to their readers concerning changes in body construction, suspension, type, motors, propulsion and so on of the 1911 car. And while all these changes have been arranged for, the painters and finishers, whose work is, more than anything else, the visible thing which helps sell the car, have not been idle. As a matter of fact, when Milady and her escort visit the Madison Square Garden Automobile Show in January she will find original and unlooked-for color creations, striping effects to move her into an ecstasy of delight, and a finish sure to evoke her unstinted admiration.

For, verily, all these art matters have been provided for by the master of the paint shop and the varnish room.

In the matter of colors it is true that the great range of pigments—sufficient, indeed, to confuse the mind of the layman—all, or chiefly, radiate from a comparatively few members, such as, for example, green, blue, red, yellow, brown and gray. The shades and tints, and the modifications, made up from using the above as basic colors, are, fairly, as the sands of the sea. Every season brings its new crop of colors and the season of 1911, as the coming automobile exhibitions will show, is to be no exception to the rule.

For example, among many new colors to bid for popular approval will be found Detroit and Hudson gray, auto maroon, Niagara and Roman green, Detroit blue, Indian and fire blue. But it will not matter so greatly precisely what the colors are called so long as they have the tone, the brilliancy of effect, the capacity to elicit admiration. This last, in fact, is the real test of color value as it is tried out on the showroom floor and in the salesroom. It may possess other rare good qualities, but, failing in this, prove a loser.

The prospective buyer at the coming shows and elsewhere may expect, and look for, and even demand, some effects in colors which he has not hitherto enjoyed, namely, the proper display of colors with reference to one another. This matter has not heretofore been worked out on the automobile surface to the extent the painters have been capable of, and as a result we have had examples on the heavier type of car, notably the limousine, of colors jumbled together in such a way and in such direct violation of good taste and the law of artistic color effects that the entire color scheme has gone by the boards as crude and amateurish, as it deserved to. As, perhaps, nowhere else, the law of harmony, of seemly contrasts, must be lived up to the very letter on the rich and ample automobile surface. Otherwise the effect will be about as ludicrous as anything the imagination can conjure up.

The automobile surface showing the minimum number of colors, and those colors chosen for their capacity, above everything else, to display and accentuate the charms of each, will prove—indeed is proving—other things being equal, the one most eagerly sought for by buyers.

The great touring cars showing, as a case in point, two colors simply and elegantly displayed, each pigment adding to the attractiveness of the other, are commanding, and are destined to command, an amount of attention from the people whose attention is valuable, which more colors, or the same number of colors unfortunately displayed, can in nowise be expected to command.

The striping of the automobile is a part of the painter's work which may make or mar the appearance of the car. Too much striping is even worse than none at all. As in the employment of the minimum number of colors for the surface, so in the employment of the single, or, at most, the double lines of striping, lies the development of the most fetching effects. Strictly speaking, striping is intended to "set-out," to heighten the effect of the body color.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, ANNUAL MEETINGS AND OTHER FIXTURES

Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 2-7	New York City, Hotel Astor, Annual Importers' Salon.
Jan. 7-14	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 11-12	New York, Annual Meeting, Society of Automobile Engineers.
Jan. 14-28	Philadelphia, Annual Show, Philadelphia Licensed Automobile Dealers' Association, First and Third Regiment Armories.
Jan. 16-21	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A.L.A.M.
Jan. 16-21	Detroit, Mich., Tenth Annual Show, Detroit Automobile Dealers' Association, Wayne Pavilion.
Jan. 16-21	Milwaukee, Wis., Annual Show, Milwaukee Automobile Dealers' Association, Auditorium.
Jan. 28-Feb. 4	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-11	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Feb. 6-12	Buffalo, N. Y., Ninth Annual Show, Automobile Trade Association of Buffalo, Broadway Arsenal.
Feb. 13-18	Washington, D. C., Annual Show, Convention Hall.
Feb. 13-18	St. Louis, Mo., Fifth Annual Show, Coliseum.
Feb. 14-19	Kansas City, Mo., Annual Show, Motor Car Trade Association.
Feb. 15-18	Grand Rapids, Mich., Annual Show.
Feb. 18-25	Minneapolis, Minn., Annual Show, Minneapolis Automobile Show Association, National Guard Armory.
Feb. 18-25	Brooklyn, N. Y., Annual Show, Brooklyn Motor Vehicle Dealers' Association, 23d Regt. Armory.
Feb. 18-25	Binghamton, N. Y., Second Annual Show, Binghamton Automobile Club and Chamber of Commerce, State Armory.
Feb. 18-25	Newark, N. J., Fourth Annual Show, New Jersey Automobile Exhibition Co.
Feb. 20-25	Cincinnati, O., Annual Show, Cincinnati Automobile Dealers' Association.
Feb. 20-26	Omaha, Neb., Annual Show, Omaha Automobile Association.
Feb. 21-25	Baltimore, Md., Annual Show, Automobile Club of Maryland, Fifth Regiment Armory.
Feb. 24-27	New Orleans, La., Annual Show, New Orleans Automobile Club.
Feb. 25-Mar. 4	Toronto, Ont., Automobile Show, Ontario Motor League.
Feb. 27-Mar. 4	Kansas City, Mo., Fifth Annual Show, Kansas City Automobile Dealers' Association, Convention Hall.
Mar. 4-11	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.
Mar. 14-18	Syracuse, N. Y., Third Annual Show, Syracuse Automobile Dealers' Association, State Armory.
Mar. 14-18	Denver, Col., Annual Automobile Show, Management Motor Field, Colorado Auditorium.
Mar. 15-18	Louisville, Ky., Annual Show, Louisville Automobile Dealers' Association, First Regiment Armory.
Mar. 18-25	Pittsburg, Annual Show, Pittsburg Auto Show Association (Inc.), Exposition Hall.
Mar. 25-Apr. 1	Buffalo, N. Y., Fourth Power Boat and Sportsmen's Show, Sixty-fifth Regiment Arsenal, Buffalo Launch Club.
Mar. 25-Apr. 8	Pittsburg, Fifth Annual Show, Duquesne Garden, First Week, Pleasure Cars; Second Week, Commercial Trucks. Automobile Dealers' Association of Pittsburg, Inc.
Apr. 1-8	Montreal, Can., Automobile and Motor Boat Show, Automobile and Aero Club of Canada.

THE AUTOMOBILE

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STANDING on any corner of a business thoroughfare watching automobiles go by affords food for serious reflection to the man who studies the economic problem, and among the things which come to the surface mention may be made of spreading wheels and the poor alignment of the front with the rear wheels. When the snow is on the ground and the average automobilist finds by inspection that the front and rear wheels do not track with each other he may take it as a sign that the alignment is poor. Considerations of economy are founded on the proper alignment of the front with the rear wheels, although it is considered good practice to have the front wheels toe in slightly. In dealing with the lining up of wheels in THE AUTOMOBILE of this week the methods in vogue in some of the garage repair shops are illustrated, and since the process involved is relatively simple, one would fail to understand why any automobilist should throw away 25 per cent. of the value of his tires rather than to align the wheels.

* * *

ALUMINUM, as it is used for crankcases and transmission gear boxes, is supposed to be of the first quality, but if an automobilist has the misfortune to become "shipmate" with a broken crankcase he will at once take a keen interest in the problem involved and he will have to determine for himself whether or not he will call upon a repairman or procure a new case from the maker. Under the head of "Practical Repairing" this problem is discussed at some length in THE AUTOMOBILE this week, and quite a little space is devoted to that part of the subject which will help the automobilist to understand whether or not the quality of the material present in the event of a broken crankcase will be such as to encourage the making of a repair. If the material in any given case passes a critical inspection as to its physical characteristics it will then be time enough to utilize the oxy-acetylene flame and such other facilities as may be had with a view to welding the broken parts.

* * *

COMMUNICATIONS continue to come to the Editor bearing upon the subject of the mathematical determination of the horsepower output of internal combustion motors as they are used in automobile work. It is almost strange that anyone would regard an empirical formula as having any great virtue, particularly in view of the fact that a plurality of companies are paying real money to engineers of considerable reputation for no better purpose than to design motors so that they will deliver power on a satisfactory basis. If the whole subject is encompassed in an empirical formula that in itself is so simple that an office boy might commit it to memory in twenty minutes, it is past understanding why a pay-roll should be considerably bulged for the purpose of recompensing men of accentuated skill. As a matter of cold hard fact the formula tells nothing.

* * *

WHETHER or not an automobile motor will be highly efficient in the delivery of mechanical power or most efficacious as a stove or heater depends entirely upon the thermic balance, and judging from the character of discussion which emanates from even high sources it is not believed that the thermic relations are given the serious consideration to which they are entitled. But there is no reason why even an automobilist might not make himself quite familiar with the reasons why a motor will either deliver power or act like a stove, for instance; in other words, an ordinary kitchen range is looked upon as being a faithful servant if it furnishes heat. The stove differs from the motor when the latter is working properly, in that mechanical power is the product, but when a motor is in poor health it is mostly noted for its ability to imitate the kitchen range. All these thermic relations are being clearly expounded in THE AUTOMOBILE under the head of "Cantor Lectures," and the automobilist who wishes to know the difference between the motor in his automobile and the stove in his kitchen is in a position to acquire the information.

* * *

RECOUNTING the cost of a tour in THE AUTOMOBILE this week, involving a distance of 4,309 miles, taking thirty-nine traveling days, brings to light several important details, as, for illustration, the average traveling was on a basis of 110 miles per day. The trip was made over a great variety of roads between Freehold, N. J., and Billings, Mont. The total of the expenses of the trip was $3,507.55. A casual examination of the items of expense would lead one to the conclusion that the hotel bills were rather frequent and too large to suit the pocketbook of a man of ordinary means. The tire bills are also something to notice, and gasoline at 20 cents per gallon seems too high. It would seem possible for a man who first makes suitable preparation and thereafter drives his own automobile to conclude a tour of this magnitude well within the cost in this particular case.

News Section

HAPPENINGS OF THE WEEK IN VARIOUS SECTIONS OF THE COUNTRY AS GATHERED BY THE 84 SPECIAL WRITERS AND CORRESPONDENTS OF "THE AUTOMOBILE"

S. A. E. Program to be Interesting—News of the Shows Throughout the Country—New Jersey Automobile and Motor Club Quits A. A. A.; Louisville Club Will Follow Suit; Belated Action of A. A. A. on Disqualifications—Refinements to be Seen at the Paris Salon—News of Maker and Dealer in Many Fields—Peeps Through Auto Goggles at Foreign Lands—Short Personal Items of Interest to the Trade, Etc.

S. A. E. Program to Be Interesting

ASSEMBLING in New York when the metropolis is seething with automobile interest, the Society of Automobile Engineers will hold its annual meeting January 11-12, 1911. The sessions will be held in the quarters of the Automobile Club of America.

The opening session will probably be along the usual lines, including an opening address by President H. E. Coffin, followed by election of members and reports of the treasurer and council. Reports on the election of officers and a discussion of proposed amendments to the constitution of the society will probably conclude the session.

The first professional session is scheduled for the afternoon. According to reports, it will include papers on "Electro Steel," by Joseph Schaeffers; "Physical Facts Relating to Metallurgy," by Radclyffe Furness; reports of the Committee on Standards, including those of divisions on the various metals, parts and generally on standardization. A. L. McMurtry, who has been particularly active in contest work from the technical viewpoint, will deliver an address on "Contest Rules that Affect the Engineer." The matter of contests will be treated in two or more additional papers, one of which will be by Chester S. Ricker, who will discuss timing and coaching.

Wednesday evening will be devoted to a reception at which the retiring president and the president-elect will speak. This will be followed by the annual dinner and entertainment.

The last day of the meeting will be very busy. A professional session will convene at 9 o'clock, at which a number of important subjects will be covered. Logan Waller Page, of the Department of Agriculture, will treat of the construction of highways for motor traffic. "Leaf Springs," E. K. Rowland; "Valve Systems," E. P. Batzell; "Hot-Roller Gears," H. N. Anderson, and "Commercial Gasoline," by F. H. Floyd, are among the subjects that are reported to have place on the program of the session.

Thursday afternoon's professional session will be occupied by half a dozen addresses, including the following: "Bearing Metal Tests," S. P. Wetherell, Jr.; "Test of Franklin '20' Air-cooled Car," L. R. Evans; "Development of Grinding Wheel," G. N. Jeppson; "Methods of Grinding," John C. Spence; "Frictionless Friction Drive," C. E. Duryea; "Fire Protection," N. B. Pope; "Multi-point Ignition," Otto Hains.

"Commercial Vehicles" will be the subject of the evening session. "Standardization" will be treated by W. P. Kennedy; "Vertical Motors under Foot Boards," by B. D. Gay; "Proper Speed," by P. H. Breed; "Chain Drive for Trucks," by the same speaker; "Gasoline-Electric Transmission," Alex. Churchward; "Foolproofing the Commercial Car," A. J. Slade; "Co-operation between the Electric Vehicle Maker and Central Station," Robert McA. Lloyd; "Multiple Uses of Municipal Service Machines," John M. Mack; "City Merchandise Transportation," Hayden Eames; "Production of Commercial Vehicles," Charles E. Hadley; "The Ampere-hour Meter," C. A. Lamphier, and several other interesting papers will be presented by eminent engineers.

It is understood that many other subjects may be introduced.

Stoltz Reorganizes Croxton-Keeton Co.

J. P. Stoltz, of New York, and H. D. Michaels have effected a reorganization of the Croxton-Keeton Motor Company, of Massillon, Ohio, which has been in the hands of the courts since last Summer. The name of the company has been changed to the Croxton Motor Company, capitalized at $250,000, of which $150,000 will be common and $100,00 7 per cent, preferred stock.

The transaction was completed last Saturday, and the new management took hold immediately.

Production had not been stopped completely during the receivership, and all the new concern had to do was to put on more men. After his return to New York Mr. Stoltz informed THE AUTOMOBILE that he expected to have about 100 men working by the first of the year and that a still larger force might be put on in the near future.

H. A. Croxton, founder of the company, will remain as president and general manager. Mr. Croxton is favorably known to the trade. Mr. Stoltz is vice-president and will have charge of the Eastern distribution, with headquarters at New York. Mr. Michaels is secretary and treasurer of the reorganized company.

The amount of cash involved in the transaction was $75,000, and a settlement with the creditors had been previously effected on a basis of 25 per cent.

The holders of the preferred issue of the Croxton-Keeton company will receive an equal number of similar shares in the new concern. The company has filed articles of incorporation at the Ohio capital. The incorporators, besides the three officers heretofore named, are: W. E. N. Hemperley and Charles P. L. McLain.

In commenting upon the situation, Mr. Stoltz said: "Conservatism will be the keynote of our activities. For the present practically the same line will be manufactured, but a number of improvements are being considered. The record of the car speaks for itself."

All idea of moving the factory from Massillon to some other location in Ohio has been abandoned.

Storage Battery Displaces Horse

Gould storage battery cars have been installed on the Twenty-eighth and Twenty-ninth street cross-town line in New York. The new cars take the place of the antiquated, ark-like, horse-drawn cars that have proved such a joke to rural visitors in New York for ten years.

The new cars so far have proved satisfactory and a vast improvement over their ancient predecessors.

News Notes of the Coming Automobile Shows

AFTER the gasoline pleasure vehicle section of the A. L. A. M. show closes at Madison Square Garden, the commercial or freight vehicles will have their innings. The truck section will exhibit in practically the same decorative surroundings as were used by the pleasure cars and the appended list of exhibitors indicates that this section will prove the greatest of its class ever attempted.

Special program features are being arranged for the week which will attract a big attendance, in the opinion of those who have charge of the show. A complete and official list of those who will show trucks, electrics and accessories is as follows:

MAIN FLOOR

1a F. B. Stearns Co.
2a R. L. Morgan Company.
3a Pierce-Arrow Motor Car Co.
4a The Waverly Co.
5a Knox Automobile Co.
6a Hupp-Yeats Electric Car Co.
7a Peerless Motor Car Co.
8a Metzger Motor Car Co.
9a The Autocar Company.
10a Reliance Motor Truck Co.
11a Rapid Motor Vehicle Co.
12a Alden Sampson Mfg. Co.
13a Grabowsky Power Wagon Co.
14a The Lansden Company.
15a Studebaker Automobile Co.
16a The White Company.
17a Packard Motor Car Co.
18a Mack Bros. Motor Car Co.
19a American Locomotive Co.
20a General Vehicle Co.
21a Anderson Carriage Co.

ELEVATED PLATFORM

101a Buick Motor Co.
102a Cartercar Company.
103a Pope Mfg. Co.
104a Daimler Import Co.
105a H. H. Franklin Mfg. Co.
106a Reo Motor Car Co.
107a Willys-Overland Co.
113a Brush Runabout Co.
114a Atlas Motor Car Co.
115a Randolph Motor Car Co.
116a W. H. McIntyre Co.
117a The Garford Co.
118a Ward Motor Vehicle Co.
119a The Kissel Motor Car Co.
122 The Goodyear Tire & Rubber Co.
123 The Whitney Mfg. Co.
124 The Veeder Mfg. Co.
125 The Hartford Rubber Wks. Co.
126 The Badger Brass Mfg. Co.
127 The B. F. Goodrich Co.
128 The Diamond Rubber Co.
129 C. F. Splitdorf.
130 Gray & Davis.
131 G & J Tire Co.
132 Morgan & Wright.
133 National Carbon Co.
134 Light Mfg. & Fdy. Co.
135 Baldwin Chain & Mfg. Co.
136 Phineas Jones & Co.
137 A. O. Smith Co.
138 National Tube Co.
139 Diamond Chain & Mfg. Co.
140 The Jones Speedometer Co.
141 N. Y. & N. J. Lubricant Co.
142 C. A. Mezger, Inc.
143 Weed Chain Tire Co.
144 Continental Rubber Works.
145 Wheeler & Schebler.
146 Pennsylvania Rubber Co.
147 Remy Electric Co.
148 Consolidated Rub. Tire Co.
149 The Randall-Faichney Co.
150 The United States Light & Heating Co.
151 Republic Rubber Co.
152 The Conn. Tel. & Elec. Co., Inc.
153 The Chandler Co.
154 Columbia Nut & Bolt Co., Inc.
155 Coes Wrench Co.
156 Hartford Suspension Co.
157 Edmunds & Jones Mfg. Co.
157a Adam Cooks Sons.
158 Morrison-Ricker Mfg. Co.
159 J. H. Lehman Mfg. Co.
161 Chas. E. Miller.
162 A. W. Harris Oil Co.
163 Standard Roller Bearing Co.
164 The Firestone Tire & Rubber Co.
165 Oliver Mfg. Co.
166 The Timken Roller Bearing Co.
167 The Timken-Detroit Axle Co.
168 Pittsfield Spark Coil Co.
169 Spicer Mfg. Co.
170 Brown-Lipe Gear Co.
171 Swinehart Tire & Rub. Co.
172 Warner Instrument Co.
173 J. H. Williams & Co.
174 Kokomo Electric Co.
175 Warner Gear Co.
176 The Standard Welding Co.
177 The American Ball-Bearing Co.
178 The Fisk Rubber Co.
179 A. R. Mosler & Co.
180 Gabriel Horn Mfg. Co.
181 Castle Lamp Co.
182 Joseph Dixon Crucible Co.
183 Valentine & Company.
184 Heinze Electric Co.
185 Vacuum Oil Company.
186 Briscoe Mfg. Co.
187 The Wm. Cramp & Sons Ship & Engine Bldg. Co.
189 R. E. Dietz Company.
190 Herz & Co.
191 S. F. Bowser & Co., Inc.

BALCONY

223 Columbia Lubricants Co. of N. Y.
224 Bosch Magneto Company.
225 Michelin Tire Company.
226 Lovell-McConnell Mfg. Co.
227 The Elec. Storage Bat. Co.
228 Continental Caoutchouc Co.
229 Eisemann Magneto Co.
230 Stewart & Clark Mfg. Co.
231 Empire Tire Co.
232 Thermoid Rubber Co.
233 Vesta Accumulator Co.
234 New Departure Mfg. Co.
235 Link Belt Company.
236 The Hoffecker Company.
237 Lebanon Steel Casting Co.
239 Apple Electric Co.
240 The Turner Brass Works.
241 Auto Improvement Co.
242 American Ever Ready Co.
243 Stromberg Motor Devices Co.
244 Muncie Gear Works.
245 Gemmer Mfg. Co.
246 Excelsior Motor & Mfg. Co.
247 Warner Mfg. Co.
248 The Motz Clincher Tire & Rubber Co.
249 Miller Rubber Co.
250 Livingston Radiator & Mfg. Co.
251 The Star Rubber Co.
252 The Royal Equipment Co.
253 Driggs-Seabury Ordnance Corp.
254 The Cleveland Speed Indicator Co.
255 H. W. Johns-Manville Co.
256 The Stein Double Cushion Tire Co.
257 Edison Storage Battery Co.
259 Booth Demountable Rim Co.
260 George A. Haws.
261 The Homo Co. of America.
262 E. B. Van Wagner Mfg. Co.
283 Parker Motor Co.
284 Ross Gear & Tool Co.
285 Crucible Steel Co. of America.
286 Standard Thermometer Co.
287 Isaac G. Johnson & Co.
289 Whitlock Coil Pipe Co.
291 Briggs Mfg. Co.
292 Stevens Mfg. Co.
293 Orlando W. Young.
295 Newark Rivet Works.
700 Bicycling World & Motorcycle Review.
701 F. A. Baker & Co.
702 The Hendee Mfg. Co.
703 Reliance Motorcycle Co.
704 Pontiac Motorcycle Co.
705 N. S. U. Motor Company.
706 The Miami Cycle & Mfg. Co.
707 Harley-Davidson Motor Co.
708 Reading Standard Co.
709 Excelsior Supply Co.
710 Aurora Automatic Machinery Co.
711 Emblem Mfg. Co.
712 Pierce Cycle Co.
713 Consolidated Mfg. Co.
714 Merkel-Light Motor Co.
715 American Motor Company.
716 Marvel Motorcycle Co.
717 Motorcycle Pub. Co.
718 Motorcycling.
719 Eclipse Machine Co.
720 S. D. Manufacturing Co.
721 Motor Car Equipment Co.
722 Wagner Motorcycle Co.
723 H. & F. Mesinger Mfg. Co.
724 The New Era Auto-Cycle Co.
725 Detroit Motorcycle Mfg. Co.
726 Nathan Novelty Mfg. Co.
737 Syracuse & Elbridge Glove Co.

CONCERT HALL

302 Hayes Manufacturing Co.
303 Havoline Oil Co.
304 The Hess-Bright Mfg. Co.
306 Peter A. Frasse & Co.
308 Sparks-Withington Co.
309 Frost Gear & Tool Machine Co.
310 Willard Storage Battery Co.
312 Vanadium Metals Co.
314 Western Tool & Forge Co.
318 The Cupror Co.
319 Atlantic Refining Co.
320 United Steel Co.
321 Vanadium Sales Co.
322 The Century Rub. Trad. Co.
323 Howard Demountable Rim Co.

2ND TIER AND ROOM 7

401 The Wright Wrench & Forging Co.
407 L. V. Fletcher & Co.
412 Philadelphia Steel & Forge Co.
415 International Metal Pol. Co.
415b Calmon Asbestos & Rubber Works.
419 E. M. Benford.
420 C. A. Willey Co.
423 Automobile Tire Co.
426 Reinhold Noflux Aluminum Solder Co.

BASEMENT

500 New York Sporting Goods Co.
501 Merchant & Evans Co.
502 Newmastic Tire Co.
503 Keystone Steel Casting Co.
504 Class Journal Co. (Automobile).
505 Class Journal Co. (Motor Age).
506 The Electric Speedometer & Dynamometer Mfg. Co.
507 Hydraulic Oil Storage Co.
508 Novelty Mfg. Co.
509 Kilgore Mfg. Co.
510 Garage Equipment Mfg. Co.
511 Dorian Remountable Rim Co.
512 The R. M. Hollingshead Co.
518 North East Electric Co.
526 Fegley Tire Chain Co.
536 Fay Machine Tool Co.
539 Fedders Mfg. Works.
540 Randerson Auto Parts Co.
541 The Perfection Spring Co.
543 Star Starter Company.
543a The Lefever Arm Co.
544 Wayne Oil Tank & Pump Co.
545 Joseph Tracy.
546 Ernest Flentje.
547 N. B. Arnold.
548 The Troy Carriage Sun Shade Co.
549 Ajax Trunk & Sample Case Co.
550 Post & Lester Co.
551 Motor Print Co.
552 Motor Vehicle Publishing Co.
553 Gotham Aluminum Solder Co.
553a Luce Mfg. Co.
554 John T. Stanley.
555 Motor.
556 Julius King Optical Co.
557 Jas. L. Gibney & Bro.
558 The Horseless Age.
559 Fred Robinson.
560 The H. S. M. Auto Switch Co.
561 The Power Wagon. Pub. Co.
564 Scranton Auto Equip. Co.
565 Wm. P. Miller's Sons.
566 P. Rielly & Son.
567 Atlas Chain Co.
568 Hilliard Clutch & Machinery Co.
570 The Walter H. Foster Co.
571 Findeisen & Kropf Mfg. Co.
583 Mutual Auto Accessories Co.
584 Barthel, Daly & Miller.
585 S. Hoffnung & Co., Ltd.
586 J. S. Bretz Co.
587 The Simms Magneto Co.
588 Automatic Appliance Co.
589 Nonpareil Horn Mfg. Co.
590 The Lutz-Lockwood Mfg. Co.
591 U. S. McAdamite Metal Co.
592 Gus Balzer.
593 New England Automobile Journal.
595 Harry A. Allers & Co.
596 Automobile Topics.
597 The A-Z Company.
598 Simonds Mfg. Co.
599 Thos. Prosser & Son.
600 Chilton Co.
601 International Enginering Co.
602 Chas. D. Tingley & Co.
603 Frank H. Cross Distributing Co.
604 Chas. J. Dowing.
605 The Eagle Co.
606 A. J. Myers, Inc.
607 The Harrison Radiator Co.
608 Tuttle Motor Co.
609 Westen Mfg. Co.
610 Clayton Air Compressor Works.
612 Keystone Lubricating Co.
617 Sheldon Axle Co.
618 Automobile Supply Mfg. Co
619 Star Speedometer Co.
620 Valve Seating Tool Co.
622 Alfred C. Stewart Machine Works.

Palace Show Cars Now Arriving

There is a gathering of the automobile clans apparent everywhere in metropolitan motor circles, and along with the men who make and represent cars, the cars themselves are coming, too. Every section of the land is contributing by fast freight and express. On account of the fact that the Palace Show comes first on the list of events, the cars that are arriving first are mostly destined for exhibit in that show, which opens New Year's eve and continues in session until January 7.

The aeronautic section of the Palace Show has attracted much attention and the announcement has been made that the Army and Navy Club, the membership of which is 2300, will attend the opening session in large numbers. Weight carrying biplanes and multiplanes will be featured and military and naval officers have signified much interest in them as well as the swifter types, for which a speed of as much as 85 miles an hour has been claimed.

The details of installation of wireless telegraphy in the flyers will be shown in practical form and two machines will receive and transmit messages under conditions that approximate those of service as nearly as possible.

The truck displays will be specially emphasized, the line entered for the show including an interesting lot ranging all the way from the giant $6,000 car that carries ten tons, to the small parcel carriers that negotiate a couple of hundred pounds and cost only a small sum.

The scarcity and high price of horse feed and the inability of Dobbin to compete with the motor truck in good or bad weather or roads, has centered attention on this form of transportation and the management is confident that the truck section will prove popular.

Importers Allot Show Space

Space allotments for the Importers' Salon, which will be held at the Hotel Astor, January 2-7, have been made as follows:

In the section on the left side of the main aisle the C. G. V. Import Company drew the space nearest the door, where C. G. V. and Zedel cars will be shown. The Panhard & Levassor Automobile Company will display Panhard cars in the next space, and the De Dion-Bouton Selling Branch will have De Dion cars in the third space. The Renault Frères Selling Branch drew the first space in the section on the right side of the main aisle, where Renault cars will be shown. A. T. Demarest & Co. will have the next space to display Itala and English Daimler cars. The Benz Auto Import Company of America will show Benz cars in the third space.

Cesare Conti will have the first space under the balcony, at the right of the entrance, to show S. P. A. cars. Henry Ducasse & Co. drew the next space for the display of Darracq cars. The Peugeot Import Company will have the next space for Peugeot cars. Of the spaces at the left side of the room. Burr & Co. drew the one nearest the Broadway side of the room, where they will show examples of fine coachwork. Next to them the S. P. O. Automobile Company will have the S. P. O. and Vinot cars. J. M. Quinby & Co. drew the third space for showing Isotta-Fraschini cars. Glentworth & Jackson will show Napier cars in the end space.

One Hundred Models at Milwaukee Show

Milwaukee, Dec. 19—The first drawing for space at the third annual Milwaukee motor show, to be held this year by the Milwaukee Automobile Dealers' Association, with the co-operation of the Milwaukee Automobile Club, indicates that the show will be far greater in scope and size than any previous exposition.

The drawing was held at the Auditorium on December 15, and representatives of nearly 100 cars, twelve commercial cars and a large number of accessory dealers were allotted space, demanding most of the 95,000 square feet offered by the main hall and corridors, as well as the smaller halls.

The commercial car exhibits will be confined to the basement directly under Main Hall. It is planned to provide 15,000 additional feet of space for accessories by erecting a temporary gallery over the permanent parquet seat section surrounding the arena of Main Hall. This gallery will be 24 feet wide and 600 feet long. The space assignments are as follows:

PLEASURE VEHICLES: Section A—Edward F. Leverenz, spaces No. 22 and 23; American Automobile Company. No. 12 and 13; Buick Motor Car Company. No. 21 and 20; Kopmeier Motor Car Company. No. 29 and 30; Schreiber Motor Car Company, No. 14 and 15; Franklin Automobile Company, No. 24 and 25; Johnson-Burnham Sales Company, No. 31 and 32; Mitchell Automobile Company, No. 27 and 28; Hickman-Lauson-Diener Company, No. 5 and 6; Bates-Odenbrett Auto Compony, No. 18 and 19; McDuffee Automobile Company, No. 16 and 17; Albert Smith, No. 33 and 34; Welch Brothers' Motor Car Company, No. 1 and 2; Studebaker Automobile Company, No. 3 and 4; Emil Estberg, No. 7 and 8; Edgar F. Sanger Company, No. 10 and 11; Johnson Service Company, No. 9; Orrin B. Hughes, Marshfield, Wis., No. 26.

Section C—Warren Motor Car Company, spaces No. 1 and 2; F. A. L. Motor Company, Chicago, Ill., No. 7; Winton Motor Car Company, No. 6; Hearne Motor Company, No. 3; Gove Auto Company, No. 5; Akin Motor Car Company, No. 9; J. I. Case T. M. Company, Madison, Wis., No. 4.

Section D—Curtis Automobile Company, spaces No. 3 and 4; Velie Motor Car Company, Chicago, Ill., No. 1 and 2.

Lobby—West Side Auto Garage, No. 1; Mau Automobile Company, No. 2.

COMMERCIAL VEHICLES: Section 1—Buick Motor Company. spaces No. 3 and 4; Motor Truck Sales Company, No. 5 and 6; Johnson Service Company, No. 16 and 17; Brodesser Motor Truck Company, No. 18; Emil Estberg, No. 2; KisselKar Company, No. 12; Abresch-Cramer Auto Truck Company, No. 7; Orrin B. Hughes, Marshfield, Wis., No. 22; Stephenson Motor Car Company, South Milwaukee, No. 20; Commercial Auto Company, No. 1; Crown Commercial Car Company. North Milwaukee, No. 21; Welch Brothers' Motor Car Company, No. 9; C. F. Megow Company.

ACCESSORIES: Section F—Leo Hofmeister Company, space No. 1; Milwaukee Bronze Casting Company, No. 5; Milwaukee Oil and Tank Company, No. 2; Western Fixture Company, No. 6; Bartles-McGuire Oil Company, No. 4; Wadhams Oil Company, No. 7; Kamblee Company, No. 3.

Section, G—S. F. Bowser & Co., Inc., spaces Nos. 5, 6 and 7; Goodyear Rubber Company, Nos. 1 and 2; Standard Oil Company, Nos. 3 and 4.

Section H—Gross Hardware Company, Nos. 7 and 8; Wallmann Manufacturing Company, Nos. 9 and 10; Auto Supply Company, Nos. 5 and 6; Julius Andrae & Sons Company, Nos. 12 and 13; King Leather Tire Company, Nos. 15 and 16; Milwaukee Auto Specialty Company, No. 11; O'Neil Oil and Paint Company, No. 4; Milwaukee Tire Repair Company, No. 14; Avery Portable Lighting Company, No. 3; Sidney-Hirsch Company, No. 2; Garage Equipmnet Company. No. 18; Racine Auto Tire Company, No. 1.

AUTO TOPS AND BODIES: Rehearsal Hall—Milwaukee Trimming Company, Cream City Trimming Company, A. J. Monday, Charles Abresch Company, Longden-Buyger & Co., Fond du Lac, Wis.

Spaces Allotted at Hartford

Hartford, Dec. 19—Spaces on the main floor of Foot Guard Armory for the forthcoming show of the Hartford Automobile Dealers' Association, which is to be held in February, date as yet undecided, were allotted at a meeting of the association held this week. There are ten spaces on the main floor and an elevated stage, which this season, as in past years, goes to the Ford. Spaces 1 and 2, allotted to Brown, Thomson & Co., will be devoted to the display of the Lozier, Cadillac and Stevens Duryea. Space 3 was drawn by the Capitol City Auto Company, agents for the Mitchell, and Space 4 went to S. A. Miner, distributer of the Pierce Arrow. Space 5, the last on the north side of the building, was allotted to the Reo Automobile Company. On the south side of the building, Spaces 6 and 7 were given to the Palace Automobile Station Company, which will show the Thomas Flyer, Waverley electric, E. M. F. and Flanders. R. D. & C. O. Britton have the next two adjoining spaces and will show the Columbia and Maxwell lines, while the last space on the south side of the main hall goes to S. A. Foster & Co., agents for the Rambler and Regal. Other spaces in the basement, galleries and two front rooms off the main floor have not as yet been given out. The show committee is authority for the statement that there are enough applications on hand to fill two large buildings. An overflow hall is under consideration.

Colonels' Show in Big Armory

Louisville, Dec. 19.—The Fourth Annual Exhibition of the Louisville Automobile Dealers' Association will be held in the First Regiment Armory, which covers more floor space than any other building south of the Ohio River, March 15, 16, 17 and 18. The exhibit will open the evening of March 15.

Several committees have been appointed to make preparation for the show, the most important one being the publicity committee, composed of Hubert Levy, of the Hubert Levy Auto Company, and W. F. Glenn, of the Olds Motor Works.

The dealers have decided to spend considerable more money this year on decorations and expect to do something elaborate in this line. There will be a special department for commercial cars, electrics, accessories and the various trade journals.

Two-Bit Rate Killed at Chicago

CHICAGO, Dec. 19—S. A. Miles on behalf of the National Association of Automobile Manufacturers has made announcement that no 25-cent admission to the coming Chicago show would be in force. In place of such tickets, the exhibitors will be furnished with as many invitations as are needed, for which a rate of 50 cents each must be paid by the exhibitor. After the show the invitations taken up at the gate will be charged against the concerns issuing them, and the balance, if there be any, will be returned.

Among the other rules announced is one prohibiting the showing of commercial cars in the pleasure car section up to February 4. No exhibitor may remove his display from its sectional location until after 10.40 o'clock on closing night. This rule was enacted because of the tendency on the part of exhibitors at former shows to start their cars for the aisles early in the evening of the final night, thus hindering free passage and endangering spectators.

Detroit Space at Premium

DETROIT, Dec. 19—How to apportion 30,000 square feet of floor space among exhibitors sufficient to fill three times that amount was the problem confronting Detroit Auto Dealers' Association officials when it came to allotting space for the annual show to be held in Wayne Gardens, January 16-21.

Manager W. R. Wilmot conducted the drawing for places, the 24 association members having first pick, after which others who desired to be represented were cared for so far as possible.

The complete list of exhibitors is: Buick Motor Co., Brush Detroit Motor Co., J. H. Brady Auto Co., Cadillac Motor Car Co., Cartercar Co., Cunningham Auto Co., Elmore Automobile Co., Ford Motor Co., Grant Bros. Auto. Co., Lozier Motor Car Co., Wm. F. V. Neumann Co., Olds Motor Car Co., Seidler-Miner Auto Co., Standard Auto Co., J. P. Schneider Co., United Motor Detroit Co., Winton Motor Car Co., Security Auto Co., Rapid Motor Vehicle Co., Gillespie Auto Sales Co., Warren Motor Car Co., C. F. Gilmour, Alpena Motor Car Co., Hupp-Yeats Detroit Co., Krit Motor Sales Co., Anderson Carriage Co., Federal Motor Truck Co., Detroit Hupmobile Co., Collins & Co., Charles Berdan, Overland Motor Sales Co., VanDyke Motor Car Co., Phipps-Grinnell Co., Lion Motor Sales Co., Imperial Auto Co., R. H. Evans Motor Car & Parts Manufacturing Co., Amnett Auto Garage Co., Nederlander Auto Sales Co. This gives a total of 40 exhibitors, several of whom will have two or more makes of cars in the gardens, making the show stronger numerically than ever before.

Baltimoreans Confer on Show

BALTIMORE, MD., Dec. 19—Joel G. Nassauer, Thomas S. Young, Joseph M. Zamoiski, H. M. Luzius and Dr. H. M. Rowe have been appointed by the Automobile Club of Maryland the committee to arrange for the annual automobile show to be given at the Fifth Regiment Armory from February 21 to 25, inclusive.

This committee will meet Messrs. Zell, Schaab, Callahan, Duck and one other to be appointed, of the Baltimore Dealers' Association, in an effort to enter into a mutual agreement in handling the show. At this meeting it will be decided whether the club will hold the show as formerly or whether it will be a co-operative affair.

Buffalo Show Promising Affair

BUFFALO, N. Y., Dec. 19—Preparations are in full blast for the ninth annual Buffalo Automobile Show, which is to be held at the Broadway Arsenal during the week of February 6-12, by the Automobile Trade Association of Buffalo.

Although the hall is a capacious one, it appears from the present number of inquiries for exhibitors' space that it is going to be a difficult matter to take care of every one desiring to be represented.

Details Complete at Omaha

OMAHA, Dec. 19—The directors of the Omaha Automobile Show Association met last week and prepared a plat of the auditorium for the automobile show which opens Feb. 20.

Later all of the members of the association met and drew for spaces. There was a general protest for more space, so that it was decided to exhibit all of the trucks down in the basement. This will leave the whole floor of the large auditorium for the exhibition of pleasure vehicles. It was hoped to arrange it so that all of the cars should be exhibited on this floor, but there were too many pleasure cars to be shown.

The Johnson-Danforth Company, now dealing in the Avery truck, applied for membership and the privilege of exhibiting, and was admitted.

This makes a total of twenty-nine automobile dealers and five general accessories dealers who will exhibit. In addition, a dozen more dealers in tops, tires and other accessories have applied for space, and if possible will be accommodated.

Washington Dealers Draw

WASHINGTON, D. C., Dec. 19—With every inch of space allotted, the National Automobile Show, to be held in Convention Hall during the week of February 13, promises to be particularly successful.

The drawing for space took place last week and was attended by every dealer in the city. The hall will be divided into fifty-six spaces, which will be occupied by thirty dealers, representing fifty-four different makes of cars, and seven supply and accessory dealers. The show committee, of which W. C. Long is chairman, has the plans for the show well in hand.

Floor Space Taken at St. Louis

ST. LOUIS, MO., Dec. 19—The St. Louis Show committee reports that there is no more space to be had until the platting of the elevated aisle is completed. This will give 8,000 additional feet of space, and many applications have been received for reservations there, according to the committee. Rigid rules for conducting the exhibit have been adopted, and it also has been decided to advertise the show on an extensive scale within a radius of several hundred miles of St. Louis.

Pittsburgh Show in Exposition

PITTSBURGH, Dec. 19—Exposition Hall has been secured by the Pittsburgh Automobile Show Association for its display, March 18-25. The building is said to be the largest permanent exhibition building west of New York. So far space has been assigned to forty-two exhibitors. Among the recent accessions to the association are the Velie, Alco, Packers Truck, Penn Motor and Pittsburgh Motor companies. Thomas I. Cochran is manager.

Ford and Rambler at Brooklyn

While neither the Ford nor the Rambler will be exhibited at either of the New York automobile shows, both will be exhibited at the forthcoming Brooklyn show. Already definite preparations are being made to accommodate at least 150 displays. Members of the Brooklyn Motor Vehicle Dealers' Association are enthusiastic about the prospects for a successful result of the enterprise.

Will Make Valveless Engine

DETROIT, Dec. 19—The Evans Motor Car & Parts Co. is preparing to put on the market a car incorporating the two-cycle motor controlled by the English Valveless Engine Co. A large plant is all ready to be put into commission as soon as the final details have been arranged, and the manufacture of cars and motors will shortly be undertaken on an extensive scale.

N. J. A. and M. C. Trustees Quit A. A. A.

WAVING a stuffed club over the heads of the victorious forces of motordom in New Jersey, the specter of dissension threatens to nullify the effects of the winning fight made by Jersey automobilists at the late election, when, on the face of the returns, the noxious State law which forbids anyone who lives outside the classic precincts of Jersey from tooling his car within the aforesaid classic precincts unless the regular Jersey license fee had been paid as a condition precedent, was defeated.

The appearance of the specter was not exactly unheralded, for a whole series of mutterings had been audible ever since the club members of Jersey decided last Spring to upset the law.

The form it took was the adoption of a set of resolutions by the New Jersey Automobile and Motor Club trustees to withdraw from the Associated Clubs of New Jersey, and that also means that the second largest automobile club in the United States has withdrawn from the A. A. A.

As nearly as it may be outlined at this time the case is about as follows:

Away back last April, before the primary elections, the clubs decided that Jersey ought to have at least an amendment to the law covering the visits of non-residents en motor. Instead of jailing a few millionaires who had the money and were willing to spend it in Jersey, it was thought advisable to welcome them and their money. The hotel men were particularly enthusiastic about this phase of the matter.

Therefore, the clubs got together and held meetings and appointed committees and adopted resolutions, and readily got down to hard, practical politics. So efficient did this work prove to be that several aspirants for legislative jobs were shelved at the primaries simply because they were non-committal on the subject of the amendment.

The New Jersey Automobile and Motor Club, a giant organization, bore a certain part in the activities of politics. If one credits what its officers and members say, it was the "big noise" of the movement. If one takes the views of the other fellows there might be a question as to its real service.

Nevertheless, when the votes had been counted the night of November 8 it was found that the candidates who had pledged themselves to knock out the old law by passing the important amendment stood out like an army, while the opposition was represented only by a sung little bunch of hold-overs.

Thus far it looked like a perfect "skeeze" for the automobilists. Then appeared the little crack within the lute. It seems that the Newark Club was not exactly in accord with the rest of the organization about the methods that should be used to introduce the bill. Some thought Senator Walter Edge should be father of the bill, while others believed the measure should originate from a Democratic member of the lower house. At any rate a double set of legislation was prepared, and now there is a man-sized fear prevalent that the forces arrayed against the automobile will take heart at the split and oppose the passage of a measure so important to motordom.

Colonels Wish to Secede from A.A.A.

LOUISVILLE, Dec. 19—Considerable of a sensation was sprung in local auto circles at a special meeting of the Louisville Automobile Club, when action was taken which was equal to withdrawal from the American Automobile Association. The local organization held a well-attended meeting at its club rooms in the Commercial Building, and after discussing the question at length the members unanimously decided to call on the directors of the club to request the Kentucky Automobile Association, the State organization, to withdraw its membership in the national body. Louisville controls the vote of the State organization, and it is practically certain that this will be done.

The action of the Louisville Club is explained by one of its officers, as follows: "We have been paying out good money, for which we have received no return. The State Association pays to the A. A. A. $1 a year for every member of the State-wide organization, and we have, therefore, been paying out a big part of our funds for the support of the three A's. This money has been used principally in connection with work in the East and, as far as we are concerned, has resulted in no benefit. We have, therefore, decided it would be best for us to get out."

It is believed by those in touch with the situation that the action of the local club will be followed by that of other automobile organizations in this part of the country, and that later on a compact club association will be organized to promote motoring in the Middle West and South.

A specific request for the financial statement of the A. A. A. for last year, on behalf of THE AUTOMOBILE, was denied by that organization on the ground that a rule had been adopted to first publish the statement in the "house periodical." In commenting on the above article, Chairman S. M. Butler, of the Contest Board, said that if the Kentucky A. A. wished to withdraw, it had that privilege. He said that he had received no information about such contemplated action.

Belated Action of A.A.A. Disqualification

Notwithstanding the fact that the automobile racing season is over until next Spring and that its action will have little actual effect upon the earnings of racing drivers banned by its rule, at least until they have had more than plenty of time to make defence and, perchance, succeed in having their disqualification raised, the Contest Board has taken definite action against certain erring drivers in unsanctioned meetings during the past season.

Those disqualified until January 1, 1912, are the following: Barney Oldfield and his four racing cars; Leslie Henry and the Pacific Coast Motor Racing Association; J. Alex. Sloane, manager of Oldfield; Ascot Park Race Track; J. R. Kittle; Louis Arms, Williams, a Los Angeles agent; Henry Koch; William Carlson; W. H. Faust, Henry Butley and Condit, another agent, all of whom took part in the recent Ascot Park meet.

Charles F. Stamps, L. H. Mellus and W. Gray, who acted as officials at the meet, received a similar sentence, while E. Roger Stearns and Ben Kirscher were suspended for a year, and George H. Clark for two years, the latter because of his driving under an alias.

The cars entered and used by the various banned drivers are specifically barred until 1912.

As an additional penalty on Oldfield, the board has notified the Automobile Club of America of its action, for transmission to the international body at Paris, from which it will be sent to the various national automobile clubs of the world.

The board also paid its respects to the unsanctioned meet held October 1-3 at Norfolk, Va. J. E. Sheldon, Louis S. Hallowell, Coburn Motor Car Company; George Edwards and Edward Allen, who took part in the meeting, were disqualified for one year.

The Maytag-Mason Motor Company, which was disqualified for participating in an unsanctioned meet at Boone, Iowa, was reinstated.

Legagneux Breaks Flight Record

PARIS, Dec. 21—M. Legagneux, holder of the world's altitude record in heavier-than-air machines, established a new mark in distance flights for the Michelin cup to-day when he flew 320.43 miles in one uninterrupted flight.

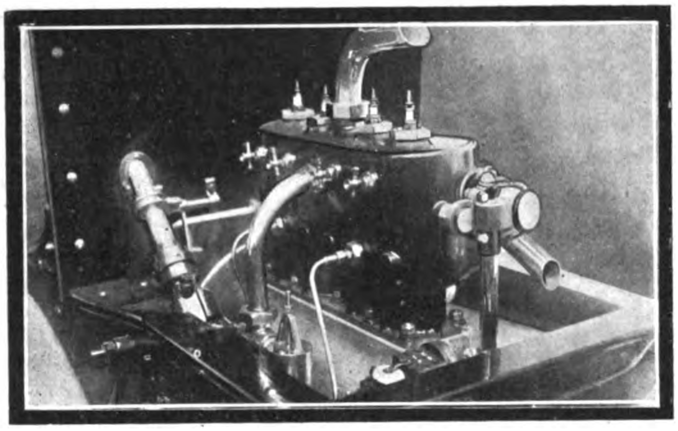
He started at 8:34 a. m. and finished his wonderful flight at 2:35 p. m.

French Refinements of Construction at Salon

PARIS, Dec. 13—Among the features of the Salon are the following:

On the Henriot system of rotary valve motor at the Paris Salon, a patent has been secured on the means for isolating the rotary valve from the combustion chamber at the moment of explosion. Near the head of the cylinder is a large port opening into a circular chamber within which is mounted a roller performing the functions of rotary valve. As can be seen from the illustration, there are two ports in this chamber, one opening into the induction pipe and the other communicating with the exhaust pipe. The rotary valve, which is hollow, has one portion of its face cut away to allow of communication between the combustion chamber and either the intake or the exhaust port.

The distinctive feature is that at the moment of explosion the piston has covered the port communicating with the rotary valve chamber, and only uncovers it after about one-sixth of the down stroke has been accomplished. The valve is thus isolated at the moment of greatest pressure, and it is this feature which, according to the inventor, has given success where other rotary valves have failed. The model shown is a four-cylinder motor in one casting, with the rotary valve carried in two ball bearings and driven off the mainshaft by means of bevel gearing and a vertical shaft.



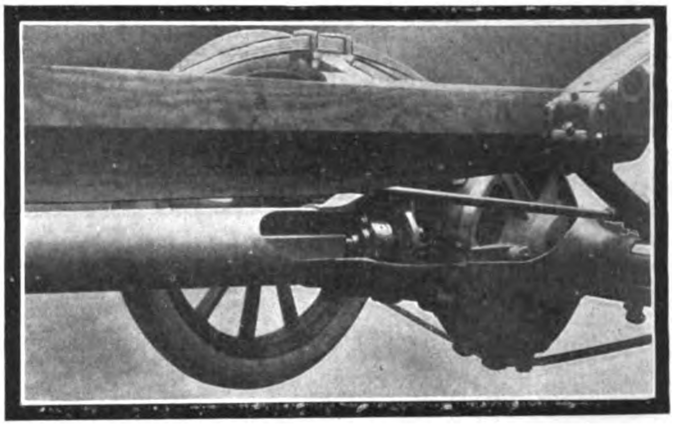
Henriot four-cylinder rotary-valve motor

It is claimed that by the use of a suitable type of cast-iron roller no leaks occur, and that the motor can be run satisfactorily as high as 4,000 revolutions a minute. The surface of the roller is lubricated under pressure by a lead from the crankcase base. One of these motors has been under test for a year on the road.

Berliet has produced a substitute for the poppet valve in the form of a piston valve motor, two pistons being employed for each cylinder, one for the intake and the other for the exhaust, and all connected to an auxiliary crankshaft driven off the mainshaft by spur gearing. The motor shown is a four-cylinder in one casting of 3.9 by 5.5 inches bore and stroke, with all working parts enclosed and the magneto carried across the front of the motor. This substitute for the poppet valve appears to be of such recent origin that the firm is not prepared to say whether it will be adopted in the future or not.

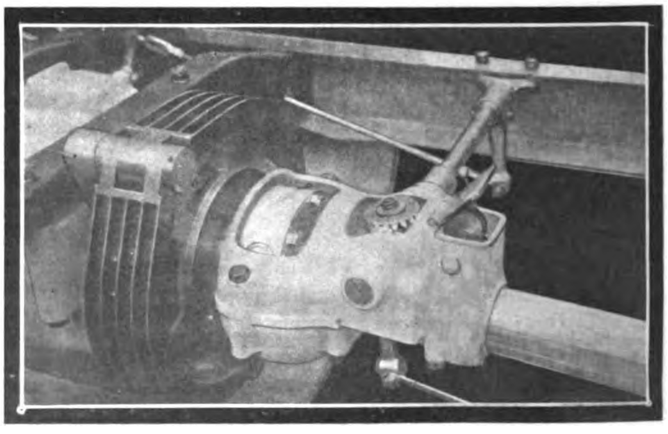
Ballot's attempt to provide a substitute for the poppet valve is in the form of a spherical sleeve in the head of the cylinder and having an oscillating motion by means of a suitably shaped cam on an overhead shaft operated from the mainshaft by a silent chain. As it oscillates the spherical sleeve successively uncovers the intake and exhaust ports carried in the head of the cylinder. The sleeve is kept in contact with the cylinder head by two coil springs.

Self-starters appear to have gone out of favor, for in no case were they to be seen on cars produced by big firms. A substitute for the starting crank was shown on the Mustad stand. The steering column had two wheels, the lower one being attached to an outer sleeve on the steering column and having at its base a bevel pinion engaging with a second pinion on the end of a horizontal shaft. The shaft passed through the dashboard, and at the opposite end, and under the footboards, was mounted a spur pinion. Keyed on the extremity of the motor shaft, just to the rear of the clutch, was another pinion, and between them an intermediate pinion normally kept out of engagement by means of a coil spring. A foot pedal allowed the intermediate pinion to be brought into engagement with the gear wheel on the driving shaft and on the motor shaft. Thus, by swinging round the lower of the two wheels on the steering column, the motor could be caused to turn. On releasing the pedal the intermediate pinion would slip out of engagement, thus releasing the wheel on the steering column.



Sizaire & Naudin rear axle, showing new torque tube. Direct drive on all three speeds

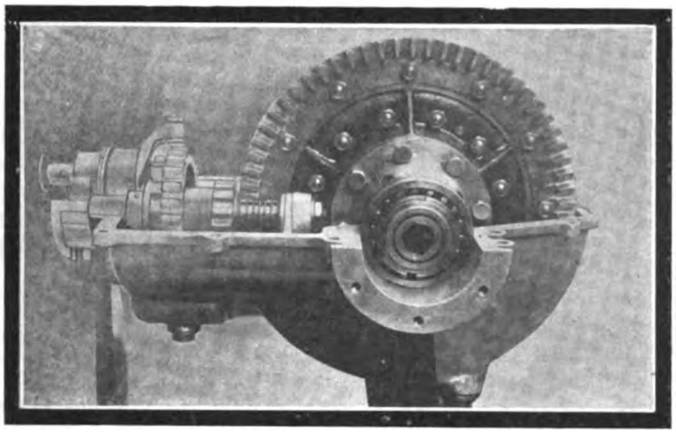
A neat and simple type of tire inflator was shown on both the Hispano-Suiza and the Piccard-Pictet cars, the two being built under the same license. On the gearbox cover was carried a small air-cooled cylinder, similar to a small motorcycle cylinder, with piston and connecting rod, this latter being connected up to a crankshaft having a squared end on which was mounted a spur pinion. By means of a cam and suitable lever projecting through the gearbox cover, the pinion could be moved on its shaft until it was brought into engagement with the 1st speed



Renault brake on transmission encased universal joint; differential gear for rear brakes and oil filler shown open pinion. The pump was sufficiently small and the gearbox carried sufficiently low for there to be no projection above the floor boards. The whole apparatus was most simple, and as the cylinder was only held in position by four bolts it could be readily dismounted.

How Michigan Law Works Out

LANSING, MICH., Dec. 19.—In an address before the American Road Builders' Association, which concluded a three-day session in Indianapolis recently, State Deputy Highway Commissioner Frank G. Rogers explained the highway system of Michigan, dwelling on the State Reward Law and the benefits that the State was deriving from the operation of the law.

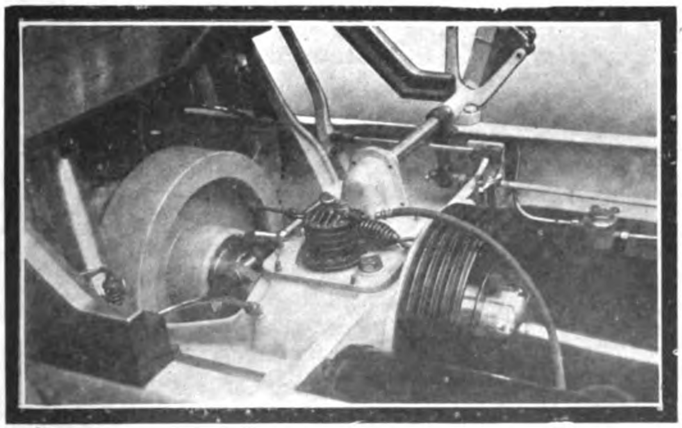


Miolans gear, giving 4 direct drives, right-hand side showing first and reverse speeds, shown at Paris Salon

Mr. Rogers stated that there were 70,000 miles of public highway in the State, and that 790 miles were either constructed or in course of construction under the provision of the law which provides a State reward of $250 to $1,000 per mile.

Maryland Law to Be Changed

BALTIMORE, MD., Dec. 19—Motor Vehicle Commissioner George wants an amendment made to the Maryland Automobile Law, whereby the registration year of licensed machines will begin May 1 and end April 30, instead of, as at present, from January 1 to December 31. He says that under the present arrangement the State loses thousands of dollars in revenue.



Tire pump on the Hispano-Suiza gear box. Behind the pump the external clutch spring will be noticed

By taking out licenses as they do in April or May, they get part-year licenses, obtaining a reduction in fee for each month of the elapsed time between January 1 and the time the license is applied for.

Good Roads for Franklin County

MALONE, N. Y., Dec. 19—Franklin County is to have 152 miles of first-class highways inside of two years as the result of the recent adoption of a bond issue of $500,000 by unanimous vote of the supervisors.

It is planned to expend $3,000 a mile on construction work, and the first section to receive attention will be through the Adirondacks from Saranac Lake to Malone, passing through Paul Smith's, Meacham Lake and Cheem Falls. This will connect with the State road leading from Malone to the Canadian border.

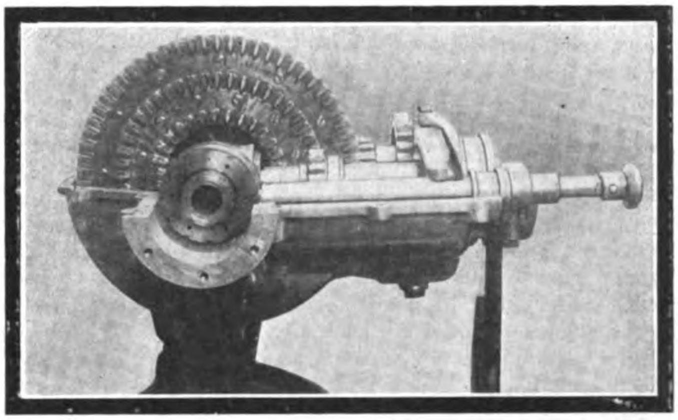
In connection with this project, the Canadian government has agreed to build a macadam boulevard from the international line into Montreal, following the St. Lawrence.

Work will commence in the Spring, and it is said that it will be completed, so far as the first section is concerned, in time for the 1911 touring season.

The project, which was suggested in practical shape by County Superintendent of Highways S. M. Howard, has received the support of farmers and merchants as well as hotel men.

Portola Race Again Postponed

SAN FRANCISCO, Dec. 19—Once again the Portola Road Race has been postponed. According to the latest plans the event is to be held over the San Leandro course on Washington's birthday, and is to be known as the Oakland-Panama Pacific Road Race.



Miolans gear with 4 direct drives, showing 2nd, 3rd and 4th speeds

The events are to be the same as scheduled for January 2. Manager Ferris announces that Los Angeles dealers will enter the following cars: Fiat, Isotta, Apperson, Simplex, Pope-Hartford, Only, Mercer, Maxwell and Staver-Chicago.

Ferris has the sanction and support of the Oakland and San Francisco dealers. He has been required to put up a $12,000 bond.

Insurance Companies Raise Ban

Insurance companies have withdrawn the restrictions whereby gasoline trucks were denied admittance to steamship piers in New York City.

Some time ago the insurance companies established a rule requiring occupants of piers, railroads and steamship companies to sign a warranty to the effect that such trucks could not be admitted upon their piers, and unless such warranty was signed an extra premium of 50 per cent would be charged. As a result of this dealers have found that a great many merchants have refused to supplant their horse-drawn delivery systems by motor trucks, owing to the necessity of whatever trucks they used frequently visiting the docks and piers to deliver or receive freight. The railroad and steamship lines have pointed to the attitude of the insurance companies as their reason for refusing admittance to the trucks.

News of Maker and Dealer in Many Fields

CLEVELAND, O., Dec. 19—A. C. Leonard, driver for W. T. Boutell, of Minneapolis, has been awarded $1,000 as first prize in the Winton Six upkeep contest for 1910. Between April 1 and November 30 Leonard drove Mr. Boutell's Winton Six a distance of 21,127 miles at a total repair expense of $1.40.

Second money, $500, was awarded to G. W. Butler, driver for J. E. Clenny, of Chicago. Butler drove 19,015 miles on a total repair expense of 30 cents.

Other prizes were awarded as follows

Third, $250, won by P. W. Mulford, driver for W. J. Friedlander, of Cincinnati; 18,809 miles; repair expense, 30 cents.

Fourth, $150, won by Wm. E. Ochsie, driver for Martin Daab, Hoboken, N. J.; 17,130.9 miles; repair expense, none.

Fifth, $100, won by John J. Boyce, driver for Isaac Bacharach, of Atlantic City; 17,390 miles, repair expense, $3.46.

Sixth, $100, won by Chas. A. Rice, chauffeur for L. T. Peterson, of Youngstown, O.; 15,790 miles; repair expense, none.

Seventh, $100, won by John T. Wilson, driver for W. B. Martin, of Cleveland; 14,847 miles; repair expense, none.

Eighth, $100, won by Michael Stone, driver for H. M. Cheney, of Toledo; 14,059 miles; repair expense, none.

Ninth, $100, won by Wm. G. Hyatt, driver for S. S. Boothe, of Los Angeles; 13,526 miles; repair expense, none.

Tenth, $100, won by Guy C. Davis, driver for Horace J. Phipps, of Boston; 14,208 miles; repair expense, $1.50.

The total distance driven by these ten men was 165,901.9 miles. and the total repair expense was $6.96.

G. J. G. Company to Build Runabout

WHITE PLAINS, N. Y., Dec. 19.—The G. J. G. Motor Car Company has made announcement that it would turn out a new type of runabout, beginning Feb. 15. The motor has four cylinders, 3 5-8 by 4 1-4 inches, cast of gray iron. The crank and cam shafts are drop forged, supported on Parsons' white metal bearings. The ignition system is by magneto, and the circulation is provided for with a centrifugal pump and Mercedes radiator. Cone clutch, splash lubrication, semi-floating rear axle and other standard features are included in its specifications.

Dealers Display New Cars

SPRINGFIELD, MASS., Dec. 19—The local dealers and representatives have now on display most of their 1911 models and automobile accessories in spacious and attractively decorated quarters, noteworthy among them being the Norcross-Cameron Company and William H. Dexter. The Norcross-Cameron Company have an up-to-date garage and salesrooms neatly decorated, along with an excellent display of 1911 models of the Peerless, Chalmers, Hudson, Buick and Waverly cars, for which they are the Springfield representatives.

William H. Dexter, in addition to a line of Cole cars, has added a display of the models of the Paige-Detroit cars, ranging in prices from $875 to $1,250.

Most of the automobile dealers and agents throughout the city report many new orders for 1911 cars, and it is the opinion that this will be the best season so far.

Maytag Company Reorganized

WATERLOO, IA., Dec. 19—The Maytag-Mason Motor Company recently has been reorganized, with capitalization of $1,000,000, and plans are being made to increase the yearly output from 1,000 cars to 2,500. The 1911 line includes seven models of pleasure cars on three different sizes of chassis, 26, 35 and 40 horsepower, respectively.

The company has made and marketed a two-cylinder motor, with which a favorable impression has been made in competition, both for speed and economy. The company plans to go into contest work on a larger scale next year.

In addition to the line of pleasure cars, the company manufactures a number of small trucks ranging in capacity from 900 to 1,800 pounds.

U. S. Motor Co. Annual Meeting

Reporting that business from August to November, 1910, exceeded that of the corresponding period of last year by 51 per cent., the United States Motor Company assembled in annual meeting Tuesday at Jersey City. The chief business on the calendar was the election of a board of directors and the entire incumbency was re-elected as follows: Benjamin Briscoe, J. C. Brady, J. D. Maxwell, C. G. Stoddard, K. B. Schley, Frank Briscoe, Horace de Lisser, J. H. Edwards, R. Irvin, H. Lloyd, O. J. Mulford, H. W. Nuckols, R. A. Robinson, J. W. Wellington and C. Tucker.

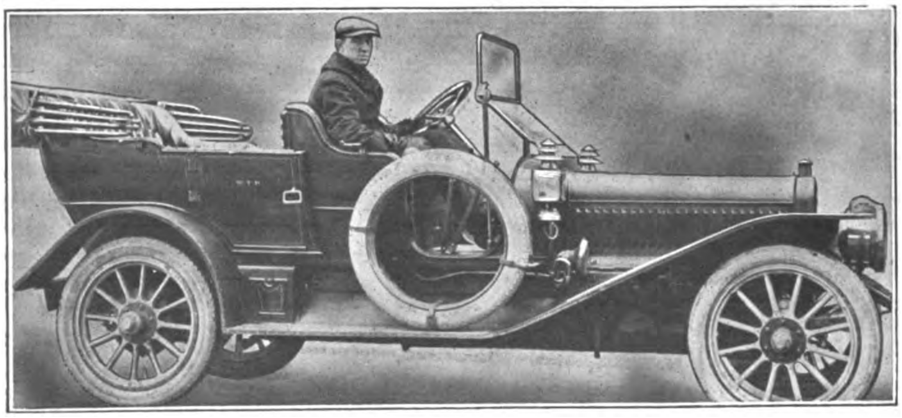
The directors are scheduled to meet again in the near future to elect officers.

Low Rates Please Moline Makers

MOLINE, ILL., Dec. 19—Announcement that the Trunk Line Association has granted reduced rates to the Madison Square Garden show in New York was hailed with delight by automobile manufacturers, dealers and owners in this vicinity. The Middle Western representatives promise to be present in force for the annual event. Local factories will be represented. C. H. Van Dervoort, sales manager, and Frank Salisbury will attend from the Moline Automobile Co. and will be in charge of an exhibit.

Workmen in the factory of the Mid land Motor Co. are busy preparing special exhibition chassis and motor for the Madison Square event. The Midland people are just getting out their 1911 models and, though late, these machines have more than the usual number of new features.

The Midland Motor Co. is planning to enter a 6-cylinder racer in the 500-mile race on the Indianapolis motor speedway May 27 of next year and expresses high hopes for the car.



Driver Leonard, winner of Winton upkeep prize

Peeps Through Auto Goggles at Distant Lands

MADRID, Spain, is waking. For the accommodation of automobile tourists a new hotel has just been opened. It is an up-to-date house, containing 185 fine bedrooms and 75 bathrooms. The proprietors aim to provide their guests "with all the comforts of home," together with a generous measure of cheer which will prompt the guests to declare that "they will always come back." In addition to being conducted on modern lines, this house, like some of the other modern hotels in Europe, has established a special passenger and luggage automobile service, five touring cars meeting all trains.

The splendid condition of the roads of Spain makes automobiling a source of delight in that country, and it is expected that as soon as the Winter wears away the custom of touring, as established by the jolly young King Alfonso, will be resumed with vigor and continue to grow in popularity as favorable conditions in the land of the Dons become known to automobilists, and especially to those from foreign nations who cross the border seeking new highways and byways to conquer.

In England a new spring-wheel for use on motor vehicles is about to be introduced. The periphery of the wheel is composed of eighteen links, each hinged to its neighbor on either side. The links in question consist of triangular blocks of wood, and while the bases make up the periphery, each apex is hinged to a piece of metal which is firmly attached to a volute spring, which is from four inches to five inches in length, according to the weight of the vehicle that has to be supported. The other ends of the volute springs, of which there are eighteen, disposed radially, are affixed to the hub, or rather to a small inner wheel of the ordinary artillery pattern, with 12 spokes. The springs are made of slightly tapered strips of special steel coiled spirally in such a way that the greater part of each turn is within the preceding one, and that under sufficient compression the whole of the inner coils can be forced within the outermost one. Blocks of hard fiber and gutta-percha are cemented to the surface of the links which roll on the ground.

The inventor intends the wheel for heavy commercial vehicles and motor omnibuses, the purpose being to give them the benefits of the pneumatic tire without using a particle of rubber in the construction of the wheel. The spring-wheel was put to the test in London the other day, a pleasure car equipped with the invention having been driven through the thick of traffic.

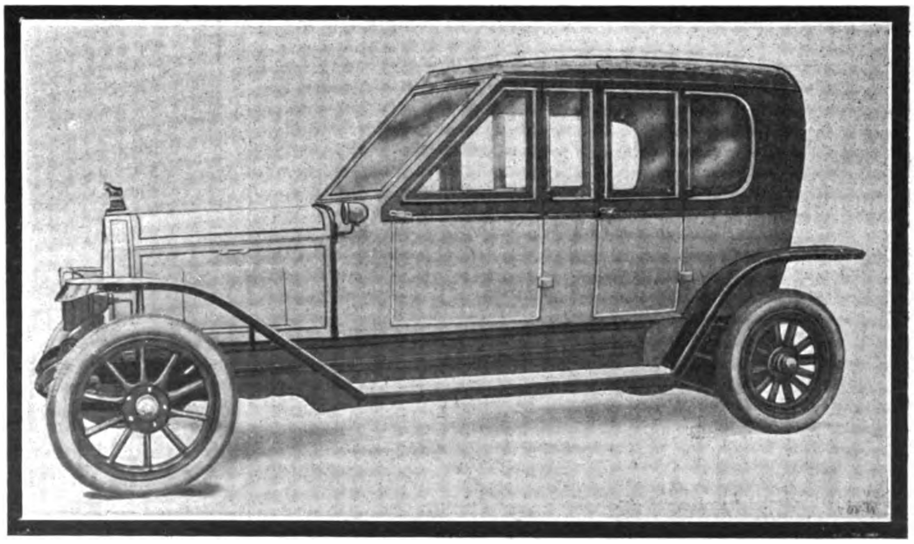
Two railless, overhead-trolley systems of tram cars have just been put into service in Bremen, Germany, connecting the outlying districts with the tram car lines running to the center of the city. The cars are of the ordinary automobile omnibus dimensions, but the electrical equipment being lighter, the weight of the cars is less than the conventional automobile omnibus. As it is necessary for the car while running to give way and move at times from 15 to 30 feet from one side of the street to the other, the difficulty was in constructing a trolley to this end. A Bremen engineer devised a way, and he has had his invention patented. The upper as well as the lower contact is increased by means of springs. Two wires reach into the car from rollers and hoops which are well insulated from each other. The car, while under way, passes other vehicles by reason of the extension of the wires, which uncoil from the drum inside of the car, and the drum automatically winds the wires up again at the least slackening. There are no switches attached to the wires; therefore, the trolleys of cars as they meet may simply be exchanged, allowing each car to renew its journey, the delay incidental to "waiting at the switch" being avoided. The wheels run on ball bearings and have solid rubber tires. The steering apparatus is similar to that used on pleasure automobiles.

Tsingtau, China, has about sixty miles of splendid roads running along the ocean front and into the mountains near by, affording one of the finest spots in the world for automobiling. In spite of this fact, there are but six automobiles in Tsingtau, and none of these is of American manufacture. Shanghai is the nearest convenient trading point from which machines might be shipped, and the freight charges, under the conditions, are not unreasonable.

Guadalajara, Mexico, harbors about 120 automobiles, of which 75 are in constant use, including one traffic car. The others are either in the hospital or their owners are not in the city. Cars thus out of commission cease paying the tax while idle, the amount of the levy being $4.98 per month. There are few asphalt-paved streets in the city, the country roads are bad, the hotels are not inviting and there is no local agent actively representing any manufacturer. Outside of the tax the cost of operating a car is not great. Good gasoline is 27 cents per gallon, and a chauffeur may be employed at $14.94 to $19.92 per month. A mechanic of good ability receives $62.50 per month. There are three garages in Guadalajara. About 60 of the machines are American-made, 30 are French, the remainder are English, Italian and German.

Chile holds out little encouragement for the introduction of the automobile for the reason that the number of desirable roads is limited. Valparaiso and the adjacent towns possess 30 cars of all sorts, and the chances for an increase in the number are not bright. Santiago has from 75 to 100 machines, with about the same country road conditions as are found in Valparaiso, although Santiago's streets are better paved. European-made machines are mainly seen in Chile, although the few American cars found here are splendidly adapted to the country owing to its hilly roads, and good climbers being necessary. There is no competition for this trade amongst automobile manufacturers.

New South Wales shows enterprise in the introduction of automobiles, the number being 1,095, exclusive of motor buggies and certain makes of which there are only one or two running. America is represented by 119; England, 519; miscellaneous foreign, 467. Altogether, 142 makes are found in the Commonwealth.



Inside drive body on a Pipe chassis, shown at Paris Salon

Cameron Sees Big Gun Cast by Krupp

Toledo, O., Dec. 19—W. H. Cameron, chief engineer of the Willys-Overland Company, has returned from his European trip with Mrs. Cameron, arriving in New York via the steamer "President Grant." During his visit in Germany he was granted the unusual privilege of inspecting the works of the great Krupp company. Mr. Cameron says that the German manufacturers are centering a vast amount of attention upon the chrome-nickel alloys and that they are not doing much with vanadium and other varieties of steel alloys for automobile work.

He says that his statements about the use of vanadium and its advantages proved surprising to the Teutons. He witnessed the casting of a huge gun at the Krupp plant. He states that the material from which the gun was made was treated in seventeen large furnaces, each containing 100 crucibles, and requiring the services of 500 men to cast.

French Factory for Goodrich

Paris, Dec. 14—The Goodrich Tire Company has decided to manufacture in France. For this purpose the European company has just secured possession of a large factory at Colombes, near Paris, recently vacated by the now defunct Krieger Gasoline-Electric Company. With a total area of 30,000 square yards, the space available is sufficient for a very large production.

It is expected that the new factory will be in working condition early in the spring and will be controlled by engineers and foremen from the Akron establishment. When in full working order it will supply the whole of the European market, comprising France, Italy, England, Germany and other outlying countries.

Not only will freight charges be avoided, but the high duty at present paid to bring American tires into most European countries will be removed. The company has had a selling branch in London for several years, and about three years ago opened a selling branch in Paris, primarily for the convenience of American tourists who were unable to use French sizes on their American rims. Since then the business has grown to such an extent that the supplying of tourists is a mere side issue. In France the Goodrich company has had considerable success with the taxicab companies.

Plans of Parry Auto Co.

Indianapolis, Dec. 19—Creditors of the Parry Automobile Company have practically agreed to ask the Superior Court to authorize the operation of the plant by the Union Trust Company, receiver, and to authorize a limited issue of receiver's certificates for the purpose.

After this is done it is probable the receivers will organize a holding company to take over and operate the plant until the indebtedness has been removed. During the last week the creditors have held a number of meetings here.

Panhard Valveless Motor

SHOWING ABSENCE OF VALVE POCKETS, CLEANLINESS OF DESIGN AND ACCESSIBILITY OF ALL PARTS, ROCKING MAGNETO ADVANCE

ANOTHER prominent maker to adopt the Knight engine system is Panhard et Levassor and their product will be known as Valveless-Panhard. The general principle is identical to that used on the Knight-Daimler, but the engine differs in several details.

The intake side of the motor, which has a bore of 100 millimeters (3.93") and a stroke of 140 millimeters (5.51"), is particularly free and accessible. The pump P is of the centrifugal type and is driven by a cross shaft that also serves to drive the magneto. The shaft is actuated by worm gear from the eccentric shaft, which in its turn is driven from the crankshaft by a silent chain through a sprocket attached thereto, the covering for which is marked T, Fig. 1.

The water is taken from the radiator through the pipe D and circulated by the pump P through D1 and returned to the radiator through D2. The intake manifold is made from copper with the lugs sweated on, carrying the carbureter so that it is easily removed. The float chamber is fitted with a removable cap F for flooding purposes and the usual Krebs air adjustment is located in B. Hot air is supplied to the carbureter through A2, while the sleeve A3 is fitted to give the requisite amount of cold air in hot weather. The control is by wires actuated from the center of the steering wheel passing over the roller H, which is fitted with a spring to carry the wire with it as it is played out and causes the throttle to rotate. The spark plugs are situated at S1, S2, S3, S4 directly over the center of the piston. A pump for the gasoline pressure is fitted and marked R and is driven by a small cam. In Fig. 1 the closeness of the joints at the

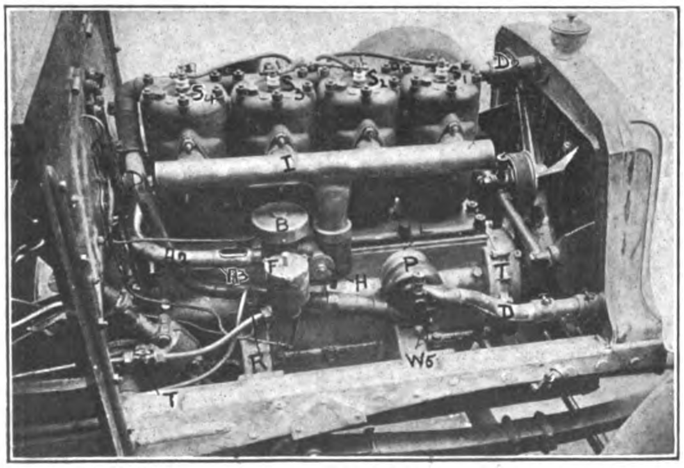


Fig. 1—Intake side of Panhard-Knight motor, showing carbureter water pump

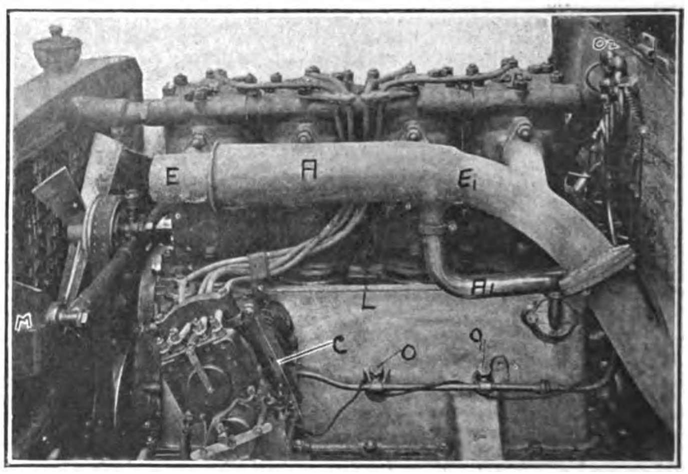


Fig. 2—Exhaust side of Panhard-Knight motor, showing rocking magneto retarded

cylinder bases is clearly shown and one bolt L serves to hold a pair of cylinders to the crankcase.

The feet are particularly large and the water-cooling area has been carried very low, as, besides the pistons, the sleeves require cooling as well. The same cleanliness wil be noticed on the exhaust side, the method of driving the magneto being clearly seen. The magneto employed is the Nilmelior and instead of the usual advance in this case the whole magneto is rocked from side to side; in Fig. 2 it is toward the radiator and in Fig. 3 it is inclined to the dashboard. The control is by wire C and is held forward when the wire is slack by the spring S. The exhaust manifold E carries on it a sleeve A welded to it at E1 preventing the air that enters from escaping except through A1, which leads to the carbureter. V and V1 are air vents for the crank chamber, W4 is a plug to drain all the water from the cylinders; other drain plugs are situated beneath the pump marked W5, Fig. 1, as well as in front of the radiator. The neat water joints W, W1, W2, W3 conduct the water from cylinder to cylinder. The heads are cast separately from the bases of the cylinders and it is almost impossible to see the joint, but this is located at the line J on the front cylinder; they are held by six nuts.

Reference to Fig. 4 shows the eccentric shaft L and the connecting rods M and M¹ which operate the sleeves N¹ and N driven by the chain from sprocket J to sprocket K. The shape of the piston H and compression chamber leave no room for pocketing of the gases and the lubrication of the piston sleeves and cylinder walls is by splash, the oil passing through the cross-drilled holes in the different parts. The lubrication system for the rest of the motor is effected by the pump U in Fig. 5; oil is taken from a reservoir under the floor boards and passes through the lubricator glasses on the dashboard, thence to the pump, which sends it to the main crankshaft bearings, it eventually finding its way to the crankcase to act for the splash, no used oil passing back to the pump.

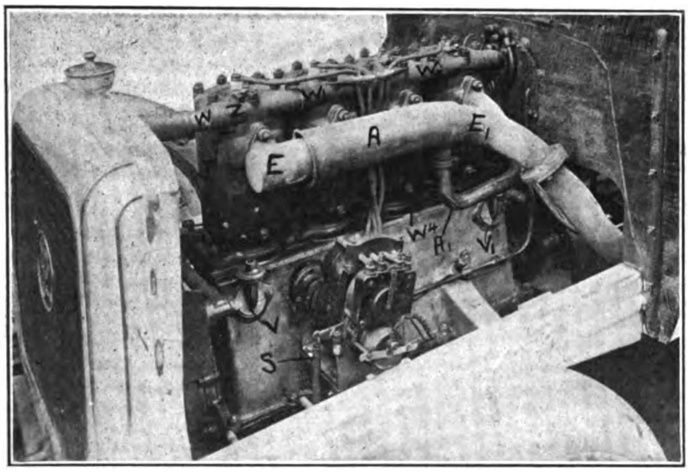


Fig. 3—Exhaust side of Panhard Knight motor, showing magneto advanced and hot air intake

The ports n1 open at the proper time for the suction and the ports n2 open for the exhaust. The magneto and pump drive O is carried on ball bearings and is driven by a worm at 90 degrees.

"The American Invasion"

Take this matter of the alleged invasion of our market by American motor cars. I am not for the moment referring to those cars of American origin which have already been upon our market for some time, but to the newcomers, whose arrival in bulk is anticipated. Our attitude is splendidly indifferent. "Nothing doing," we say. "Do you remember what happened to the American bicycle?" we say. "History just repeating itself," we say. "American cars not suited to our conditions; will never find a market here," we say. And so on. Our trade is very nice and healthy just now, do you see. We are plump and warm, and our outlook is rose-colored. "Let us eat, drink and be merry to-day—why not?" we say.

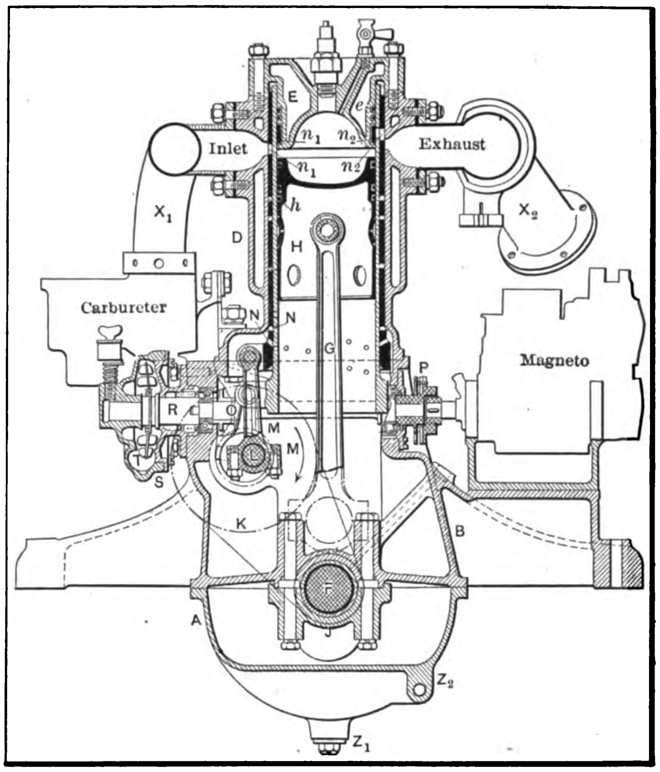


Fig. 4—Transverse section of the Panhard Knight motor, showing disposition of magneto and water pump and the chain-driven half-time shaft. It will be noticed that the actuating arm for the sleeves is in the shape of an ordinary connecting rod

Why not? The story of the prodigal son makes answer. The whole of our experience makes answer. If there were no to-morrow we might live out to-day to the uttermost. But as there *is* a to-morrow, it would not be bad policy to waste less in riotous living now. Do not let us make the gorgeous mistake of supposing that we have nothing to learn from America. Do not let us imagine for a moment that the American car cannot function as well (or better) on our roads as on the roads for which they were first of all made. And do not forever be dragging in the tale of the American bicycle. It has nothing to do with the case, except to indicate the only manner in which we may deal with the American car.—*Motor World,* London.

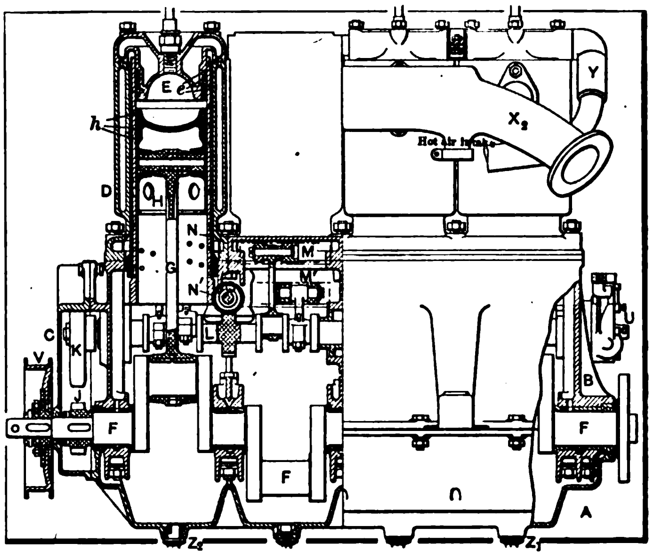


Fig. 5—Longitudinal section of the Panhard Knight motor, showing spherical pistons, crankshaft, and half-time shaft and the oil pump U

News in Brief from the East, West and South

Boston, Dec. 19—A meeting of the reorganization committee of the Bay State A. A. was held recently at which it was decided to have the annual meeting on December 28.

Cleveland, Dec. 19—William Orden has been appointed agent for Northern Ohio for the Auburn line of motor cars. His headquarters will be at the Lorain Clark garage.

Texarkana, Tex., Dec. 19—The Ohio car now making a transcontinental tour from New York to San Francisco has passed this point on its way westward.

Norwich, Conn., Dec. 19—F. W. Browning, president of the Uncas Specialty Company has taken active charge of the affairs of the company. Robert R. Keith is general manager. B. F. Leavitt has resigned.

New York, Dec. 19—The Carhartt Company has increased the price of its 30-35 model to $2,500. At this price the equipment consists of windshield, remountable rims, top, speedometer and license plate holders.

Detroit, Dec. 19.—The Ackerson Engineering Company has made announcement of its succession to the business of the Merle MacFarland Company. The company makes axles, power plants, motors, jack-shafts, etc.

New York, Dec. 19—Henry Knott, who for the past three years has been associated with the Frank Seaman Agency, has been appointed advertising manager of the E. M. F. Company, with his headquarters at Detroit.

Des Moines, Ia. 19—A room has been set aside at the Coliseum, at which the Second Annual Automobile Show will be held, for the exclusive use of the various trade papers during the show. The show dates are March 7 to 11.

Cleveland, Dec. 19—The factory of the Gabriel Horn Co., 1407 E. Fortieth street, was completely destroyed by fire Saturday, December 10. The loss is estimated at from $50,000 to $75,000 a great part of which was in valuable stock.

Pittsburg, Dec. 19—From January 16 to 21 an auction sale of automobiles will be held in the Exposition Hall. The sale is announced to be open to anyone who wishes to buy or sell a car and is being fostered by leading members of the trade.

Ft. Worth, Tex., Dec. 19—The Southern Motor Works has opened a distributing branch at 707 Commerce street, this city, which has been placed in charge of H. H. Brooks. A complete stock of Marathon cars, as well as parts, will be carried.

New York, Dec. 19—Considerable talk has been indulged in about the building of a municipal garage to care for the 130 automobiles owned by the City of New York. The number of machines has been increased by 11 during the current year.

San Francisco, Cal., Dec. 19—The San Francisco branch of the Firestone Tire & Rubber Co. has just moved into its handsome new building at Van Ness avenue and Fulton street. It is a three-story structure, built exclusively for the company.

Philadelphia, Dec. 19—The meeting of the Executive and Good Roads Committee of the Pennsylvania Motor Federation, which was scheduled for last week, has been postponed until January. Lack of sufficient notice is given as the reason for the postponement.

Columbus, O., Dec. 19.—On and after ten days it will be unlawful to have an automobile horn here which does not give off efficient warning signals. Mayor Marshall signed the ordinance passed recently by Council, and after ten days it will be in full force and effect.

Boston, Dec. 19—The Automatic Appliance Company announces that it has taken over the Couch & Seeley Co. and the Transfer Issuing Machine Company. The new concern is occupying the offices and factory formerly used by the Couch & Seeley Co., 162-172 Columbus avenue.

Cincinnati, Dec. 19—The Schacht Motor Car Company is now comfortably installed in its new plant and is turning out four-cylinder cars at the rate of ten a day. The present factory is three times as lorge as the old plant, with acreage for increasing to four times its present capacity.

New York, Dec. 21—The regular monthly meeting of the Electric Vehicle Association of America was held last night at the Engineering Societies Building. "The Alkaline Battery," by W. H. Holland and "The Mercury Arc Rectifier for Charging Electric Vehicles," by R. E. Russell were the two set papers read.

New York, Dec. 19—A midnight class of the Automobile School conducted by the West Side Young Men's Christian Association, 318 West Fifty-seventh street, has been opened to meet the demand of night workers who, because of their hours of employment, are unable to attend the regular day and evening classes.

Indianapolis, Dec. 19.—Harry C. Stutz has joined the forces of the Empire Motor Car Company, of Indianapolis. Mr. Stutz has been associated with the Marion, American and Overland automobile companies, also with the Schebler carburetor concern as engineer, and is now head of the Stutz Auto Parts Company, of Indianapolis.

Racine, Dec. 19.—C. O. Hamilton, of Sayrick, O., was elected president of the National Gas & Gasoline Engine Trades Association last week. The other officers elected are: Vice-president, A. C. Parker, Racine; secretary, Adolph Strictmatter, Cincinnati, O.; treasurer, O. M. Knobloch, South Bend, Ind. The semi-annual session will be held in Detroit next June.

Baltimore, Md., Dec. 19—Several changes have been made in connection with the local agency of the Ford Auto Company. Robert F. Kaehler, formerly of the Baltimore office, has gone to Richmond, Va., to take charge of that branch, while J. K. Harper, formerly of the Richmond, Va., branch, will be identified with the Baltimore branch after January 1. A. M. Eastwick will be in charge of the Baltimore branch.

Moline, Ill., Dec. 19—C. H. Van Dervoort, sales manager of the Moline Automobile Company, East Moline, Ill., and F. G. Salisbury are on a trip through the South, during which they will visit agents and establish several new agencies. Previous to the time of their departure a touring car, 1911 model, was shipped to Memphis, Tenn., and Van Dervoort and Salisbury will use the machine out of that city.

New York, Dec. 19—Automobile manufacturers and dealers of New York city and vicinity, are demanding of the Secretary of State, better facilities for obtaining license numbers for motor vehicles. They have been put to a great deal of inconvenience and trouble, on account of being compelled to loan purchasers license numbers, while the purchaser is awaiting the receipt of numbers for his machine, from Albany, which usually takes about ten days.

New Orleans, Dec. 19—Entry blanks are out for the New Orleans Mardi Gras Speed Carnival, the third running of which will take place February 25, 26 and 27, 1911. A big list of events has been arranged by Secretary-Manager Homer C. George, of the New Orleans Automobile Club, and every indication is said to point to a record-breaking number of cars. The prize list amounts to $3,500, with the various events ranging from five to fifty miles each, in addition to two one-hour races.

New York, Dec. 19—The Joscelyn Stable Co., 112-126 West Fifty-second street, has issued a booklet describing the immense garage conducted by the company. The building is four stories, 200 by 100 feet, and is reckoned to be as nearly fireproof as any in its line. The garage is equipped with cement floors, metal ceilings, steel lockers, three large elevators, telephone on each floor, compressed air service, buffing machines and vacuum cleaners. A full line of accessories is carried. Special regard for the comfort of chauffeurs has been provided.

Proper Garage Fittings

In the Handling of Gasoline and Lubricating Oil in the Average Garage the Entire Cost of a Decent Set of Fittings Is Dissipated at Least Once a Month

DISREGARD of considerations for economy in the maintenance of the garage have such far-fetched consequences in several directions that it may not be considered out of place if a few of the points are afforded discussion and suggestions of a remedial nature are offered. Before talking about the details and the methods by which economies may be perfected it will be to the purpose to point out that lubricating oil, even though it does cost far too much money to permit it to run on the floor, should be kept in the oil tank where it belongs on account of the savage manner in which it attacks the rubber of the tires, thus making heavy inroads upon the factors for general economy. In the same way, while it is true that gasoline is too high-priced to consider permitting it to run into the sewer pipe, it has that element of risk involving the fire hazard and possible explosions which is a sufficient reason for wishing to keep it in a storage tank rather than to permit it to escape onto the garage floor.

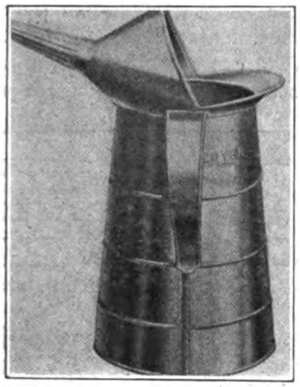


Fig. 2—Combination measure and funnel

Then there are the questions of labor cost. If a workman has to discover a pin-hole leak in an inner tube and he takes, say, three hours in the process, his time, at 60 cents per hour, may foot up to a sum total greater than the value of the inner tube. There are a considerable number of like problems scattered through the average large garage, and the Dover Stamping & Manufacturing Company, of Cambridge, Mass., has given all of these matters a considerable amount of attention, with the result that this study and investigation has brought out the various types of equipment which it recommends for use. Referring to Fig. 1 of the new Dover testing tank, it will be observed that the inner tube is permitted to rest in a suitably shaped pan, and by means of a rod with a gooseneck extremity the tube is held in its natural shape, thus permitting the workman to quickly determine whence the leaks come by observing the source of any trouble that might rise up in the water in the tank. The pan is made of heavy steel suitably galvanized, with a double seam construction, capable of being filled and emptied quickly, and occupying but little room on the shelf when it is not in actual service.

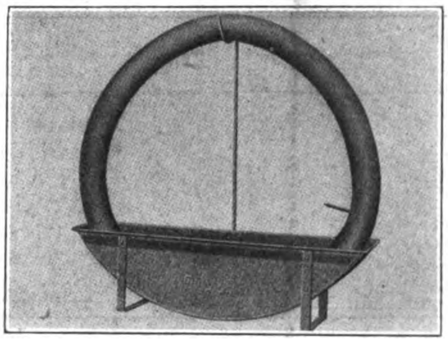


Fig. 1—New tank for testing tires, with support for the top

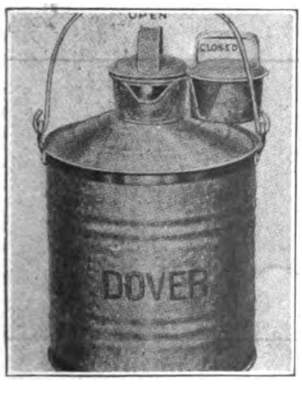


Fig. 4—Non-evaporating gasoline measure

In order to avoid the spilling of lubricating oil and gasoline, the company has brought out what is known as the "duplex" combination measure and funnel as shown in Fig. 2. The features of this combination measure are manifold; among them these four may be mentioned: No. 1 is the pouring lip, which is used when a funnel is not necessary and fast pouring becomes desirable. Feature No. 2 is the advantage of the funnel for pouring, thus making it possible to replenish an oil tank, even though it may have a small filler orifice, without losing a part of the oil. Feature No. 3 is the handle on the side, by means of which it is possible to use the measure with certainty and without the discommoding feature which would be represented were the handle in the wrong place where it would be likely to get in the way. Feature No. 4 has to do with the measuring marks, which are graded to half-pints, pints and quarts, which is a great convenience.

Referring to Fig. 3 of the Dover radiator filler, the funnel scheme is retained, but it is also fitted with a brass strainer so that foreign matter is excluded from the radiating system, and the work is done with greater efficiency; moreover, the spilling of water over the varnished surfaces of the car is avoided. Fig. 4 shows the new non-evaporating gasoline measure which is designed to hold five gallons of gasoline, it being 11¼ inches in diameter and 18 inches high over all, with a filling opening which is 4 inches in diameter. In this can the pouring lips and filler opening are combined. The filler opening has a cover plug which is so arranged that by turning it one-half around the pouring lip is shut off and the remaining gasoline is prevented from evaporating.

Fig. 5—Rust-proof steel 5-gallon wagon measure

Fig. 3—Radiator filler, with funnel and brass strainer

Fig. 5 shows the new five-gallon wagon measure, which is made of extra heavy steel and galvanized after it is made so that the seams and other crevices are rendered rustproof. The body and bottom of this measure are heavily reinforced and the bail is provided with a large boss so that the measure is easy to carry. This type of measure is used by dealers for the most part in connection with the gasoline delivery wagon. Fig. 6 presents a type of garage funnel with a capacity for six gallons. This funnel is provided with a chamois strainer and is intended for rapid work. It is made of heavy steel, and, like other Dover products, is galvanized after it is made. The chamois-skin is held by a large hook which has the effect of stretching it tight across the bottom for the full diameter of the funnel, and it is supported by a wire rack to prevent sagging.

Fig. 6—Garage funnel for rapid filling

Among the Accessory Makers

A NEW TYPE OF ROLLER BEARING; RHEOSTAT FOR CHARGING BATTERIES; WORK UNDER A CAR MADE EASY; HAZARD GEAR-SHIFTING LEVERS

GILLETTE TYPE OF ROLLER BEARING

The modern trend in roller bearing work is in the direction of the narrow type so that roller bearings will fit into substantially the same space as is normally required for annular types of ball bearings, and the Gillette roller bearing as shown in Fig. 1 is so designed that the distance N is about on a par with standardized space, which distance varies of course with the different sizes of bearings, and the sizes in turn are in keeping with the loads that the bearings will have to carry. The over-all diameter A is ground to a definite size, and the inside diameter E is very carefuly ground, thus making it possible to fit the bearing on a ground shaft, so that it will tap on and if suitably endwise clamped will serve without burrowing into the shaft. The rollers are tapered and traverse a pair of truncated cones, the outer one of which is shown separately, and the inner cone, or raceway, is presented in the assembly. The several other dimensions as indicated in the illustration by letters are given in a tabulation which the company sends out. The R. G. Peters Mfg. Co., Grand Rapids, Mich., are the makers.

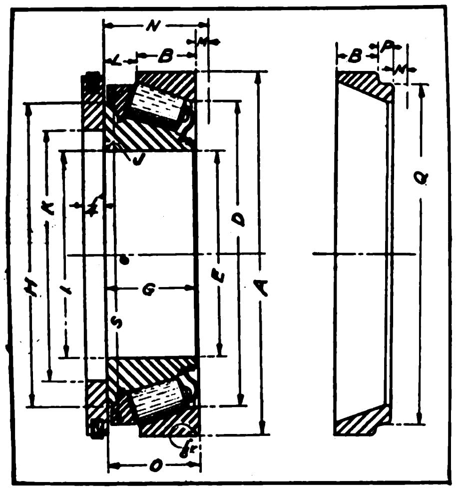


Fig. 1—Illustrating the Gillette type of roller bearing

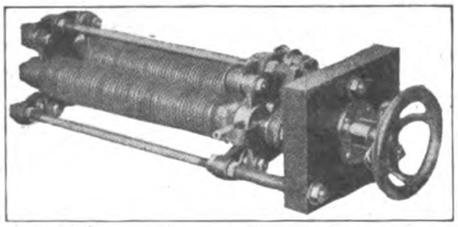


Fig. 2—One of the three types of Allen-Bradley battery-charging rheostats

BATTERY-CHARGING RHEOSTATS

Referring to Fig. 2 of the Allen-Bradley H2 panel type of rheostat as made by the American Electric Fuse Company of Muskegon, Mich., it will be observed that the resistance is varied to suit the charging conditions of the battery by turning on a hand-wheel at the right and the extent to which it is necessary to alter the resistance in circuit will be known to the operator since he will observe the ampere readings of the meter, varying the resistance to suit the charging rate of the particular battery that is undergoing treatment in any given case.

This illustration shows that one of the three types of charging rheostats listed by this company. The principle of the rheostat is that involving the use of graphite discs which are manufactured subject to a temperature of 7,000 degrees Fahrenheit, and are thereafter tested for mechanical strength. These discs offer a high resistance to electricity, and the amount of this resistance is varied by altering the contact condition between discs by changes in pressure. The device is very simple and owing to the high temperature which obtains during the manufacture of the resistance units it is scarcely to be supposed that overheating will take place during the use of the rheostat. Temperature is kept down by having the units open to air currents and under ordinary charging conditions it is plain that the temperature does not elevate to a point that is worthy of notice. These charging units are of the greatest importance to the man who owns an electric vehicle and who wishes to charge the same in his own garage, and they are also made in the several forms which facilitate their use in connection with charging boards in central station work.

PORTLAND REPAIRMAN'S COUCH

Referring to Fig. 3 of the Portland Repairman's Couch as manufactured by the Spear Auto Company of Portland, Me., it will be observed that it is a substantially constructed platform with four castors fastened to the cross-members and so arranged as to avoid eating up much of the headroom under the automobile where this repairman's couch is adapted for use. The head of the couch is provided with an adjustable cushion so that the operator is enabled to change the headrest to suit the varying conditions, and it is claimed for this couch that it very materially facilitates the repairman's work, thus earning the cost of it perhaps within a week.

HAZARD GEAR-SHIFTING LEVERS

Among the accessories as manufactured by the Hazard Motor Mfg. Co., of Rochester, N. Y., a complete line of gear-shifting lever sets occupies a prominent place, and Fig. 4 is an illustration of the unit method of assembling the gear shifting and emergency brake levers, including the connecting details so that the unit may be assembled separately and then applied to the automobile on which it is intended to go. The various designs of the Hazard company are in keeping with the structural requirements of the various makers of automobiles, and among the selective hand-control sets available is one, for instance, which is adapted for use in connection with rear axle transmissions. The company states: "Our controls are made from malleable steel castings, the handles being heavily brass plated and polished. We can also furnish the controls cast in solid manganese bronze and highly polished." The outfits are furnished complete including shafting tubes and brake-shafts, ready to be bolted to the chassis frame.

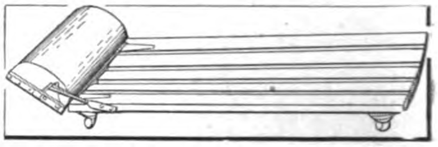


Fig. 3—Making easy work under a car

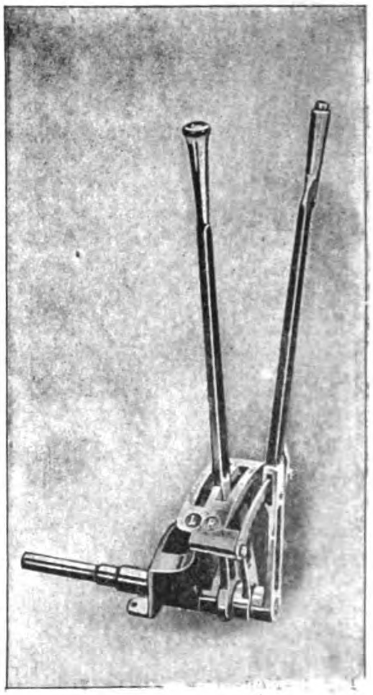


Fig. 4—The Hazard gear-shifting levers

Vol. XXIII New York—Thursday, December 29, 1910—Chicago No. 26

The Automobile

1911 Promises Many Innovations

APPROACHING the end of the year brings with it the awakening of interest in the things that are promised for the immediate future. Doubtless many of the innovations which will become familiar to the 1911 automobilist by the time the touring season opens are hidden beneath the surface, with here and there just a little speculation bearing upon some of the matters which seem to be in an unsettled state. Observation seems to point conclusively to certain heretofore unobserved body refinements, and Fig. 1 is offered as an indication of the trend in body work. It does not necessarily follow that bodies will have but one side door, but it is believed that there is a distinct inclination on the part of body designers to bow to the necessities from the machinery point of view, and the glass cowl as shown in this example is specifically referred to for the purpose of indicating that it is no longer considered good form to so design bodies that there will be dark "cubby holes" hiding the machinery and its relating members, thereby preventing the owner of the car from inspecting and oiling the parts at sufficiently frequent intervals to maintain that noiseless state which reigns in orderly quarters.

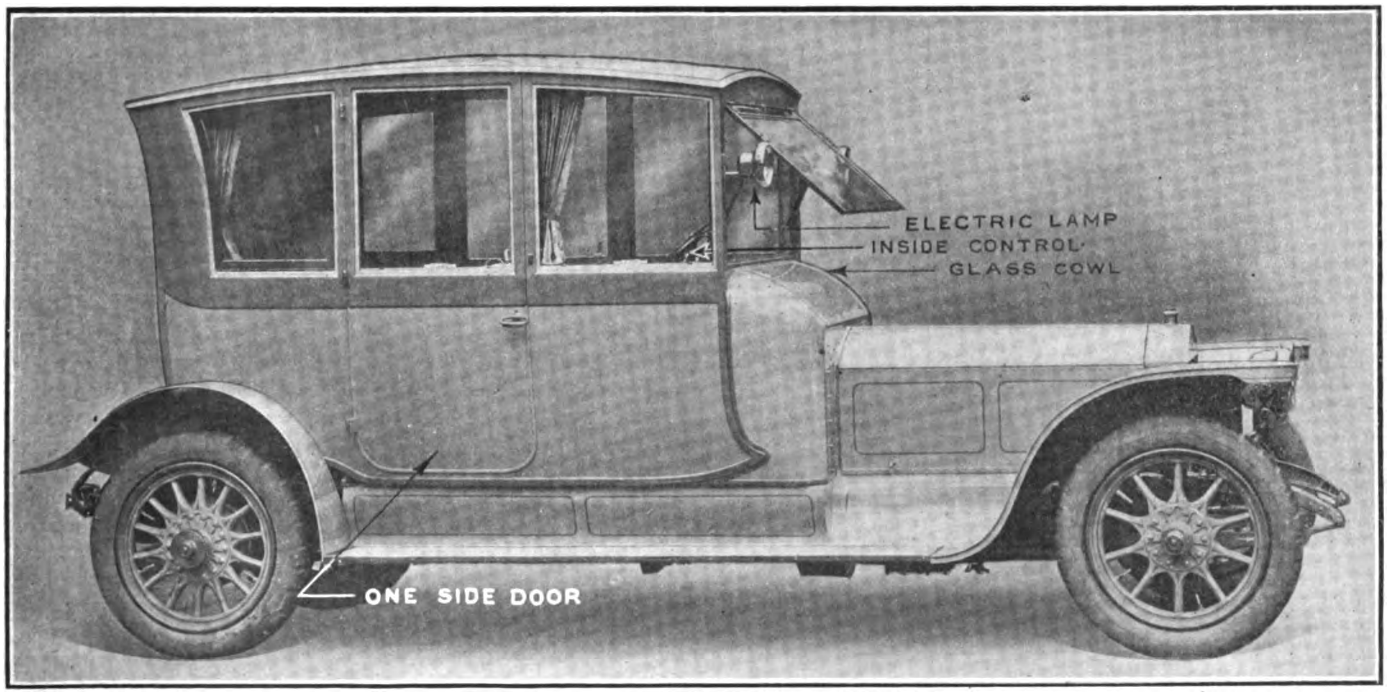


FIG. 1—1911 BODY WITH SINGLE SIDE DOOR, TRANSPARENT COWL, ELECTRIC LIGHTING AND INSIDE DRIVE

Dismissing the facility of the inside control with mere mention for the time being, it remains to point out that electric lighting is now the regular order of procedure; dynamo-electric machines are so perfected that they may be attached to the automobile motor, and despite the fact that the speed of the motor is a widely varying quantity, the dynamos are so contrived that they will run at a constant speed, and this improvement in the equipment for lighting permits of the use of lamps of large candlepower and a full set without having to cope with the overloading of batteries and the resultant depreciation. Moreover, in this plan the battery employed "floats" on the circuit so that it is charged automatically and is available for the supplying of electrical energy during the periods of time when the automobile motor is shut down, thus affording to the automobilist a continuous supply of electrical energy and all that it implies, not only when the automobile is running, but also when the car is standing in the garage, so that through the good office of a flexible cord and a portable lamp the automobile may be gone over and inspected in the minutest detail.

Too much importance cannot be attached to these improvements in lighting; it is not enough to merely provide illumination when the automobile is on the road; it cannot be kept upon the road unless it is maintained in good working order, and it is impossible to properly inspect and care for a car if it is run into a more or

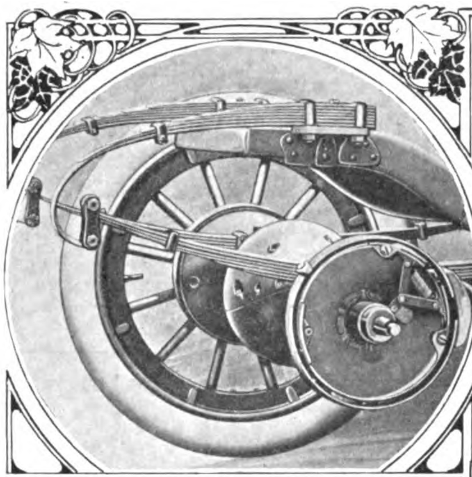


Fig. 2—Rear End View of the Cole Thirty Chassis

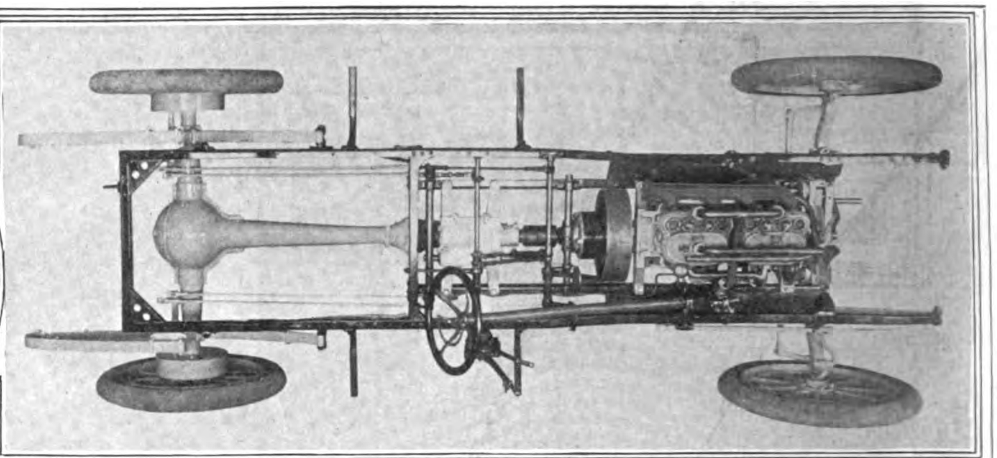


Fig. 6—Stripped Chassis of the Henry Automobile

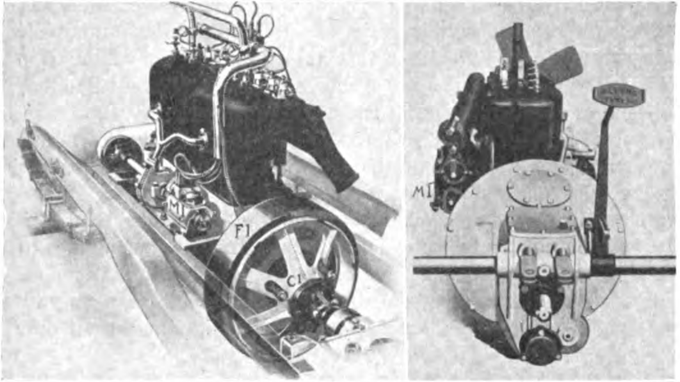


Fig. 3—Perspective of Firestone-Columbus Power Plant

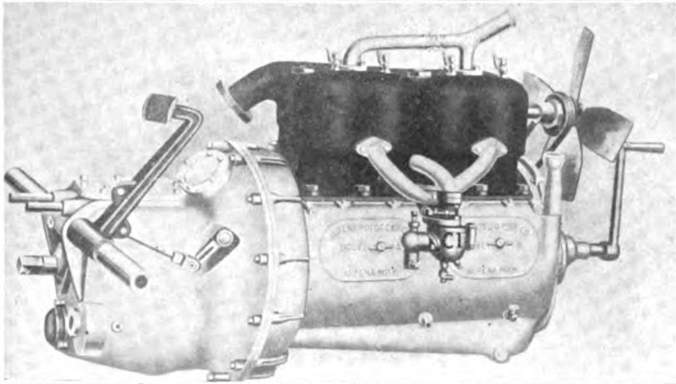


Fig. 4—Side Elevation of the Alpena Motor

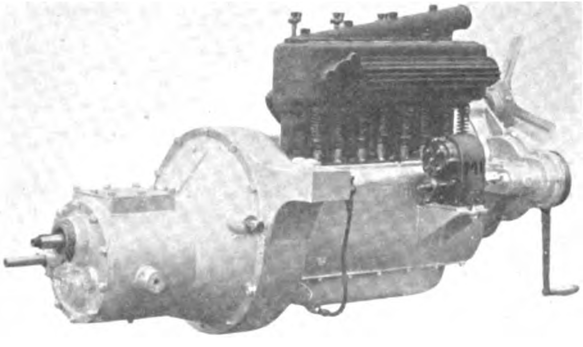


Fig. 5—Magneto Side of the Parry Block Type Motor

less dark garage and nothing better than a candle is available as the source of illumination when the automobilist starts out with a squirt can for the purpose of distributing lubricating oil. Among the many refinements in addition to those in body work and accessories there are the matters of machinery adjustment which are being handled somewhat differently from the process as it obtained heretofore.

In order to show that accessibility and stability of design are uppermost, 10 more cars were picked at random this week and the general dimensions are given in a tabulation on a comparative basis. The body work will be appreciated by examining the illustrations of the completed cars, and for the purpose of bringing out the 1911 trend in machinery designing, mechanical illustrations were picked at random, with an eye to bearing out the contention that there is a certain cleanness attending the work, thus satisfying the complaint, which was more or less justly made in the past, that designers were inclined to be slovenly.

Black Crow

EIGHT models of this make of automobile are included in the tabulation. Three of these models are equipped with a power plant that is rated at 25.6 horsepower A. L. A. M. rating, the motor having a bore of 4 inches and a stroke of 4 1-2 inches. The motor is of the four-cylinder, water-cooled type, with the cylinders cast *en bloc* equipped with a honeycomb radiator, using the thermo-syphon system of water circulation, and among the other refinements mention is made of a high-tension (magneto) ignition system, with a dry battery auxiliary ignition system. Lubrication is positive, and the clutch, which is of the multiple-disc type, is designed to afford an extra measure of flexibility of performance under severe road conditions. The transmission is designed for three forward speeds and reverse, is of the selective type and is swung on the rear axle. The wheelbase is 109 inches, and the tread is standard. The tires are 32 x 3 inches. The power plants for the remaining models are along conventional lines, sizes considered. The cylinders are cast in pairs, water cooling obtains in each example, and the radiator is of the honeycomb pattern, but the water is circulated by the thermo-syphon system in each case. In all examples the means for lubrication are positive, and the high-tension magneto is aided by a supernumerary battery system. In the larger cars the wheelbase is extended, being 112 inches in models 13 and 14, reaching up to 120 inches in the remaining models.

Firestone-Columbus

PRESENTING two models in detail in the tabulation, it will suffice here to refer to Fig. 3 of the 4 1-2 x 5-inch bore and stroke, respectively, water-cooled motor, showing the same in perspective, looking at the left-hand side. The cone type of

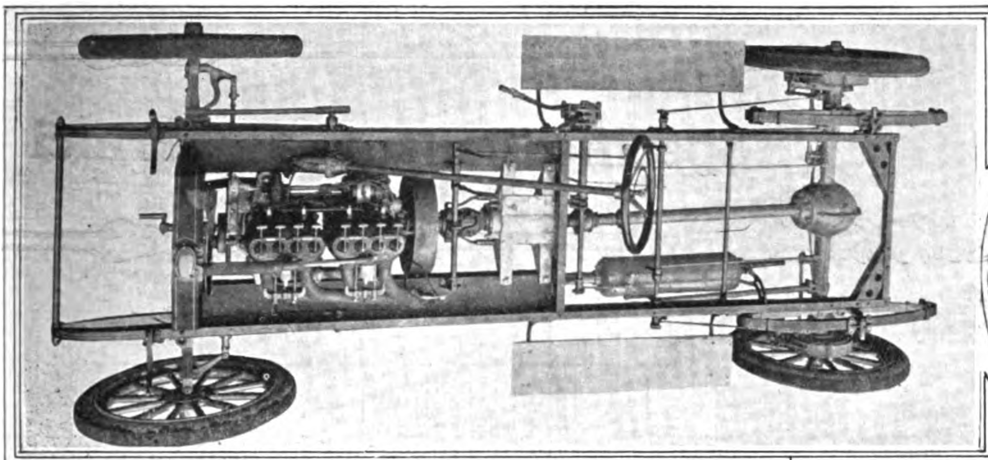


Fig. 7—Stripped Chassis of One of the Parry Models

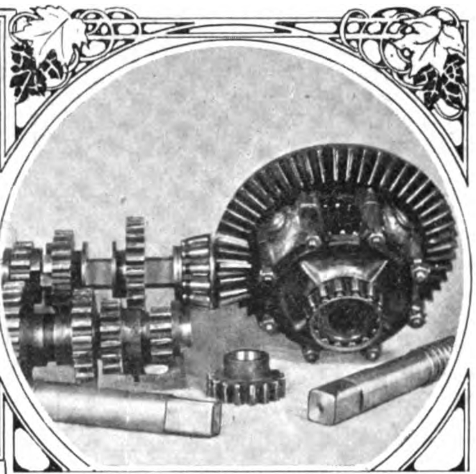


Fig. 8—Showing Crawford Transmission Gears

clutch C1 is shown to advantage in the flywheel F1 and the magneto M1 rests on a shelf back of the water pump of the centrifugal type W1, both being driven by a common shaft which takes power from the half-time gear system; the gears are encased in a grease-tight housing in front. The carbureter is placed upon the side opposite to the motor; this is also the camshaft side. The cylinders are T-type, cast in pairs. The power plant rests upon a sub-frame. As the tabulation shows, the power plant is made in two sizes; the A. L. A. M. ratings are given in the tabulation. The Firestone rating of the motor as here shown is 40 horsepower.

Krit

WITH four models shown in detail in the tabulation as here presented it remains to observe that the Krit power plant is of the type using *bloc* cylinders and a two-ball bearing crankshaft. The power plant is also of the self-contained design, that is to say, the clutch and transmission gear are within an extension of the motor case. The design is compact without being so cramped that it will be difficult to get at the working parts to note how they function, and a magneto of the high-tension type is used for ignition purposes. Other refinements, including the four-cylinder motor with a bore of 3 3-4 and a stroke of 4 inches, will be noted. The A. L. A. M. rating of the motor is given as 22 1-2 horsepower. The crankshaft, which is short, and of stout section, is accurately centered on a pair of silent type ball bearings, and the lubrication is carefully contrived.

Paterson

SEVEN models of this make of car are tabulated in this article, two sizes of power plants are listed, and the main characteristic of the motor work lies in a certain simplicity along lines including the unit construction. The cylinders are cast in pairs, of smooth exterior, and the motor, clutch and transmission are protected by a common oil-tight case. The clutch is of the cone type, faced with leather, and the transmission is of the selective type affording three speeds and reverse. In the system of lubrication, while splash is relied upon, the level of the oil is maintained by means of a system of plunger pumps. Cooling is done by thermo-syphon, including an efficient radiator. Ignition is accomplished by magneto with a coil and battery auxiliary. Models G and H differ in detail from the model using the "thirty" motor, but the main considerations are on a common level; the good points for one model are retained in all.

Abbott-Detroit

THE general appearance of the touring car of this make is depicted in the illustration, and the data of the cars is given in the tabulation. The motor is of the four-cylinder, water-cooled type, has an A. L. A. M. rating of 25.6 horsepower, and

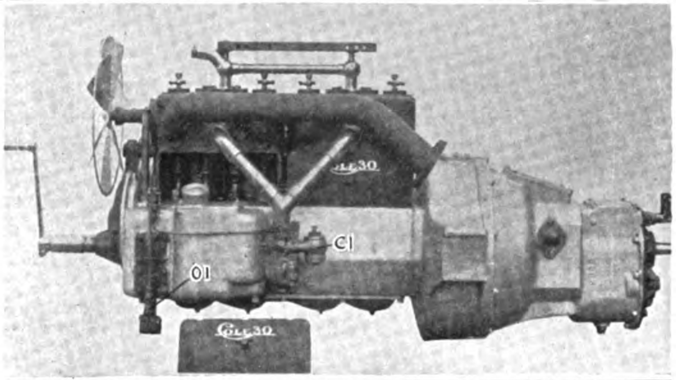


Fig. 9—Carburetor Side of the Cole Thirty Motor

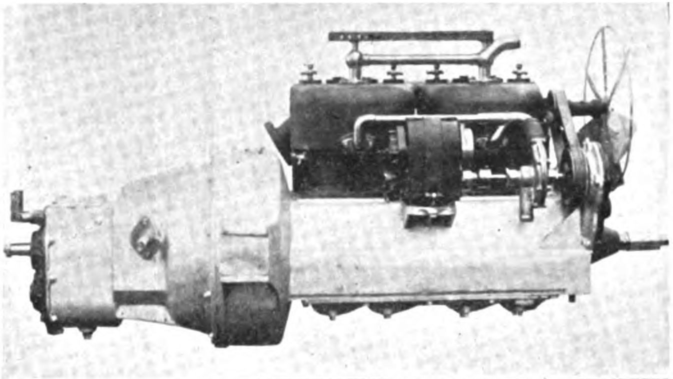


Fig. 10—Magneto Side of the Cole Thirty Motor

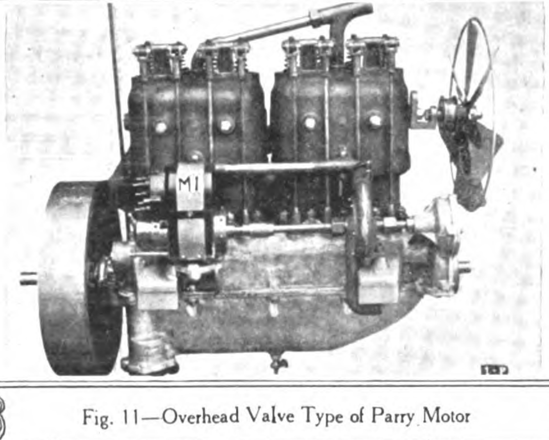
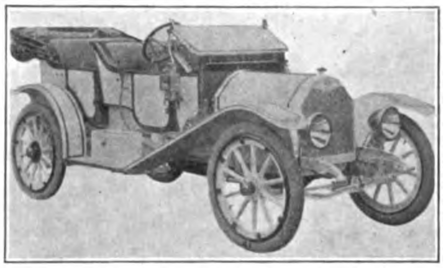
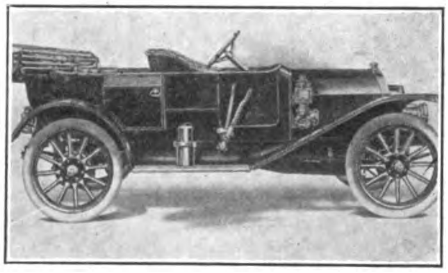


Fig. 11—Overhead Valve Type of Parry Motor

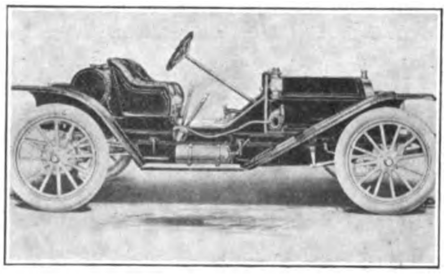
Specifications of the Princi



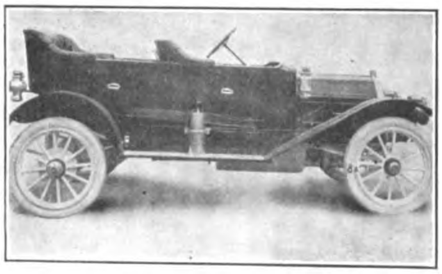
Abbott-Detroit pony tonneau



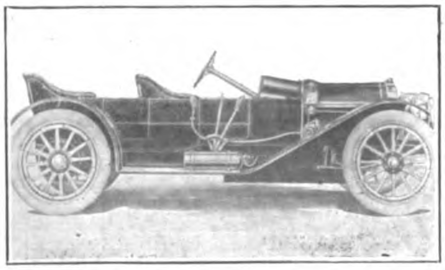
Alpena fore-door touring car



Black Crow, Model 16



Crawford, Model 11, 35 h.p. touring car



Cole Model M "30" fore-door toy tonneau

MAKE AND MODEL	Price	H.P.A.L.A.M.	BODY		MOTOR				COOLING		IGNITION		Lubrication
			Type	Seats	Cyl.	Bore Inches	Stroke Inches	Cyl. Cast	Radiator	Pump	Magneto	Battery	
Black Crow 10	$1000	25.6	R'bout.	2	4	4	4½	Block.	H'comb.	None.	H. T.	Dry	Mech.
Black Crow 11	1100	25.6	Surrey	2	4	4	4½	Block.	H'comb.	None.	H. T.	Dry	Mech.
Black Crow 12	1150	25.6	D.ton	2	4	4	4½	Block.	H'comb.	None.	H. T.	Dry	Mech.
Black Crow 13	1300	27.2	Tour'g.	5	4	4⅛	4½	Pairs	H'comb.	None.	H. T.	Dry	Mech.
Black Crow 15	1500	28.9	Torp'o.	5	4	4¼	4½	Pairs	H'comb.	None.	H. T.	Dry	Mech.
Black Crow 16	1650	30.6	R'bout.	2	4	4⅜	5	Pairs	H'comb.	None.	H. T.	Dry	Mech.
Black Crow 17	1750	30.6	Torp'o.	5	4	4⅜	5	Pairs	H'comb.	None.	H. T.	Dry	Mech.
Black Crow 20	2000	30.6	Torp'o.	7	4	4⅜	5	Pairs	H'comb.	None.	H. T.	Dry	Mech.
Alpena Flyer A	1450	25.6	Tour'g.	5	4	4	4½	Pairs	Tubular	Cent 'fl	H. T.	Dry	F.fd.G
Alpena Flyer B	1450	25.6	Fd. Tg.	4	4	4	4½	Pairs	Tubular	Cent 'fl	H. T.	Dry	F.fd.G
Alpena Flyer C	1600	25.6	Fd. Tg.	5	4	4	4½	Pairs	Tubular	Cent 'fl	H. T.	Dry	F.fd.G
Alpena Flyer D	1450	25.6	R'ster.	2	4	4	4½	Pairs	Tubular	Cent 'fl	H. T.	Dry	F.fd.G
Cole 30-M	1650	36.0	T. ton.	4	4	4¾	4½	Pairs	Cellular	Cent 'fl	H. T.	Dry	Splash
Cole 30-A	1650	36.0	Tour'g.	4	4	4¾	4½	Pairs	Cellular	Cent 'fl	H. T.	Dry	Splash
Cole 30-O	1600	36.0	Tour'g.	4	4	4¾	4½	Pairs	Cellular	Cent 'fl	H. T.	Dry	Splash
Cole 30-L	1600	36.0	R'ster.	2	4	4¾	4½	Pairs	Cellular	Cent 'fl	H. T.	Dry	Splash
Henry M	1750	27.2	Tour'g.	5	4	4⅛	5¼	Pairs	Tubular	Cent 'fl	H. T.	Dry	Splash
Henry F	1800	27.2	Fd.Tg.	5	4	4⅛	5¼	Pairs	Tubular	Cent 'fl	H. T.	Dry	Splash
Henry P	1750	27.2	T. Rr.	2	4	4⅛	5¼	Pairs	Tubular	Cent 'fl	H. T.	Dry	Splash
Henry K	900	22.5	R'ster.	2	4	3¾	4½	Block.	Tubular	Syph'n	H. T.	None.	Pump
Henry J	1050	22.5	Tour'g.	4	4	3¾	4½	Block.	Tubular	Syph'n	H. T.	None.	Pump
Crawford 11-30	1375	28.9	Tour'g.	5	4	4¼	4½	Pairs	Tubular	Cent 'fl	H. T.	Dry	Splash
Crawford 11-35	1650	32.4	Tour'g.	5	4	4½	4½	Pairs	Tubular	Cent 'fl	H. T.	Dry	Splash
Parry 25	900	19.6	R'bout.	2	4	3½	3¾	Pairs	Tubular	Syph'n	H. T.	None.	Splash
Parry 43	1300	28.9	R'ster.	4	4	4¼	4½	Pairs	Tubular	Cent 'fl	H. T.	Dry	Splash
Parry 42	1350	28.9	T'ring.	5	4	4¼	4½	Pairs	Tubular	Cent 'fl	H. T.	Dry	Splash
Parry 39	1500	28.9	R'ster.	4	4	4¼	4½	Pairs	Tubular	Cent 'fl	H. T.	None.	Splash
Parry 37	1500	28.9	D.ton	4	4	4¼	4½	Pairs	Tubular	Cent 'fl	H. T.	None.	Splash
Parry 44	1600	28.9	Tour'g.	5	4	4¼	4½	Pairs	Tubular	Cent 'fl	H. T.	None.	Splash
Parry 46	1850	32.4	Torp'o.	5	4	4½	4½	Pairs	Tubular	Cent 'fl	H. T.	None.	Splash
Paterson A	1295	25.6	Tour'g.	5	4	4	4	Pairs	Tubular	None.	L. T.	Dry	Splash
Paterson B	1295	25.6	D. Ton.	4	4	4	4	Pairs	Tubular	None.	L. T.	Dry	Splash
Paterson C	1175	25.6	T'bout.	4	4	4	4	Pairs	Tubular	None.	L. T.	Dry	Splash
Paterson E	1425	25.6	Fore-d.	4	4	4	4	Pairs	Tubular	None.	L. T.	Dry	Splash
Paterson F	1200	25.6	R'ster.	2	4	4	4	Pairs	Tubular	None.	L. T.	Dry	Splash
Paterson G	1550	28.9	Tour'g.	5	4	4¼	4½	Pairs	Tubular	Cent 'fl	L. T.	Dry	Splash
Paterson H	1600	28.9	Fd. Tg.	5	4	4¼	4½	Pairs	Tubular	Cent 'fl	L. T.	Dry	Splash
Abbott-Detroit B	1500	25.6	Tour'g.	5	4	4	4½	Pairs	H'comb.	Cent 'fl	H. T.	Dry	Splash
Abbott-Detroit B	1500	25.6	R'bout.	3	4	4	4½	Pairs	H'comb.	Cent 'fl	H. T.	Dry	Splash
Abbott-Detroit B	1650	25.6	D't.ton[2]	4	4	4	4½	Pairs	H'comb.	Cent 'fl	H. T.	Dry	Splash
Abbott-Detroit B	2200	25.6	Coupe	4	4	4	4½	Pairs	H'comb.	Cent 'fl	H. T.	Dry	Splash
Abbott-Detroit	1500	28.9	Tour'g.	5	4	4	4¼	Pairs	Cellular	Cent 'fl	H. T.	Dry	Splash
Abbott-Detroit	1650	28.9	D.ton	4	4	4	4¼	Pairs	Cellular	Cent 'fl	H. T.	Dry	Splash
Abbott-Detroit	1500	28.9	R'ster.	2	4	4	4¼	Pairs	Cellular	Cent 'fl	H. T.	Dry	Splash
Abbott-Detroit	2350	28.9	Coupe	3	4	4	4¼	Pairs	Cellular	Cent 'fl	H. T.	Dry	Splash
Krit	800	22.5	R'bout.	2	4	3¾	4	Block.	Tubular	Syph'n	H. T.		Splash
Krit	825	22.5	R'ster.	3	4	3¾	4	Block.	Tubular	Syph'n	H. T.		Splash
Krit	850	22.5	Tour'g.	3	4	3¾	4	Block.	Tubular	Syph'n	H. T.		Splash
Krit	1275	22.5	Coupe	3	4	3¾	4	Block.	Tubular	Syph'n	H. T.		Splash
Firestone-Col'bus 86-C		32.0	Fore-D.	5[1]	4	4½	4½	Pairs	Cellular	Cent 'fl	L. T.	Dry	Pump
Firestone-Col'bus 65-C		42.0	Fore-D.	5	4	4½	5	Pairs	Cellular	Cent 'fl	H. T.	Dry	Pump

[1] Or 60 inches.

BLACK CROW—Otto F. Rost, 1593 Broadway, New York City
ALPENA FLYER—Alpena Motor Car Co., Alpena, Mich.
COLE "30"—Cole Motor Car Co., Indianapolis, Ind.
HENRY—Henry Motor Sales Co., Muskegon, Mich.
CRAWFORD—Crawford Automobile Co., Hagerstown, Md.

the cylinders have a bore of 4 inches and a stroke of 4 1-2 inches. The compression is 54 pounds per square inch above atmosphere, and the inlet valves are located in the head; the exhaust valves are located in the side. Lubrication is by splash, with a sight feed on the dash. Ignition is by means of the Splitdorf dual system, including a magneto. The car is delivered to the purchaser complete at the price named in the tabulation, including combination oil and electric lights for the side and tail, also a 6-inch electric headlight and a 120 ampere-hour storage battery, horn, tool-kit, pump and jack are included.

pal Mechanical Dimensions

Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
	Type	Speeds	Location	Drive				Crankshaft	Trans-mis'n	Axle		Front	Rear
M. disc	Sel	3	Axle	Shaft	109	56	P. Steel	Plain	Roller	Roller	.....	32x3	32x3½
M. disc	Sel	3	Axle	Shaft	109	56	P. Steel	Plain	Roller	Roller	.....	32x3	32x3½
M. disc	Sel	3	Axle	Shaft	109	56	P. Steel	Plain	Roller	Roller	.....	32x3	32x3½
M. disc	Sel	3	Axle	Shaft	112	56	P. Steel	Plain	Roller	Roller	.....	32x3½	32x3½
M. disc	Sel	3	Axle	Shaft	112	56	P. Steel	Plain	Roller	Roller	.....	34x3½	34x3½
M. disc	Sel	3	Axle	Shaft	120	56	P. Steel	Plain	Roller	Roller	.....	34x3½	34x3½
M. disc	Sel	3	Axle	Shaft	120	56	P. Steel	Plain	Roller	Roller	.....	34x4½	34x4
M. disc	Sel	3	Axle	Shaft	120	56	P. Steel	Plain	Roller	Roller	.....	36x4	36x4
M. disc	Sel	3	Unit	Shaft	112	56	Channel	Plain	Ball	Ball	2250	34x3½	34x3½
M. disc	Sel	3	Unit	Shaft	112	56	Channel	Plain	Ball	Ball	2250	34x3½	34x3½
M. disc	Sel	3	Unit	Shaft	112	56	Channel	Plain	Ball	Ball	2250	34x3½	34x3½
M. disc	Sel	3	Unit	Shaft	112	56	Channel	Plain	Ball	Ball	2250	34x3½	34x3½
Cone	Sel	3	Unit	Shaft	118	56	P. Steel	Plain	Ball	Roller	2700	34x4	34x4
Cone	Sel	3	Unit	Shaft	118	56	P. Steel	Plain	Ball	Boller	2700	34x4	34x4
Cone	Sel	3	Unit	Shaft	118	56	P. Steel	Plain	Ball	Roller	2700	34x4	34x4
Cone	Sel	3	Unit	Shaft	118	56	P. Steel	Plain	Ball	Roller	2700	34x4	34x4
M. disc	Sel	3	Unit	Shaft	116	56	P. Steel	Plain	Ball	Ball	2550	34x4	34x4
M. disc	Sel	3	Unit	Shaft	116	56	P. Steel	Plain	Ball	Ball	2550	34x4	34x4
M. disc	Sel	3	Unit	Shaft	116	56	P. Steel	Plain	Ball	Ball	2550	34x4	34x4
M. disc	Sel	3	Axle	Shaft	106	56	P. Steel	Plain	Ball	Roller	1800	32x3½	32x3½
M. disc	Sel	3	Axle	Shaft	108	56	P. Steel	Plain	Ball	Roller	1800	32x3½	32x3½
Cone	Sel	3	Axle	Shaft	112	56	P. Steel	Plain	Ball	B. & R.	2300	32x3½	32x3½
Cone	Sel	3	Axle	Shaft	118	56	P. Steel	Plain	Ball	B. & R.	2450	34x3½	34x3½
Cone	Sel	2	Unit	Shaft	100	56	P. Steel	Plain	Roller	Roller	1700	32x3	32x3
Cone	Sel	3	S. Frame	Shaft	116	[1]56	P. Steel	Plain	Roller	Roller	2300	32x3½	32x3½
Cone	Sel	3	S. Frame	Shaft	116	56	P. Steel	Plain	Roller	Roller	2300	32x3½	32x3½
Cone	Sel	3	S. Frame	Shaft	116	[1]56	P. Steel	Plain	Roller	Roller	2300	32x3½	32x3½
Cone	Sel	3	S. Frame	Shaft	116	[1]56	P. Steel	Plain	Roller	Roller	2300	34x3½	34x3½
Cone	Sel	3	S. Frame	Shaft	118	[1]56	P. Steel	Plain	Roller	Roller	2300	36x3½	36x3½
Cone	Sel	3	S. Frame	Shaft	118	[1]56	P. Steel	Plain	Roller	Roller	2300	36x3½	36x3½
Cone	Sel	3	Unit	Shaft	106	56	P. Steel	Plain	Ball	Ball	2000	32x3½	32x3½
Cone	Sel	3	Unit	Shaft	106	56	P. Steel	Plain	Ball	Ball	2000	32x3½	32x3½
Cone	Sel	3	Unit	Shaft	106	56	P. Steel	Plain	Ball	Ball	2000	32x3½	32x3½
Cone	Sel	3	Unit	Shaft	110	56	P. Steel	Plain	Ball	Ball	2000	34x3½	34x3½
Cone	Sel	3	Unit	Shaft	106	56	P. Steel	Plain	Ball	Ball	2000	32x3½	32x3½
Cone	Sel	3	Unit	Shaft	118	56	D. Steel	Plain	Ball	Ball	2800	34x4	34x4
Cone	Sel	3	Unit	Shaft	118	56	D. Steel	Plain	Ball	Ball	2800	34x4	34x4
M. disc	Sel	3	Motor	Shaft	110	56	P. Steel	Ball	Ball	Roller	2100	34x3½	34x3½
M. disc	Sel	3	Motor	Shaft	110	56	P. Steel	Ball	Ball	Roller	2100	34x3½	34x3½
M. disc	Sel	3	Motor	Shaft	110	56	P. Steel	Ball	Ball	Roller	2100	34x3½	34x3½
M. disc	Sel	3	Motor	Shaft	110	56	P. Steel	Ball	Ball	Roller	2100	34x3½	34x3½
M. disc	Sel	3	Unit	Shaft	110	56½	P. Steel	Plain	Ball	Roller	2240	34x3½	34x3½
M. disc	Sel	3	Unit	Shaft	110	56½	P. Steel	Plain	Ball	Roller	2240	34x3½	34x3½
M. disc	Sel	3	Unit	Shaft	110	56½	P. Steel	Plain	Ball	Roller	2240	34x3½	34x3½
M. disc	Sel	3	Unit	Shaft	110	56½	P. Steel	Plain	Ball	Roller	2240	34x3½	34x3½
M. disc	Sel	2	Motor	Shaft	96	56	P. Steel	Ball	Ball	Ball	1200	32x3	32x3
M. disc	Sel	2	Motor	Shaft	96	56	P. Steel	Ball	Ball	Ball	1250	32x3	32x3
M. disc	Sel	2	Motor	Shaft	96	56	P. Steel	Ball	Ball	Ball	1250	32x3	32x3
M. disc	Sel	2	Motor	Shaft	96	56	P. Steel	Ball	Ball	Ball	1250	32x3	32x3
Cone	Sel	3	S. Frame	Shaft	113	56	P. Steel	Plain	Ball	Ball	2250	34x4	34x4
Cone	Sel	3	S. Frame	Shaft	120	56	P. Steel	Plain	Ball	Ball	2650	34x4	34x4

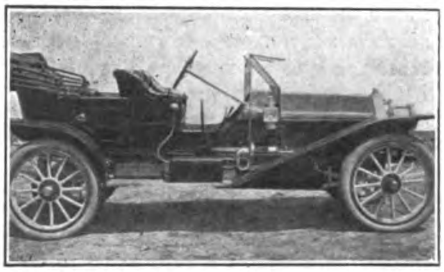
[1] Fore-door body.

PARRY—Parry Automobile Co., Indianapolis, Ind.
PATERSON—W. A. Paterson Co., Flint, Mich.
ABBOTT-DETROIT—Abbott Motor Car Co., Detroit, Mich.
KRIT—K-R-I-T Motor Car Co., Detroit, Mich.
FIRESTONE-COLUMBUS—Columbus Buggy Co., Columbus, O.

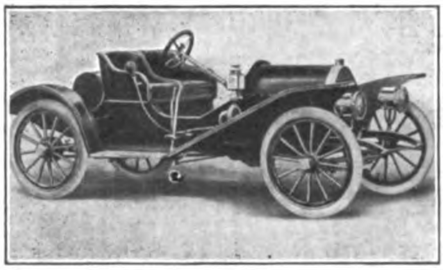
Alpena

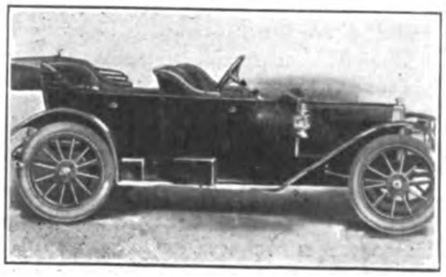
AMONG the automobiles that are tabulated in this article the Alpena Flyer is included. In addition to a photograph of one of the models, the unit power plant is illustrated with a side view in Fig. 4, and a rear-end view at the right in Fig. 3. Referring to Fig. 4, the right-hand side of the motor, the Schebler make of carbureter C1 is located in the mid-position, and glancing at the rear-end view it will be observed that the magneto M1 is located on the side opposite to the carbureter. In addition to the clean placing of the accessories of the motor, attention is called


Henry 40 h.p. fore-door touring car


Parry Model 37 baby tonneau


Paterson "30" 5-passenger touring car


Krit two-seated runabout


Firestone-Columbus torpedo

to the method of bolting the transmission case to the crankcase and to the well-contrived pedal placed for the manipulation of the clutch, observing that the pedal shaft is of a healthy diameter.

Parry

FOR details of the Parry line of cars reference may be had to the tabulation and, representative of the general appearance of the automobiles, one illustration of a complete car is presented. Mechanically, the class of work from this plant will be appreciated by examining Fig. 5 of the unit power plant, looking at the right-hand side, showing the magneto M1 on a shelf driven by a shaft out of the half-time gear housing in the front end of the motor. Still another motor from this plant is shown in Fig. 11, looking at the right-hand side, presenting the magneto M1, driven by the same shaft as the centrifugal water pump W1, taking power from the half-time gear in the front of the motor case. Lubrication is positive with a pump P1 incorporated in the lower half of the crankcase. The valves are overhead and the tappet rods come up on the side shown, they being straight and well proportioned for the work. In other respects the motor shows the earmarks of the designer; observe that the water connections are not only short but direct. Fig. 7 shows a stripped chassis, giving an excellent idea of the layout of the machinery.

Cole

MECHANICALLY the Cole "30" motor is shown in Figs. 9 and 10, with the unit power plant, looking at the left-hand side, presenting the carbureter C1 in a mid-position and the oil pump P1 in the lower half of the case near the front of the motor. The transmission gear is in the extension of the crankcase of the motor, being flanged to the enlargement which encompasses the flywheel, and among the other features which distinguish the Cole design from motors in general, the method of assembling, which obviates the splitting of the crankcase horizontally in the plane of the crankshaft. The scheme of design of the chassis is shown in Fig. 2 of the rear end, presenting three-quarter elliptic springs on a symmetrically fashioned live rear axle, and a channel section frame with a pronounced kick-up, thus bringing the center of gravity of the car well in the direction of the ground, leaving sufficient clearance for practical purposes under severe road conditions.

Henry

THIS make of car will best be appreciated by examining Fig. 6 of the stripped chassis in conjunction with the tabulation, which affords the detailed information necessary, and in the examination of the chassis as shown in Fig. 6 it will be observed that the motor sets back of the front axle, bringing the radiator on the axle center, and the transmission gear lines up on a subframe with the motor. The live rear axle is provided with a torsion tube concentric with the propeller shaft, and the universal joint is fixed to a cross-member just back of the transmission gear so that the axle is free to respond to road inequalities under the flexible control of three-quarter elliptic springs. The general appearance of the finished car is also shown.

Crawford

INSPECTING the illustration of the Crawford car shows a torpedo type of body with a fore door, and a straight line effect which is pleasing to the eye. The details of the car are given in the tabulation and in order to indicate the general idea of the designer the transmission gears removed from the care are presented in Fig. 8. It will be observed that the gears are of wide face, symmetrical design, and that the sliding set is provided with broached holes for a square shaft, which runs on conical roller bearings, and that the bevel gear, which is flanged to the differential housing, is combined with the differential unit separable from the axle housing, into which it may be placed after it is assembled and inspected.

The Auto in Distant Lands

STATUS OF THE INDUSTRY AS GATHERED FROM REPORTS OF UNITED STATES CONSULS IN MANY COUNTRIES

WESTERN Canada is to have its first automobile show in Winnipeg, from February 13 to 18. The exhibition will be held under the auspices of the Winnipeg Motor Trades Association. Advantage will be taken of "bonspiel" week, during which period hundreds of thousands of visitors flock to Winnipeg from all sections of Western Canada. There is to be a limit to the number of exhibits, owing to lack of space, the greatest number of automobiles that can be accommodated being sixty. For this reason, the exhibitors will be confined to firms which have been members of the Association for ninety days prior to the exhibition. The promoters intend to make the show an annual affair. It is aimed to provide ample space for all comers by the year 1912.

An automobile reliability tour is being planned for next Summer, the start to be made and ending in Winnipeg. The route will embrace the Provinces of Manitoba, Saskatchewan and Alberta. This test will be open to all makes of cars, for the purpose of creating a greater interest in the tour throughout the route, as well as to encourage the improvement of roads and bridges, the ultimate object being to determine approximately the type of automobile most suitable for use on prairie roads, of the order of those over which the contestants will travel. Other features of the run will be for the purpose of educating the public to the advantages of rapid automobile transit, both as a means of carrying passengers and goods.

The distance to be traversed will approximate 2,300 miles, the territory embracing the most valuable and alluring portions of mighty Western Canada—which drew more than 120,000 Americans across the line last year to take up agricultural pursuits. The tour will thread through the following named towns: Winnipeg, Moose Jaw, Napinka, Morris, Carnduff, Estevan, Swift Current, Medicine Hat, Lethbridge, Macleod, Calgary, Edmonton, Lloydminster, Saskatoon, Regina, Brandon and Portage la Prairie. With such consummate skill has the circuit been planned that fully eighty per cent. of the population of Western Canada will be able to witness the test. The American Automobile Association 1911 rules for reliability contests of the second grade will be adopted. Each car will be taxed $150 for an entrance fee. It is estimated that the cost per car will be $500, bringing the total expense up to about $3,000.

If any person has a mind that Paraguay is a paradise for automobilists, the only word to be heeded, is Don't! There is absolutely no use for the automobile in Paraguay. Not but that the people of that far-away country would like to take their place beside the other moderns who are making use of the automobile. But the fact is there are no roads in Paraguay over which a machine could be driven. The only highways—and these are practically byways—in the country are available for bullock-carts. The people of the land travel principally on horseback. There are myriads of swamps—where there are no sandy stretches. The roads are of the roughest description. The city of Ascuncion does not furnish an exception. The streets are raggedly paved, making it a hard job for two horses to snail along hitched to a victoria holding two fares. It would be a bold automobilist who would attempt to ride over the streets. There is but one machine in Ascuncion, and its expression is really one of melancholy, as though pitying its owner when he sometimes ventures driving it over the jagged pavements.

There are no automobile manufactories in Russia, considered from the American standpoint. A number of carriage and bicycle manufacturers have for some time been in the habit of importing parts of automobiles, including engines, tires and the more complicated pieces, and they have made the rougher parts on the premises. As an industry, automobile making has not thrived to any important degree in Russia; and for the reason that the Russians who are financially able to keep automobiles demand the very best that they can find in the market. The majority refuse to buy a cheap machine. There is, however, a continuous growing demand for good cars. The customs returns carry out this statement, as the following figures relative to imports into Russia show: The year 1906, 245 cars; in 1907, 555 cars; in 1908, 860 cars; in the last six months of 1909, 628 cars. It is expected that the 1910 imports will reach 1,500 machines. The principal makes are French, Italian, German and English. There is but one American firm represented in Russia, so far as can be ascertained. The roads within the Czar's Empire are as rough as the worst roads found in the United States. Even in Moscow the streets are paved irregularly with rough stones, which severely try the enduring power of the strongest machines.

Reichenberg, Austria, sets the price of gasoline at $9.75 per 220 pounds, or 18 gallons. At the same time automobiles are exempt from the internal revenue tax of $2.63 per 220 pounds. Government, however, proposes to feel the way towards the imposition of this tax on gasoline which is used by the owners of automobiles.

Bergen, Norway, an enterprising city, is provided with 15 automobiles, all of which, with one exception, are of European make. The exception is an American-manufactured machine. It is considered that the field offers a good future for the automobile trade provided it is carried on persistently and systematically. The lack of these requisites on the part of agents has more to do with the small number of cars found in Bergen and vicinity than to any strength of effort.

Care and Repair of Tires

UNLESS THE SPARE TIRE RECEIVES ATTENTION IT CANNOT BE EXPECTED TO PERFORM WELL WHEN PUT INTO USE

UNLESS the spare tire that the autoist carries with him on the car receives proper attention the life of this tire when put into use will by no means represent the money paid for it. Unless it receives such attentions as will be later on suggested deterioration will grow apace, and once rot has set in or the outside layer of rubber becomes inanimate and deprived of its resilient properties its ultimate utility will not represent 50 per cent. of what it should possess.

The spare tire should be wrapped in a case of some waterproof material, and in this connection leather or pantasote answer very well, provided they are not too thick and prevent adhesion all round the circumference of the tire. Such coverings are illustrated in Figs. 1 and 2. It is not sufficient to place such covers over the tires, but they must be so fitted that rain and damp are entirely excluded. If moisture of any description finds its way into the spare tire there is no telling where the damage will end. In Fig. 2 the joint J1 is at the top. It is good to have a covering of some description, but the utility of the case is partly done away with if the tires are carried in this way. In a heavy downpour of rain the wet will assuredly find its way in, whereas if the joint were placed half-way down toward the front, below the strap S2, there would be less likelihood of such a thing happening. Reference to Fig. 1 shows how this should be done.

Unless the spare tires are carried in some case or cover rain will find them an easy prey. Fig. 4 shows two tires being carried without any protection, and the first drop of rain will enter the outer casing O1 and the rim of the demountable will rust up so that when it will be required for use it will have to be cleaned off with emery paper to make a good fit.

It is only necessary that the tire be carried in this fashion for a few days in the rain to render the inside linings practically useless, as one lining of canvas after the other absorbs the moisture and starts the rotting. Segregation of the layers intervenes, ending up with decay. The method of wrapping shown in Fig. 5 is similar to those already shown, with this difference—that the tires should be taken out of their wrappings oftener and well dusted over with soapstone, at the same time removing any traces of dust. Covers should be taken off the spare tires every week in the Summer and every fortnight in the Winter, to clean off the dust which will find its way through the smallest crack.

Fig. 3 tells a frequent tale. During a few minutes that the

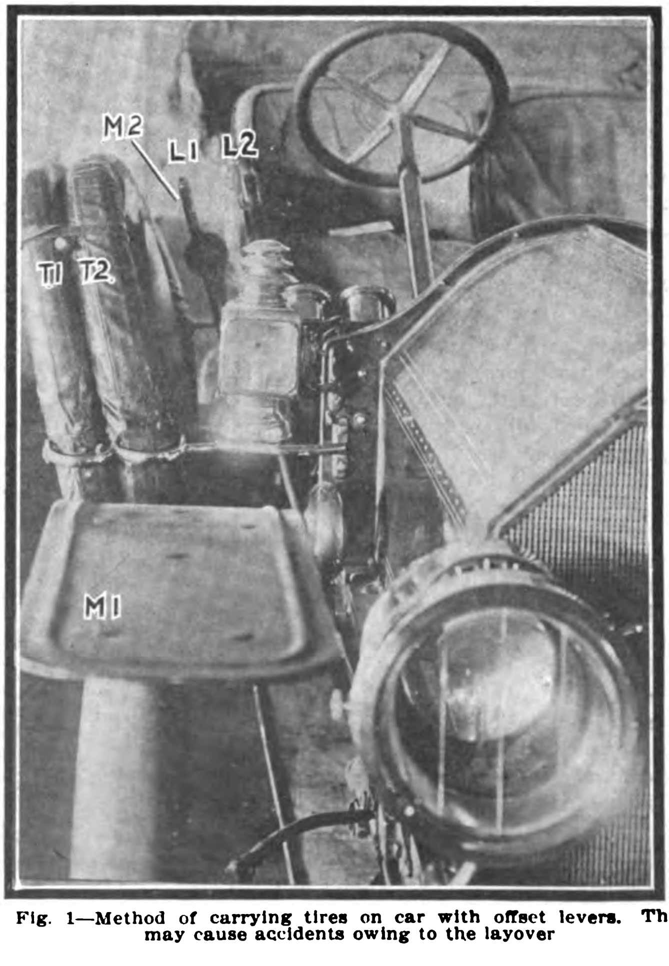


Fig. 1—Method of carrying tires on car with offset levers. This may cause accidents owing to the layover

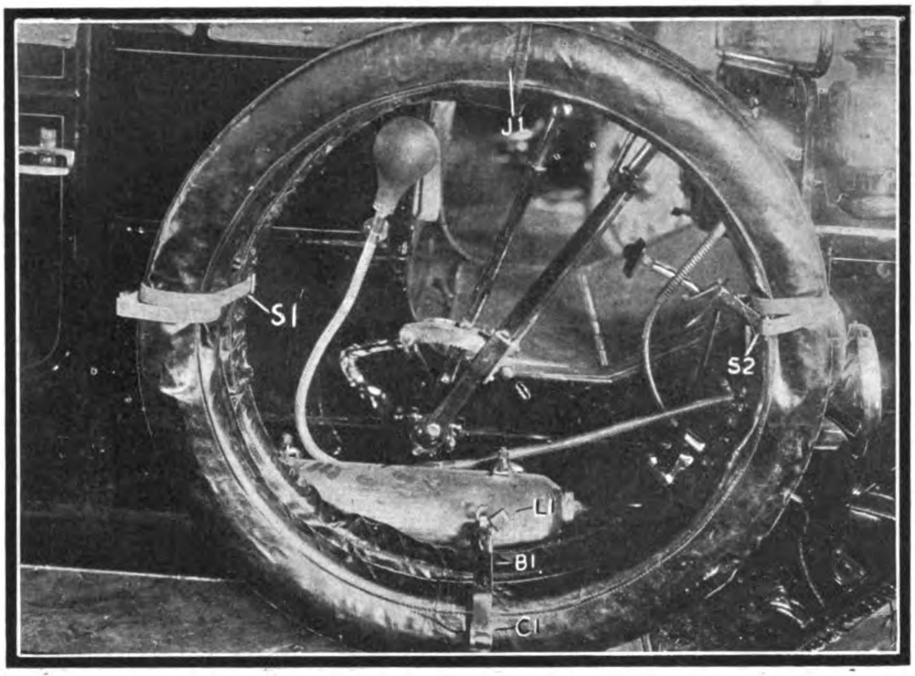


Fig. 2—A good method of carrying spare tires enclosed in waterproof covers and padlocked to prevent theft

driver goes into a store to make a purchase he carefully takes off his fur rug and throws it over the radiator and hood to prevent the motor being damaged by the inroads of frost. The poor spare tire is subjected the whole Winter through to snow, rain, sleet, frost and dust without the slightest protection. It is a very good practice to cover the radiator, but the care is misplaced. There is no use covering the tire with a fur rug; it would be satisfied with a common piece of canvas for want of something better, and would recompense the owner for his trouble by ekeing out a longer existence. The padlock P1 in this case is like bolting the stable after the horse has gone, because if one is content to allow the tire to rot it would be as well to give the tire away to some one for the time being and let him have the amount of use in a legitimate manner that is being taken out of it by neglect and failure to properly protect it.

When washing the car the spare tires must be removed and placed in a dry place off to one side, that they cannot be splashed. Tire covers are pretty ornaments, and are treated by some in this light only. They certainly add to the appearance of the car as compared with carrying tires unwrapped, but in the choice of covers the main point is utility combined with beauty and not the latter adjunct alone.

The next point after establishing the fact that the tires should be covered is how they should be carried. In a great measure this is a matter that is dependent on the type of body and the disposition of the levers. The most common method employed is that shown in Fig. 2, but it is not possible to carry tires in this manner on every car. Take, for example, Fig. 1; owing to the offset levers the tires extend about six inches beyond the extreme width of the mudguards. In a tight corner such as it is possible to get into, it is common belief that if the mudguards pass the rest of the car will also pass. Again, in stopping at the side of the curb these tires will protrude over the foot-path for several inches, and there is the possibility of knocking some one over with them or passers-by catching their clothing in the straps or irons. In such cases it is better to either carry only one tire, or if two are carried have some means similar to that shown in Fig. 5. In this case the bracket bears the weight of the tires T1 and they are supported at the sides by the irons I1 and I2. This method does not in any way interfere with the rear lamp L1 and number plate N1, as they fit conveniently inside, as the illustration shows. Besides the straps S1 it is as well to have a leather-covered chain with a padlock for prevention against theft. Some time ago curious thefts of tires fitted in this manner occurred in France, and the culprit was caught one day red-handed. He rode with an accomplice behind the car on a bicycle and cut the straps. A small jerk and the tire came loose, while the car sped on without its occupants being aware of what had happened.

The brackets to hold the tires should not be too small or weak, as the weight may snap them at some time or other and the constant friction due to chafing through not being steady will wear out the cases. The type of iron here illustrated is very handy, as the tires are locked to the running board by bar B1 and lock L1, Fig. 2.

Fig. 4 shows the same bracket with tires without covers over them. The straps are so tightly pulled that the tire is distorted, much to its detriment, due to the irons being set out too far for the size of tire. The chafing that the case ordinarily receives will be inflicted on the tire itself, if carried as in Fig. 3, and after several hundred miles of running under these conditions a perceptible rib will be cut in the tire, causing a weak spot.

Where detachable rims are used the irons should be stronger than for ordinary tires to withstand the extra weight. If they are placed at the rear of the car the exhaust outlet should be borne in mind, as heat will deteriorate rubber very quickly.

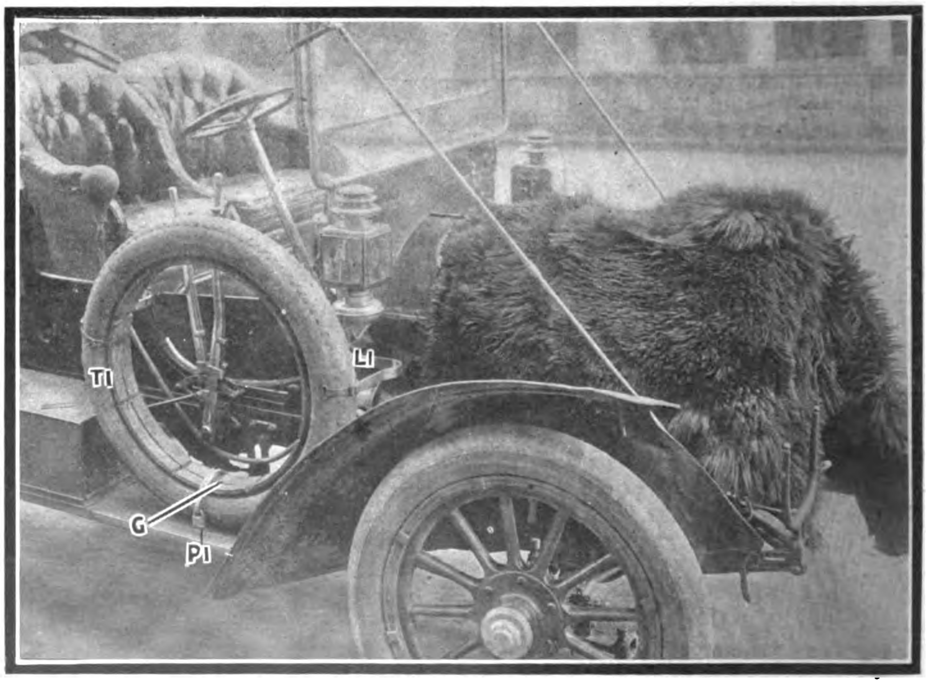


Fig. 3—The spare tire is allowed to go unprotected, while the motor has a fur overcoat. "Penny wise, pound foolish"

As soon as a spare tire has to be put into use the tire that it replaces should be sent to the repair shop, if it is worth repairing. It is no use carrying a damaged tire around, and it should always be replaced by a new one. Spare tubes should always be carried in a bag or box and if possible in a separate compartment from the tools. Before placing the tubes in the bag do not be satisfied with sprinkling some soapstone in the bag and trust to chance that it will find its way on the tube. Take a rag well covered with soapstone and wipe the tube all over with it.

When it becomes necessary to replace a tube it frequently happens that parts are missing or valve thread damaged—always pack away carefully.

Whenever the tire has to be taken off take the valve parts and put them back on the tube. In the case of spare tubes it is a good plan to tie a piece of canvas around the valve over the dust cap. An emergency spare tire can be made from stout rope wound around the rim either lengthwise or crosswise, and a combination of the two is even better. This temporary makeshift has been known to answer for several miles, and has the advantage that the rim is protected and the damaged tire saved from being torn to ribbons.

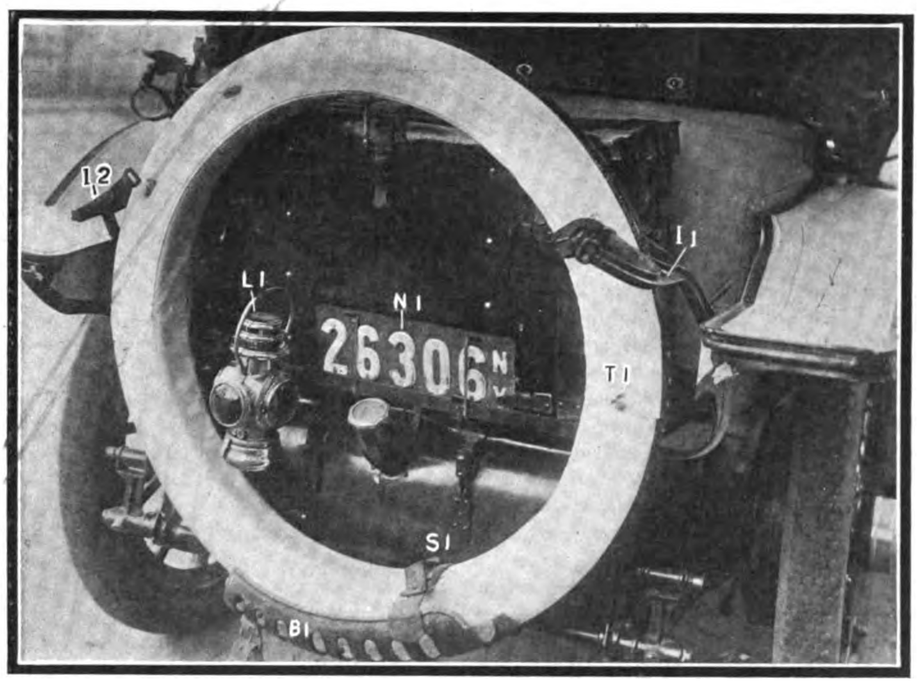


Fig. 5—A good way to carry tires out of the way of the levers. It may resemble a lifebuoy, but the utility is there

Speed-Changing Gears

Discussing Arithmetical and Geometrical Progressions in the Sliding Gear Systems

SLIDING GEARS do not always work well; sometimes the gears refuse, perhaps on second, or, in other cases, on third, but always to the great annoyance of the driver, and, if he is also to be classed as the owner of the car, his pocketbook is reminded of the cast of a new set of gears, for, as one might well suppose, it is not in the nature of things to go on clashing metal to metal and not have the parts give out as a result. In determining the proper increments of change of the gear-ratio as it is brought about through a sliding gear system, there seems to be very little data from which to establish a case. If the gear system affords four speeds and the final speed is to be so arranged that the automobile will go at, say, 60 miles per hour, the question is what should be the speed of the car considering the remaining speed changes, assuming that the motor is maintained at a constant speed?

Fixing the changes on a basis involving a geometrical progression would result in changes as follows:

8-16-32-64 (which is near enough for the purpose here).

This would make the difference between the third and the fourth speed very great, but the idea is not so bad, due to the fact that the greatest difference in speed would correspond with the best ability of the motor, and the flywheel effect of the wheels of the automobile would be maximum. A slight modification is as follows:

7½-15-30-60.

The assumption is that the reverse gear would give a lower speed than the low gear. The difference might be quite a little. It is comparatively seldom that an automobile is required to back up at high speed.

In comparison with the geometrical plan as above outlined there is the arithmetical ratio which might read as follows:

15-30-45-60.

This idea, while it sounds good, does not seem to accord with the main considerations, and, while there may be cases in which it might seem desirable to provide for the narrowing of the gap below that which obtains when a geometrical ratio is used, the fact remains that, when a motor is overloaded, it is generally on a patch of bad roadway, or when the motor is out of order, so that it is a very low gear that will be needed.

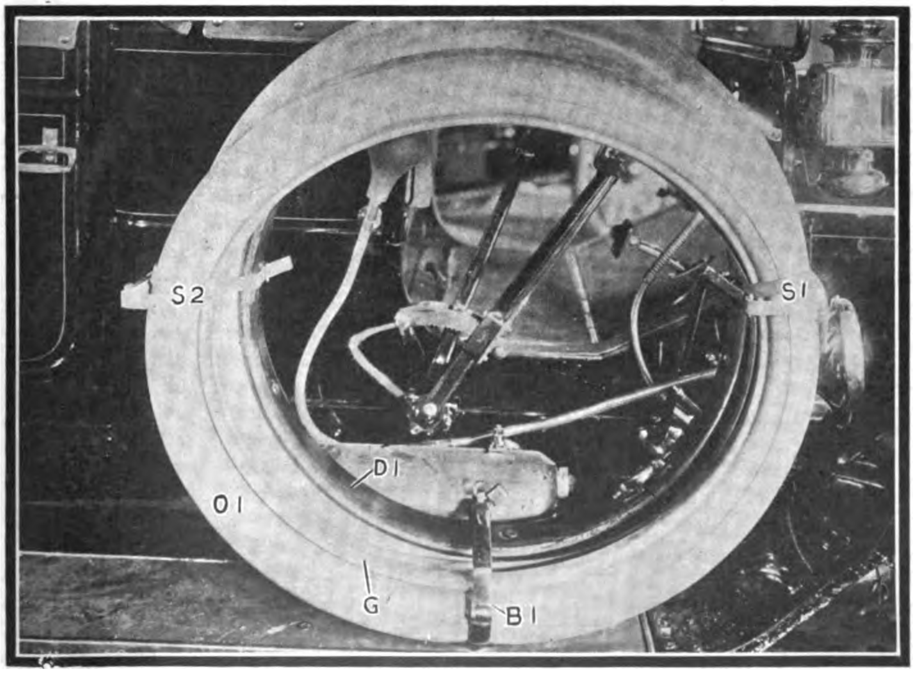


Fig. 4—Showing how tires should not be carried. Dirt and rain will soon rot them and cause rapid depreciation

Avoid Broken Wheels

CHARACTERISTICS AND TESTS OF HICKORY AS IT IS USED FOR SPOKES AND FELLOES FOR AUTOMOBILE WHEELS, SHOWING HOW TO AVOID DEFECTIVE WOOD

THE technical qualities of woods used in automobile wheel construction are of first importance. It is to its toughness, strength, and elasticity almost entirely that hickory owes its value for this purpose. It is therefore important to know to what extent it is actually superior to other woods and also which of the different species are most valuable, and under what silvic conditions the best timber may be produced. It is also important to know the range of strength and toughness of different kinds of hickory, so as to be able to distinguish good hickory from poor by its physical characteristics, and to know from what parts of the tree the best wood can be secured to furnish the raw material.

To answer these questions a series of tests was undertaken at the Forest Service laboratory at Purdue University. The material was various hickories secured from four different localities and included seven different species. Thirty-three trees were secured from Sardis, Miss.; 40 from near Napoleon, Ohio; 30 were obtained from Holly, Webster County, W. Va., and 39 in Chester County, Pa.

From each of these trees one flitch was cut through the center of the butt log from bark to bark. The flitches were 4 inches thick and from 7 to 12 feet long, depending on the length of the log.

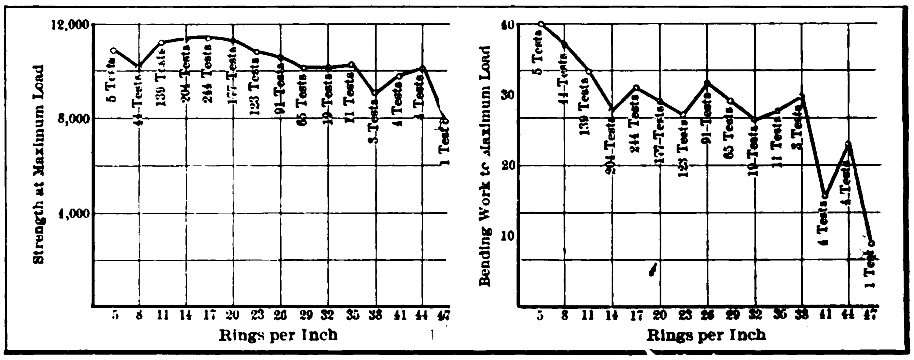


Fig. 3—Strength and work as affected by rate of growth, as shown by tests on green hickory

Upon arrival at the laboratory the flitches were cut into sticks 2½ by 2½ by 30 inches, and the specimens intended for green tests were immersed in water until the time of test to preserve them in the green condition. The temperature of the wood at the time of test was about the same for all specimens, so that the relative strength would not be affected by this cause. Shortly before the time of test the specimens were removed from the water, planed to 2 by 2 inches, and sawed to a uniform length of 28 inches for the bending test. After the bending test specimens were cut from the uninjured portion of the beam for other tests.

In cutting the individual test pieces from the flitches no attempt was made to select pieces which might yield the highest results. However, specimens were selected so as to avoid shakes and culls and to include the various kinds of growth found in any given flitch, and specimens that contained visible defects which would certainly lower the strength were not included in the tests.

The specimens were all accurately measured and weighed, the per cent. of sapwood measured, and the number of rings per inch counted. The non-porous part of the annual rings was measured and its proportion given in per cent. of the whole growth; the moisture content was determined in per cent. of oven-dry weight.

Static bending tests were the most important of the tests made.

Beams 2 inches square and 28 inches long were supported on knife edges 26 inches apart. Plates and rollers were used to avoid crushing the specimen and to do away with any friction at the end bearings. The load was applied at the center by a screw testing machine. The moving head of the machine descended at a uniform speed of 0.09 inch per minute. The amount of bending was noted for each 100 pounds increase in load up to the point where the stick began to give away, after which the loads were read for each 0.1 inch increase in deflection. The load bending curve was platted at the time of test, and the load and deflection were recorded at first visible failure and at maximum load.

The following points were determined: Specific gravity as tested and oven dry, weight per cubic foot as tested and oven dry, fiber stress at elastic limit, modulus of rupture, modulus of elasticity, horizontal shear at maximum load, work or resilience to elastic limit, work to maximum load, and total work.

Of these, the most important, in the consideration of a timber like hickory, are the strength at maximum load, as shown by the modulus of rupture, and work to maximum load.

Strength at maximum load is a measure of the ability of the timber to hold a load applied without shock.

Work to maximum load is a measure of the ability of the timber to withstand a shock or blow of any very suddenly applied load. It is a measure of toughness.

Other tests were also made in compression parallel to the grain, compression perpendicular to the grain, shear, abrasion, shrinkage, impact, and torsion.

Fig. 1, which includes all the commercial hickories, shows that the work or shock-resisting ability increases in proportion to the dry weight of the wood. The strength at maximum load also appears to increase almost in direct propor-

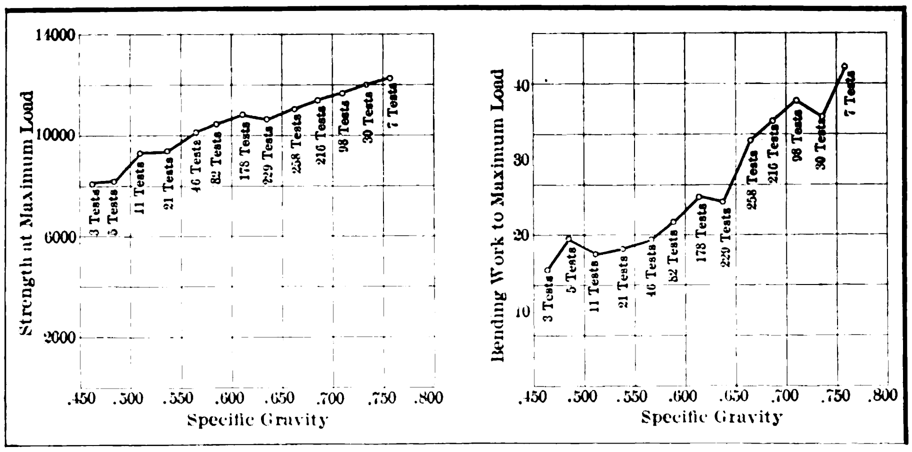
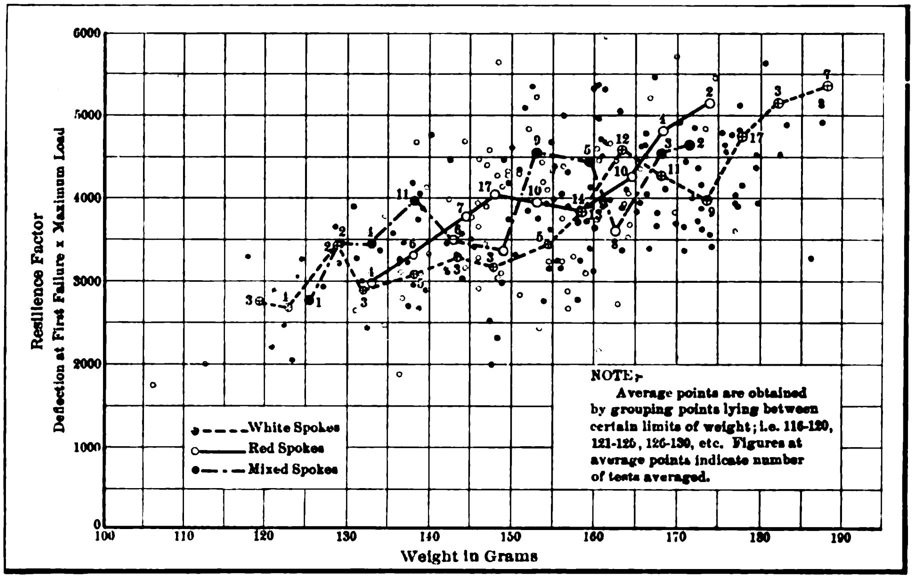


Fig. 1—Strength and work as affected by specific gravity, as shown by tests on green hickory

tion to the dry weight. The deduction from Fig. 1 is that hickory may be inspected upon a basis of weight, and the heavier the wood the better. Additional confirmation of this is found in Fig. 3, which shows that the strength and resilience of spokes increase with the weight of the spokes. This relation of weight to strength is true of various species, as is confirmed by many recent tests.



NOTE.—Average points are obtained by grouping points lying between certain limits of weight; i.e. 116-120, 121-125, 126-130, etc. Figures at average points indicate number of tests averaged.

Fig. 2—Spoke-test chart, showing relation between resilience factor and weight in clear spokes

Usually woods are selected on the basis of appearance, very largely on the rate of growth, as shown in the cross section. In hickory the wide-ringed wood, often called “second-growth” hickory, is preferred. Fig. 3, based on commercial hickory grown in good situations, shows that the work of shock-resisting ability is greatest with wide-ringed wood that has from 5 to 14 rings per inch; is fairly constant from 14 to 38 rings, and decreases rapidly from 38 to 47 rings per inch. The strength at maximum load is not so great with the most rapid-growing wood; it is at a maximum with from 14 to 20 rings per inch, and again becomes less as the wood becomes more closely ringed.

The natural deduction is that wood of first-class mechanical value shows from 5 to 20 rings per inch, and that slower growth yields poorer stock.

Experiments conducted by the Forest Service show that the user of hickory should not discriminate against heartwood in buying stock. It is true, however, that sapwood usually is more free from latent defects than heartwood.

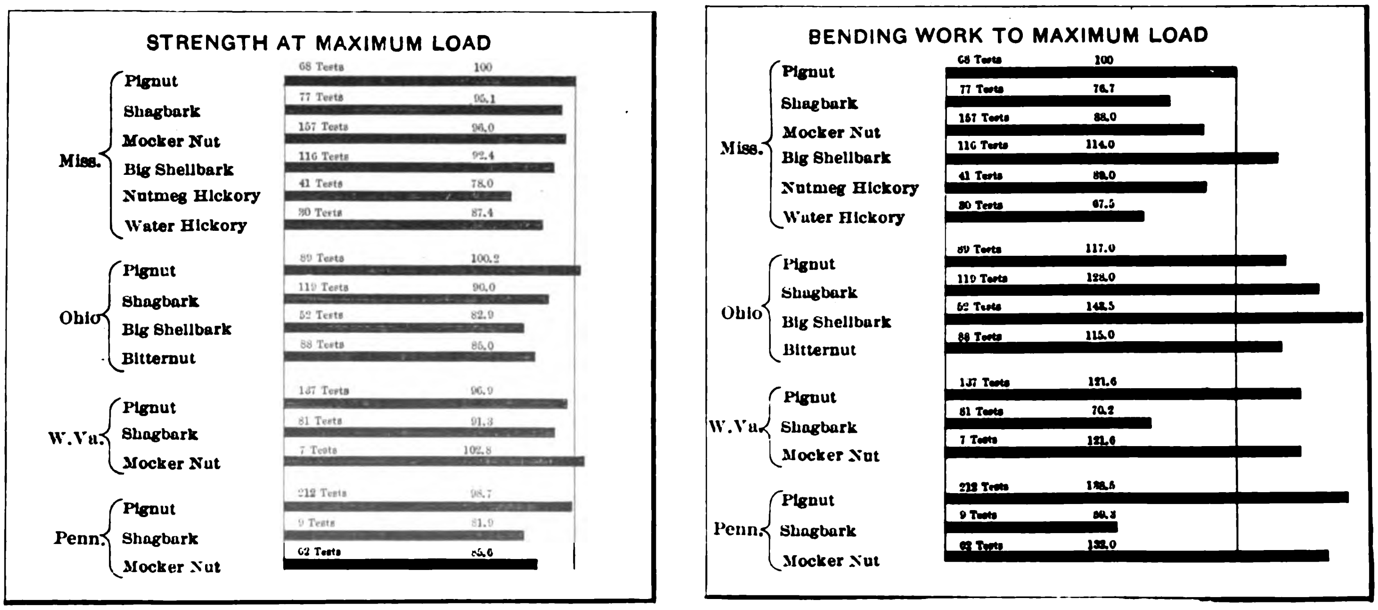
Trees about 150 years old have the maximum average strength, but the average work to maximum load is less with increasing age, and the youngest trees are toughest. Therefore, to obtain the best wood, the trees should not be allowed to become overmature.

One of the moot questions among hickory men is the relative value of northern and southern hickory. The impression prevails that southern hickory is more porous and brash than hickory from the north. Southern hickory is as tough and strong as northern hickory of the same age. But the southern hickories have a greater tendency to be shaky, and this results in much waste. In trees from southern river bottoms the loss through shakes and grub holes in many cases amounts to as much as 50 per cent.

It is clear that the difference in northern and southern hickory is not due to geographic location, but rather to the character of timber that is being cut. Nearly all of that from southern river bottoms and from the Cumberland Mountains is from large, old-growth trees; that from the north is from younger trees which are grown under more favorable conditions, and it is due simply to the greater age of the southern trees that hickory from that region is lighter and more brash than that from the north.

Figs. 4 and 5 show that pignut, which is generally considered best, is actually the strongest and toughest of the hickories, and is comparatively uniform for all regions. Shagbark is only slightly inferior to pignut; big shellbark is of only medium strength, but is inferior to no other species in toughness; mockernut is somewhat stronger than big shellbark, but lacks toughness. Strength and toughness, however, vary greatly within the same species, and the selection of the best hickory cannot be based on anything but a most rigid inspection and grading.

Iron streaks and birdpecks of small size do not appear to affect the strength or toughness of hickory. Hair checks are usually found in the heavier and better timber, and have but little effect upon the strength and toughness. Cross and spiral grain and dips in grain are all serious defects, and greatly reduce strength and toughness. The weakening effect of knots is due chiefly to the cross grain which they cause.



Figs. 4 and 5—Relative values of the various species of hickory, as compared on the basis of static bending tests

Killing the Motor

STRANGULATON DUE TO OVER-GRINDING OF THE VALVES IS OFTEN THE CAUSE OF A MOTOR DROPPING OFF IN POWER, AS THE GASES CANNOT ESCAPE FREELY

IN designing a gasoline motor to operate satisfactorily, besides the actual sizes of the parts employed and the chóice of suitable materials there remains an all-important factor, sometimes overlooked, and this is correct balancing and equalization of the working parts. As an example, supposing a piston or connecting rod of one of the cylinders of a four-cylinder motor was slightly heavier than the other three, it would be impossible to make such a motor run evenly till this fault were remedied. There is not much likelihood of such a thing happening in the latest method of construction, where nearly every part is stamped that can be so handled with advantage. The controlling of all machined parts before being handed out from the stores to the assembly shops checks inaccuracies down to 1000ths of an inch, and so prevents unequal parts. The lack of balance is set up by undue wear and other contributory causes. And the greatest of these is compression. A motor cannot be expected to perform well if the compression in the several cylinders varies more than 5 pounds per square inch either way from the mean pressure, which is usually determined by the manufacturers after exhaustive experiments with different pressures. After the car finds its way into the user's hands it depends largely on the care he takes of the valves apart from lubrication and carburetion as to the good running of his motor.

When valves are made from the proper material they do not require grinding every week, but the grinding should be done often and little rather than at long intervals, when it requires almost a machine cut to remove the pit from the valve head and seating. Fig. 1 represents the cross section of a valve chamber of a gasoline motor when the valve is new. It will be noticed that the level of the top of the mushroom is level with the top of the seating and that the seat is a perfect fit. A valve so designed, with the proper water jacketing as shown, should give good service if attended to regularly. The amount of lift required to allow the gases to escape freely without causing a back pressure on the motor depends largely on the design of the cams, and is a predetermined amount that is beyond the control of the user as far as adjustment is concerned. In the majority of cases it is safe to assume that this lift should be about 5-16ths inch, and with present-day practise, when silence plays such an important part in design, the lift of both exhaust and inlet valves is the same, although the angle of the cam varies according to the amount of time it has been found necessary to keep the valve open to perform its function. The main point to be borne in mind is that the valve must seat properly at all speeds, and this brings one to the point of clearance between the valve and the push rod directly actuated by the cam. One motor will work well with a clearance of 1-64th of an inch, or the thickness of a thin visiting card, but if this clearance was applied to a motor designed to allow a clearance of say 1-32d or even 3-64ths of an inch the valve would in all probability never seat and cause loss of power. There must be, so to speak, a dead point, or fractional amount of play in the roller which touches the cam, and to obtain this, if the setting is not known, it is better to experiment with the adjustment (taking for granted that the push rods have an adjustment, as every well-designed motor should have), starting from a small clearance and increasing this evenly till the best results are obtained. If the valves do not seat properly overheating will result, and this can be overcome in some motors by slightly increasing the clearance in the manner just referred to.

It is no use taking for granted that the manufacturer has set this correctly and leaving it at that. It is true that if properly set at the beginning it should not require touching for some time; but the wear on the different parts affected, viz., valve seat, valve head, valve spindle and push rod, roller parts and cam, after a time necessitates some resetting, and this is what the adjustment is for.

After the valve has been ground in for the first time a small amount of metal has been taken off the seat and valve consecutively, allowing the valve to drop a corresponding amount. Unless the adjustment of the clearance has been altered, how can the valve seat properly and hold the compression? It cannot, and the result will be that the valve will wear all the quicker, for instead of closing it only chatters on its seat and picks up every little bit of carbon deposit that passes through the motor until it becomes coated with it, and then only, and not before, does it seat. Granted that it does seat, what does the seat consist of? A mass of pitted matter that takes hours of labor to remove unless turned in the lathe. The seating receives a corresponding amount, with the result that the seating and valve become worn away in a similar manner to that shown in Fig. 2 after this pit has been removed.

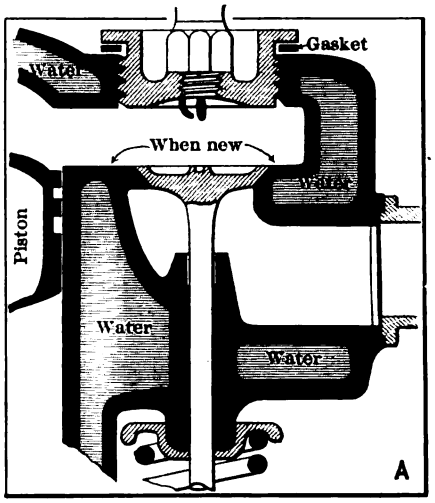


Fig. 1—Cross-section of a valve chamber, showing the valve on its seating when the motor is new

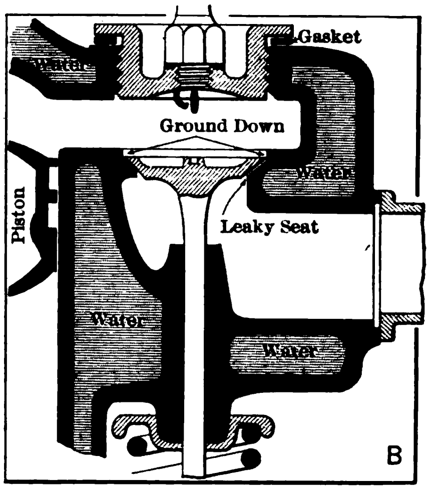


Fig. 2—Showing how the valve has sunk and the seat worn away, due to grinding, also a leaky valve, due to improper adjustment of the push rods

Fig. 3 clearly represents what happens then. The throat, or passage, instead of being free, is partly blocked, and the gases bunch when they are forced out by the piston, and unless the passage is free back pressure results, which acts in the same manner as if one were to put a brake on the motor. The points where the top of the seating originally was have by this time become sharp, as the result of much grinding, and will become red-hot and cause preignition. This shows that although all the carbon may be removed from the cylinders and pistons, yet a small particle of rough metal may become incandescent and thus upset the running of the motor. There is one way of overcoming this strangulation effect of the gases, and that is by chamfering the edges off in the manner indicated in Fig. 4. Care must be exercised in doing this, as if too much metal is removed and the wall of the water jacket is not over thick at the points A and B, in Fig. 4, a leak in the water circulation will be produced, and it will necessitate new cylinders, as it is inadvisable to attempt to repair a defective valve seating.

Anti-Oxidation

Treating Metallic Surfaces With Alcohol Vapor and Method of Producing Bright Surfaces

THE difficulty in the case of some alloys, e. g., those of aluminum, of preventing polished surfaces from being coated with oxide film, rendering them, in some instances, impervious to treatment such as soldering, is well known to the metallurgist in the laboratory and the mechanic in the shops. Particulars are published in a German scientific paper of a treatment devised by one C. Benedicks, of Upsala, who employs alcoholic vapor in a vessel immersed in a water bath. The vessel required for use (laboratory use is here referred to) is placed in the alcohol and heated until no more alcohol will condense in it. It is then removed and wetted. If the wetting is not uniform the treatment has to be repeated. When a fractured piece of steel is to be etched it should be held for a few seconds over boiling alcohol. This is generally to be recommended for metallographic analysis, because the slightest trace of grease would alter the color and appearance of the etched surface. Small articles to be galvanized are cleaned in the same way. When the grease has to be removed from the inner wall of a tube or pipette, the vapors are introduced at the top of the tube, and allowed to escape below. The treatment will not be unknown in some laboratories; but it is not generally practised, and a good deal of alcohol is wasted in the ordinary washing and rinsing. Another process recently patented in Germany has for its purpose the production of a bright surface electrolytically in baths of ordinary temperature. The end is attained by glucocides or similar substances, or nitrogenous glucocides or their derivatives. Instead of these substances, the extracts of plants or barks, as, for instance. althea, panama, or liquorice extract, may be used.—*Motor Trader* (England).

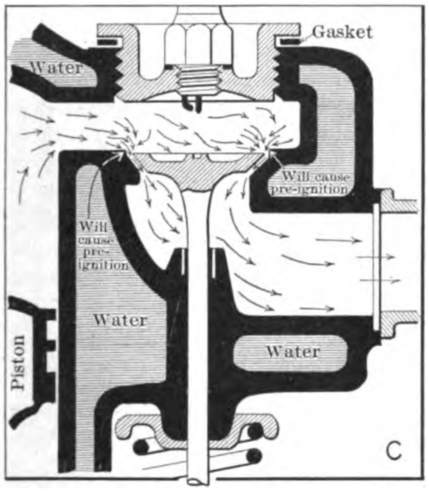


Fig. 3—Passage of the exhaust gases strangled owing to the dropping of the seat, leaving acute points to cause preignition

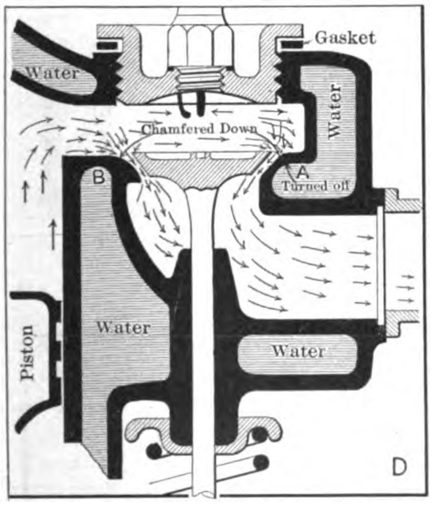


Fig. 4—Acute points chamfered off, allowing the gases free exit and doing away with the protuberances

Cover the Radiator

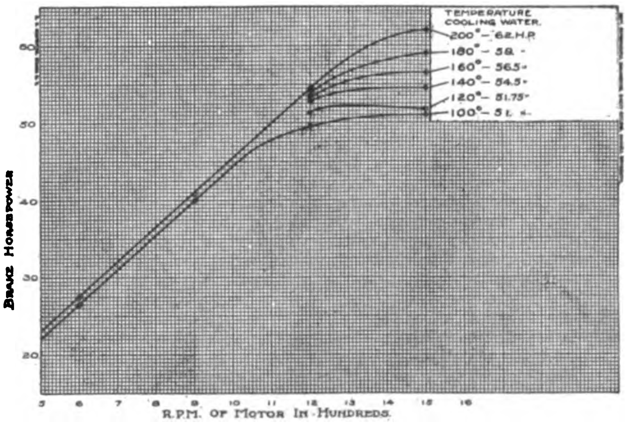
Automobile Engineer Says by so Doing the User Will Get the Benefit of More Power

MANY people imagine that a gas engine should be run as cool as possible. This belief is usually the result of some Summer experiences with a car that has had a radiator or fan inadequate to dissipate the heat of the jacketing water as fast as the engine has produced it. The cooling operation in a gas engine is very simple. At the time that the charge of gasoline and air is exploded the piston is just starting downward. But a moment before, it was on the upper dead center, and was entirely stopped. Starting from rest the piston is traveling quite slowly for the first part of its stroke. It is while the piston is moving slowly that the pressure and temperature are highest in the combustion chamber of the cylinder. The heat inside the cylinders probably reaches at least 2500° Fahrenheit. The water which is just outside of the cylinder walls is at a low temperature, comparatively speaking, for water boils at 212°. As the transfer of heat depends on the difference in temperatures there is a rush of heat through the cylinder walls and the water in the water jacket. The water takes up this heat and carries it to the radiator, where it is dissipated. If the water is heated by the cylinders faster than the radiator can throw this heat away then the car steams and the water boils away. If the radiator is of ample capacity to dissipate this heat in Summer it has too much heat-dissipating capacity for cold weather, the engine is surrounded by colder water than it should be, and more heat is lost by the charge of gas at the moment of explosion, and afterwards as the gas forces the piston downward.

The owner is, to a greater extent than necessary, buying gasoline at 20 cents a gallon and attempting to heat "all out of doors." But he is also losing engine power. The curves of horsepower shown were taken on the electric dynamometer in the engineering laboratory of the E. R. Thomas Motor Company. All of the readings were taken, of course, with same carbureter and engine.

The motor was a six-cylinder T-head type of 4 1-4 bore by 5 1-2 stroke. It will be noticed that with the water in the water jacket at 200° the horsepower developed at 1500 R. P. M. was 62, while with the water at only 100° at the same speed of 1500 R. P. M. the horsepower developed was only 51. In other words, by keeping the jacket water at 200°, instead of 100°, 21 per cent. more power was obtained.

The reason for covering a part of the radiator becomes obvious from an examination of this chart. In regard to how much of the radiator to cover, it is easy to put a "dairy" thermometer (which may be purchased for 25 cents) into the radiator filler, where the water is pumped in from the engine; or the radiator could be covered enough to allow steam to be formed, and the height or area of the shield could then be reduced until no steaming was noticed.



POWER-SPEED CURVES OF MOTOR SHOWING EFFECT OF TEMPERATURE OF JACKET WATER ON POWER

Letters From Subscribers

THIS DEPARTMENT IS DEVOTED TO THE ANSWERING OF LETTERS FROM SUBSCRIBERS ON ANY SUBJECT RELATED TO THE RUNNING OF AUTOMOBILES

Heating the Car in Winter

Editor The Automobile:

[2,460]—I was very interested in your reply to a letter in a recent issue dealing with the point of heating the automobile by allowing hot air from the motor to pass through a trap door under the rugs, but the problem I would like you to help me solve is what is a good way to heat the inside of the rear of a car. No doubt it is possible to extend the idea. I have a large touring limousine and should be very thankful if you can suggest anything. Mrs. F. C. B.

The method shown in Fig. 1, an English idea, is easily adapted to any make of car and can be turned on and off at will. It consists of two radiator plates for hot water being let in to the floor-boards of the car at the points required and the necessary piping and tank to encircle the exhaust pipe. A supply tank must be placed higher than the radiators to insure water reaching them.

Broken Gasoline Pipes Quickly Repaired.

Editor The Automobile:

[2,461]—In reading over your issue of The Automobile of November 17, we note on page 840, question 276: "How can a cracked or broken gasoline pipe be temporarily repaired?" We wish to advise that a way to make a quick and permanent repair is to use what is known as a compression coupling, of which we enclose a sketch (Fig. 2) showing the three sections, and the complete outfit of the pipe with coupling attached. This coupling makes it impossible for any leakage to occur after once applied. It is made up in elbows and T-shape; it is quicker than the course you advise.

You also suggest pulling a piece of rubber tube over the pipe or wrapping a piece of sheet rubber around it and binding with tape and string or put soft bar soap on the leak. We do not think that this is very good, as little particles may get in the gasoline and cause more trouble than the leak itself.

Philadelphia. F. R. Ash, Jr.

We appreciate your letter and the information contained therein. In giving the reply to the question referred to we would like to point out that such parts were recommended as could be reasonably expected to be found on any car. Some cars go out without a spanner of any sort and there is the type that takes a pair of pliers and a hunk of copper wire and are willing to meet all emergencies. The part you mention is no doubt a very useful accessory.

Heating the Intake Pipe

Editor The Automobile:

[2,462]—I have a car the carbureter of which is fitted very low down, and in the present cold weather in spite of hot air and hot rags the pipe persists in covering with frost. Using heated rags is all right for starting, but it is too much of a job to hold them there for five to ten minutes. Could you suggest anything to overcome this? Annoyed.

Bethlehem, Pa.

Presuming that it is not possible to shorten the intake manifold so as to set the carbureter nearer to the motor, the following method could with advantage be employed. It should have two effects:

1. Prevent freezing on the outside of the pipe.
2. Heating the ingoing gases and cause better evaporation.

Fig. 3 shows the intake manifold around which a copper pipe connected with the water circulation from the cylinders has been wound.

To facilitate dismantling the carbureter and manifold a rubber connection has been placed near the bottom and the continuation of the pipe can be carried to the lower part of the radiator. It may be found that two taps are necessary and these could easily be inserted where most convenient to get at.

There is a drawback in altering the length of the induction pipe on any car, as it may have been so designed by the makers of the motor for reasons of their own and after experiments with different lengths of piping.

Once Bit, Twice Shy

Editor The Automobile:

[2,463]—Having been recently fined for allowing my car to emit smoke, and wishing to avoid a recurrence, I write to ask

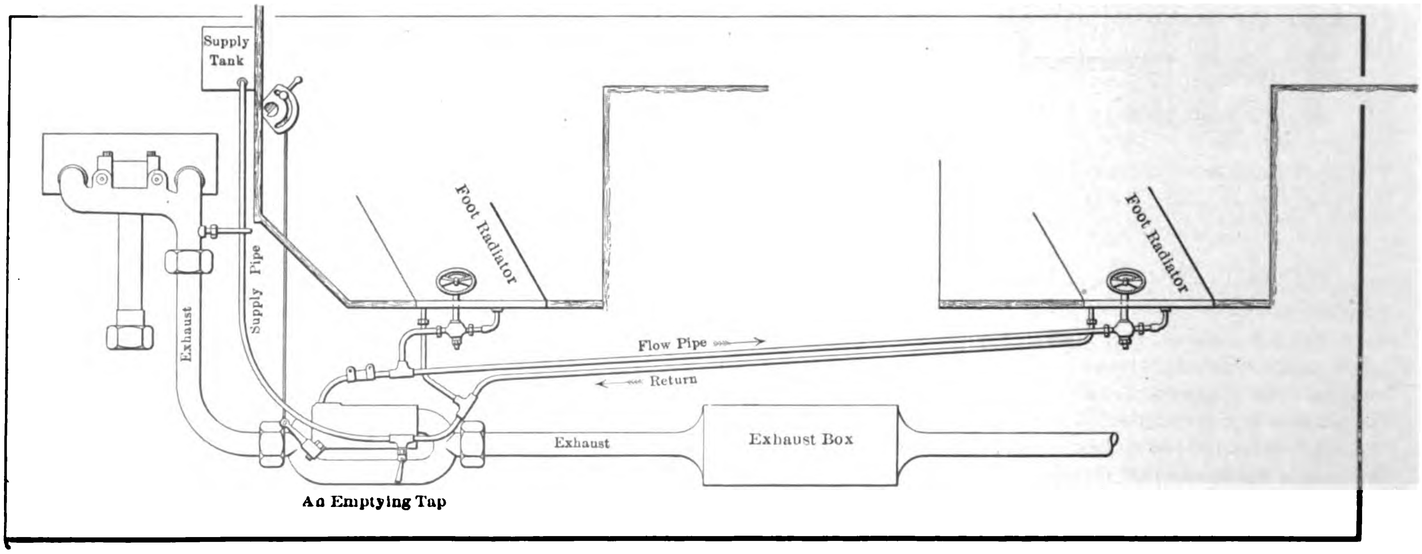


Fig. 1—Method of heating a car in winter by using small water radiators, heating the water by a casing around the exhaust pipe

you how I can fit some means of draining superfluous oil quickly out of the base chamber. I do not allow the smoke to appear wilfully, but as my car is fitted with splash lubrication only I would not like to have my bearings seize up, hence my over-anxiety in sometimes using a little too much oil.

Yonkers, N. Y. X. Y. Z.

We quite appreciate your feelings and it would be difficult to find anyone who deliberately lets his car smoke; but there is no doubt that a good deal of the trouble is due to want of care on the part of the drivers of cars, even though they have means of draining some of the oil off. Again there are some cars that always have a film of smoke exuding from the exhaust pipe, but hardly enough to be noticeable. Fig. 4 shows the lower half of the aluminum base chamber fitted with two standpipes, to the bottom of which are fitted taps.

First ascertain the proper level and cut the pipes inside the motor so that the oil will drain down to the level if there is too much when the taps are opened. It may happen that the existing plug holes may be used, but if, as in this case, they are just below the part where the connecting rods strike the oil new holes will have to be drilled midway between the two rods.

Impossible to Say Without Making a Test

Editor The Automobile:

[2,464]—Will you please inform me what horsepower would be developed in a six-cylinder gas engine having 4 3-32-inch bore and a 5-inch stroke? Also a six-cylinder engine having 4 1-4-inch bore and 5 1-4-inch stroke? Kindly state, also, in the columns of your magazine what is meant by the term "horsepower."

John Kiev.

St. Louis, Mo.

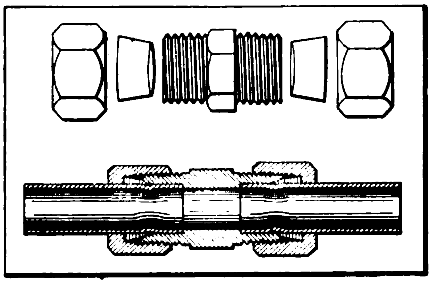


Fig. 2—Handy coupling to carry on the car in the event of a broken feed pipe

No man living can tell what a motor will do in the matter of the delivery of power without running a proper test for the purpose of finding out. All formulæ utilized in the determination of power are recognized by engineers as being empirical and comparative.

The horsepower, so called, is represented when a weight equal to 33,000 pounds is lifted vertically to a height of 1 foot in one minute.

Perhaps Some Reader Can Supply Information

Editor The Automobile:

[2,465]—Being a subscriber to The Automobile and greatly interested in aviation, I would thank you to give me the name of some aeroplane factory in the United States where I may send an application to become an aviator.

Chicago, Ill. B. R.

Oxygen May Be Had for Nothing in the Air

Editor The Automobile:

[2,466]—Under "Letters Interesting Answered and Discussed" I would like to have the following questions answered:

1. Would oxygen costing three cents per cubic foot be too expensive to use in an automobile engine with a 4-inch bore and a 4-inch stroke?

2. What proportion in volume of the mixture of the air and gasoline vapor would the pure oxygen have to compose to be called a strong mixture? How many times would a cylinder containing 100 cubic feet of free oxygen gas compressed to 1800 pounds fill a cylinder 4 x 4 inches to its maximum compression pressure (which is 60 pounds) mixed with the air in what you would call strong proportions? How long would a cylinder of oxygen of this size last?

Paul E. Pritchard.

Great Bend, Kan.

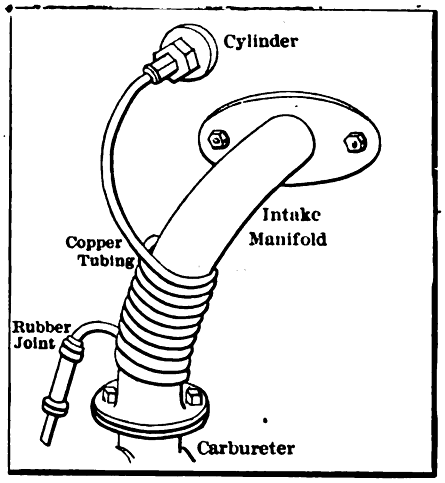


Fig. 3—Method of heating the intake manifold

1. There are two reasons why oxygen at 3 cents per cubic foot will scarcely prove attractive, although the price given is very low. To begin with, oxygen may be had from the surroundings by anyone at no cost, but the fact remains that using pure oxygen in combination with hydrocarbon fuel will produce a detonating explosive mixture which would only be fit for use in a well-built gun.

2. If you will read Cantor lectures, recently published in The Automobile, you will obtain an excellent understanding of what gasoline is for and how it works.

Tried Hard To Ruin the Radiator

Editor The Automobile:

[2,467]—I want to ask a little information from you and trust you can help me out in the matter.

I am driving a 1910 special seven-passenger car. A few days ago I stuck a small wire through the radiator and punctured it, making a leak. I tried to stop this leak by pouring a double handful of meal in the radiator. This, however, did not stop the leak at all. I then took the radiator off and had it soldered up, making a good job of it. Now I notice the radiator does not stay as cool as it did before; it gets hotter but does not boil the water at all. When it gets hot this way I can smell the meal cooking. I have an idea that this meal has caked up in the radiator and does not allow the air to get in as it did before, and this makes it get hotter. Now, what I want to know is how to get this meal out. I have washed it out several times for several hours at the time by running water through the system with the motor running, but as yet I have not succeeded in getting it out. Please advise me if there is any way. I would appreciate this information very much. W. F. Miller.

Fort Valley, Ga.

The probabilities are that the meal formed in a cake and is responsible for your present trouble. It stands to reason that it would cake up and the probabilities are that the best way to get rid of the formation will be to send steam under considerable pressure through the radiator. If the same trouble should occur again it would be as well to make a temporary repair by cutting two pieces of rubber about two inches square and two pieces of metal the same size, drill a hole through the center of all four and clamp over the leak with a small bolt.

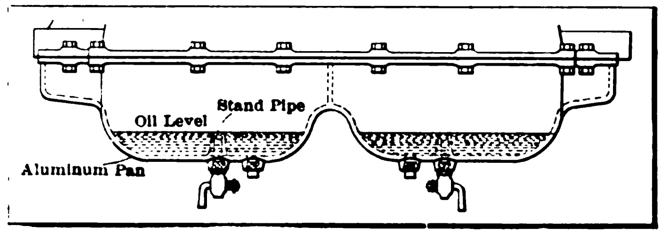


Fig. 4—Showing how standpipes can be fitted to motors to drain off superfluous oil

In the Building of Balloons

PROFESSOR WILLIAM B. ENNIS PRESENTS TECHNICAL INFORMATION UPON AERIAL SUBJECTS FOR THE PURPOSE OF CLEARING UP SOME OF THE PROBLEMS THAT DEFY SOLUTION BY A CUT-AND-DRY METHOD—SECOND INSTALLMENT

Fifth Method: Ballast.—The common plan of former practice—and one which is still a feature of all present methods of control—incolves the use of temporary detachable loads, or ballast. Suppose, in our previous illustration, the 1,900 pounds of load to consist of 1,000 pounds of bag, car and occupants, and 900 pounds of sand bags. By throwing away 5 pounds of gas we have descended 80 feet. Should we now desire to ascend we may drop some of the ballast; the balloon will then have more lifting power than load and will rise to a new equilibrium level. The loss of more gas will again enable it to descend and the discarding of more sand bags will subsequently elevate it, and so on, but not *ad infinitum,* for a sword of Damocles is over our heads, and every necessary or accidental change of level brings us nearer the moment of exhaustion both of ballast and gas.

Sixth Method: Supplementary Gas Supply.—Suppose, instead of ballast, we carry tanks of gas at high pressure to be later expanded into the gas bag so as to make up for gas vented or leakage. Will the additional gas thus obtained be of any considerable consequence in comparison with the ballast load involved? A drum of 60 pounds weight may easily hold ¼ cubic foot of hydrogen at 2,000 pounds pressure. At 60° F. the gas in the drum gives (Equation A)

$$D_H = 2{,}000 \div (5.347 \times 520) = 0.721 \text{ pound,}$$

and the weight of hydrogen in the drum is $\frac{1}{4} \times 0.721 = 0.541$ pound, capable, when expanded into the bag, of sustaining, say,

$$1{,}900 \times \frac{0.541}{162} = 6.36 \text{ pounds*;}$$

not much over 1/10 the weight of the drum which contains it. Pressure tanks containing gas might then be a little better than ordinary ballast, but not sufficiently so to offset the danger of explosion added to dangers necessarily involved in carrying an inflammable gas like hydrogen in an elastic, fragile and severely stressed envelope. The plan might be satisfactory if we had a metal as strong as steel that weighed only 1/10 as much as steel. *The carrying of ballast*—a necessary measure of safety under present conditions—immensely increases the necessary size and cost of the balloon, and is *entirely insufficient in most cases to provide the desirable degree of altitude regulation.*

Seventh Method: Vertical Propulsion.—The plan proposed of using propellers on a vertical shaft to provide for vertical movement or equilibration at pleasure belongs rather to the kinetics of the subject. It may be noted here, however, that the net vertical force is a substitute for twice the corresponding weight of ballast, since it may be used for either ascent or descent.

Eighth: Air Ballast.—Consider now the Vaniman arrangement, involving the use of a series of compartments in the bag, containing *air,* at a pressure kept close to that of the external atmosphere (Fig. 6). Under the previous conditions, suppose a single compartment of 10,000 cubic feet capacity to have been added to the original balloon, making the total sea level displacement 36,820 cubic feet. For simplicity assume the pressure of this air to be that of the external atmosphere at 1,000 feet elevation, where it has been found that $D_A = 0.0798$. The weight of air in its compartment is then $10{,}000 \times 0.0798 = 798$ pounds. At any higher elevation this air of course detracts from the buoyant power of the balloon, but this effect may be avoided by opening the escape valve for a moment.

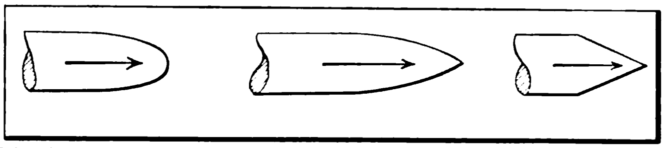


Fig. 8—Illustrating the idea that a rigorous formula does not hold

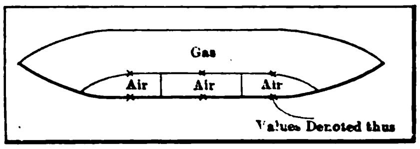


Fig. 6—Vaniman arrangement of air-ballasting of gas-bags

Now while at 2,200 feet elevation suppose we vent *into the air bag from the main hydrogen bag* 5 pounds of the latter gas. Disregarding elasticity of the air bag, the density of the mixture therein is now $(798 + 5) \div 10{,}000 = 0.0803$ pound, and its pressure† is made up of the partial pressure of the hydrogen, $5.347 \times 530 \times \frac{5}{10{,}000} = 1.417$ pounds (Equation B), plus that of the air, 14.2 pounds, making a total pressure of $14.2 + 1.417 = 15.617$ pounds. The whole balloon (gas bag plus air bag) now displaces $26{,}740 + 10{,}000 = 36{,}740$ cubic feet, and its contents weigh

$$(26{,}740 \times D_H = 26{,}740 \times 0.00589 = 157) + 803 = 960 \text{ pounds.}$$

If it is to be in equilibrium at a load of 1,900 pounds, the weight of the displaced volume of air must be $1{,}900 + 960 = 2{,}860$ pounds, and its density

$$2{,}860 \div 36{,}740 = 0.0778 \text{ pound.}$$

Its pressure is then (Equation B) $0.3706 \times 0.0778 \times 480 = 13.8$ pounds, so that the altitude of equilibrium is $2{,}000\ (14.7 - 13.8) = 1{,}800$ feet. We have descended 400 feet. *Have we lost 5 pounds of our gas?* Not quite, yet. When we again wish to ascend *let the air bag vent be opened,* the pressure falling to that of the external atmosphere, 13.8 pounds. If the vented gas has the same composition as the whole mixture, and the temperature does not change, the density of the mixture will vary directly as its pressure, becoming

$$\frac{13.8}{15.617} \times 0.0803 = 0.076,$$

and its weight will become 760 pounds. We shall now have lost

$$\frac{803 - 760}{803} \times 5 = 0.2684 \text{ pound}$$

of hydrogen, irrecoverably: we now have, however, a total weight of $157 + 760 = 917$ pounds of gas and air, requiring that the density of the air at equilibrium level be

$$\frac{1{,}900 + 917}{36{,}740} = 0.0766 \text{ pound,}$$

the pressure $0.3706 \times 0.0766 \times 480 = 13.62$ pounds, and the altitude $2{,}000\ (14.7 - 13.62) = 2{,}160$ feet. The net effect of the whole proceeding—first venting the gas into the air bag and afterward venting the air bag—is a descent of 40 feet, at a loss of 0.2684 pound of hydrogen. But this loss has given us an

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*Hydrogen weighing 162 pounds sustains a load of 1,900 pounds.

†A mixture of relatively inert gases exerts a pressure equal to the sum of the pressures which would be exerted by each of the gases if each in turn occupied the whole of the containing space alone.

altitude control between 1,800 and 2,200 feet. As with ordinary gas-venting, we must eventually succumb; but the time of succumbing has been far postponed. *Without the air bag we lost 18½ times as much hydrogen in descending only twice as far.* Besides, steering and control horizontally may be facilitated by providing a number of air compartments, with a circulating pump.

Aerial Kinetics

Resistances to Locomotion.—In a locomotive or an automobile the resistances to propulsion include journal friction, grades, curves, acceleration, etc., of which *air resistance* ("head end" resistance) is the only one to be considered in connection with a balloon. In Fig. 7, let a flat surface S-S be subjected to a perpendicular wind velocity of v feet per second: or, *what is precisely equivalent, let such a surface itself move, in still air,* at this velocity. Then if p represents pressure per square foot due to either of these movements (or both together), and D the density of the air, we have the fundamental dynamic formula,

$$v^2 = 64.4\ \frac{p}{D}.$$

Let V be the relative velocity between flat surface and air[*] (under conditions referred to in the footnote) in miles per hour. Then $v = \frac{5{,}280}{3{,}600} V$, $v^2 = 2.15\ V^2$, and

$$p = \frac{Dv^2}{64.4} = 0.0334\ DV^2.$$

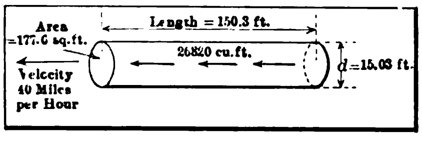

Fig. 9—Dealing with shape, power and resistance problems

At sea level and 32° F., $D = 0.0809$ and $p = 0.0334 \times 0.0809\ V^2 = 0.00269\ V^2$. At 2,000 feet elevation and 20° F. the pressure (static) of the air, in pounds per square inch, is 13.7, $D = 13.7 \div (0.3706 \times 480) = 0.0826$, and

$$p = 0.0334 \times 0.0826\ V^2 = 0.00275\ V^2.$$

Since atmospheric density decreases with both elevation and temperature the pressure on a plane surface due to a given velocity also decreases. It should be noted also that this pressure varies *as the square of the velocity.*

Experiments show that the rigorous formula given does not precisely hold in any case, and that if a moving body has a rounded, pointed, parabolic or ogival end (Fig. 8) the resistance due to velocity, per square foot of "head end" area, may be as low as $0.0020\ V^2$ at sea level and 60° F. At extremely high velocities, also, the resistance appears to vary as a higher power of the velocity, intermediate between the square and the cube. It will be safe and simple to use for our purpose the expression $p = 0.0025\ V^2$.

Shape, Power and Resistance.—Assume our balloon to be a perfectly plain horizontal cylinder (Fig. 9) with flat ends. Let a be the ratio of its length to its diameter. Its volume is then (d being the diameter in feet)

$$0.7854\ ad^3 = 26{,}820 \text{ cubic feet,}$$

whence $d = 32.5 \div \sqrt[3]{a}$.

Its head end area is $0.7854\ d^2 = 0.7854\ (1{,}056 \div a^{\frac{2}{3}}) = 1344 \div 0.7854\ a^{\frac{2}{3}} = 1715 \div a^{\frac{2}{3}}$ square feet. Call this b. Let its velocity relative to the air be V miles per hour. The total resistance due to velocity is then $0.0025\ bV^2$. This resistance is continuously exerted while the balloon moves $\frac{5{,}280\ V}{60} = 88\ V$ feet per minute, and the horsepower necessary to overcome the resistance at this speed is

$$\frac{\text{force} \times \text{distance}}{33{,}000} = \frac{0.0025\ bV^2 \times 88V}{33{,}000} = 0.000006667\ bV^3$$

(Equation C)

or, $$\frac{bV^3}{150{,}000} = \text{(say) H.}$$

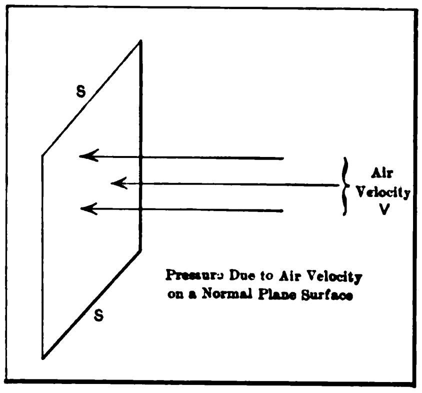

Fig. 7—Diagram used to make a point in pressure characteristics

This is *independent of the bulk or weight of the balloon.* A perfectly similar formula, though with a different constant in the denominator, would apply to a hypothetical *cubical* balloon, in which *the power would vary as the square of the linear dimension* while the *bulk and carrying capacity varied as its cube.* Large balloons are therefore highly advantageous from a power standpoint. Also, a *long* balloon is to be preferred rather than a *short* one; but this may involve difficulties in longitudinal stiffening as well as necessitating great steering power. Fig. 10 shows in part the complicated system of bracing necessary in a well known balloon having a length of about 12 times the diameter. This bracing constituted a large part of the load lifted. Adequate steering power is absolutely essential; for if the balloon turns its side to the wind the pressure due to velocity is increased in the ratio of

$$\frac{\text{side area}}{\text{end area}} = \frac{ad^2}{0.7854\ d^2} = a \div 0.7854,$$

which becomes unity only when the length is less than the diameter.

Importance of Head End Resistance.—In a locomotive, the head end resistance is rarely half the total resistance, and the highest wind velocities experienced could scarcely reduce the speed of a train 25 per cent. But in the balloon the head end resistance is the whole resistance. If power is provided adequate to move the balloon at a speed of 30 miles per hour in still air, a head wind of 30 miles per hour will stop the car; a 60-mile wind will drive it backward at 30 miles per hour. If the steering gear fails to hold the head up to the wind the area exposed to wind velocity may become ad^2, and the total wind pressure $0.0025\ ad^2V_A{}^2$, whereas the total pressure which the engine is designed to overcome at a speed V_B is only $0.0025bV^2 = 4.283V^2 \div a^{\frac{2}{3}}$. Even if the propeller were so arranged as to act in a line at right angles with the cylindrical axis of the balloon, since wind resistance varies as the area exposed and as the square of the velocity, the engine running at the rotative speed already fixed, we should have a retrograde velocity of

$$V' = \sqrt{\frac{0.0025\ ad^2V_A{}^2 - 0.0025\ bV_o{}^2}{0.0025\ ad^2}}$$

in which Vo is the relative velocity for which the engine is designed and V_A is the velocity of the wind against the side of the balloon with the steering gear inoperative. If, as is in practice the case, the engine cannot work in this position, $V_o = 0$ and the retrograde velocity of the car will equal V_A; it will drift at the speed of the wind. We must have ample steering power.

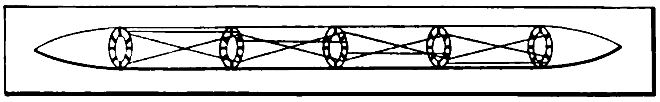

Fig. 10—Presenting a cigar-shaped car as an illustration

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[*] If the surface is moving in the same direction as the air, v or V represents the difference of the two velocities; if the movements are in opposite directions, then v or V must be taken as their sum.

Don'ts for the Autoist

GENERAL INJUNCTIONS TO THE WISE—AND THE OTHERWISE—NOT ALONE AMONG THE AUTOMOBILE FOLK, BUT IN OTHER WALKS OF LIFE AS WELL

Don't forget that the urchin, as soon as he can totter out of doors, pulls off his chapeau to the passing mob.

Don't extol the virtues of your idle thoughts, nor forget that letters patent are not issued for mere ideas; they are invariably certificates of real activity.

Don't be led astray by catch-words; if they create a favorable impression about an equipment that is not favorable, they are canny falsehoods.

Don't suppose that articulated nothings will swell the author of them into a Plato.

Don't rub elbows with every animated stick in a commonwealth of blunderers; incorporate a fertilizer company and use the material available for its true purpose.

Don't sweep the vision over a wide and luminous circle of acquaintances and say, "I wish I were as big as that." You might be looking at a potato.

Don't turn sculpturer if you propose to add to the census of pigmy thoughts.

Don't hold yourself to your promise if you discover that the idea is a poor one.

Don't indulge in unkind words; they kindle hate.

Don't wrap your ideas in a rag and totter off like old age.

Don't express your thoughts in cipher; the audience may not care to take the time to unravel the mystery.

Don't yield to a suggestion unless it is one that chimes in with the music of your sense of right.

Don't hesitate on the brink of a sound decision; the moment is more terrible than you think.

Don't circle around on gloomy wing; the monotony of the process will kill activity.

Don't manufacture the delusion to which the soul would afterward abandon itself.

Don't forget that ignorance recoils at intelligence.

Don't sink into a delirium of blind, unreasoning superstition; poke a stick into the suspected cavity and see what it contains.

Don't invoke the ghost of a dead and buried thought, nor ramble over the wild and unexplored future.

Don't stray into darkness more dense than that of night; men who make it for you would appropriate your welfare to their own use.

Don't be a partner in a sad piece of business; if you can't hook up to a good job, go home and wait until the world rolls around to a new spot—earth is twirling at the rate of 17 miles per second; you will have but a short wait.

Don't forget that a thousand misfortunes are amply paid for by a single success.

Don't give away your most poverty-stricken thoughts; it will leave you no incentive to replace them and a void will grow up in the mind.

Don't slay your adversary; you would then be without a friend to practice upon.

Don't link arms with vulgarity, nor form a trust of all the virtues.

Don't try to be as diminutive as was Cæsar—he thought himself so inconsequential that there was nothing for him beyond the grave.

Don't be late in the morning; business might get beyond you, and you would then have to run to catch up.

Don't play the part of a ruined man staggering for lack of wisdom.

Don't be a weed in a garden just because it affords you an opportunity to associate with cabbages.

Don't father a despotism on the ground that the means is justified by the end.

Don't imagine that the gold you obtain by transmuting stolen lead is yours because you are the transmuter.

Don't make rules to follow and then become the most persistent delinquent.

Don't become ambitious if you have a petty aim.

The German Trade

Staff Man, Now in the Kaiser's Kingdom, Sends Some Pertinent Pointers as to Automobile Conditions There

COMPARATIVELY few private automobiles are seen at the German capital at this time. Most people who are progressive enough to take to the motor car make use of taxicabs, whose number is "legion" there.

German buyers of automobiles are without exception members of the most well-to-do class of business men residing in the principal German towns. German farmers, or rather peasants, absolutely decline to see the advantages of the automobile, partly owing to their not being so prosperous as American farmers and partly on account of their being skeptical concerning all new inventions which they do not fully understand. Nevertheless, self-propelled agricultural implements are coming there.

Roughly speaking, there are about thirty automobile factories in Germany. Germans cannot understand how hundreds of automobile makers in America can live and prosper, nor do they see how an annual output of 200,000 cars may be sold. A superficial inspection of Berlin automobiles seems to indicate that chauffeurs take much better care of their cars than do their American brothers. The German chauffeur, who has been taught in the army to love his horse, gives his machine a great deal of loving care. Bearings and all parts that are doing work are conscientiously lubricated just as often as they need it; and tires seem to be well inflated most of the time.

If American automobiles are only slowly entering into the German Empire the reason lies in the fact that Germans are always conscious of the fact that the Atlantic is wide and the American maker is far away. The German buying an American car finds it is almost an impossibility to replace a broken or lost part of his auto, and it is his everlasting consideration for this point which keeps many of them from buying American machines.

Another handicap to a more general introduction of American makes into Germany lies in the fact that the American price of, say, $3,000—which is probably the minimum price at which the quality satisfying German buyers may be produced—means 12,000 marks in Germany, to which must be added the cost of transportation across the "pond."

German automobile consumption is not large enough to justify standardization of tools, which state of things applies to the whole continent. A large lumber firm ordered ten big trucks from the factory recently, making the condition that the makers guarantee their product to satisfy certain requirements which were outlined. The firm, which apparently has had little experience in this line so far, would not undertake to guarantee its products, and the order will now go to one of the great German firms which is fortunate enough to own a modern plant permitting of economic and standardized production of trucks.

It Stands to Reason

SHORT PARAGRAPHS DEALING WITH MATTERS WHICH SHOULD APPEAL TO THE REASON, TO SERVE AS REMINDERS OF DUTIES TO BE PERFORMED

That a proper warning signal is as much of a necessity as a wheel or a tire; it is neither safe nor comfortable to ride in an automobile that is equipped with a mute signaling equipment.

That it is no longer considered fashionable to build automobiles that are not fitted with magnetos for ignition purposes; the results are so much better that even a novice would hanker after a magneto.

That in addition to a magneto it is usual to employ an auxiliary ignition system of some kind; if a battery is used, get a good make.

That a suitable battery may be had of the "dry-cell" type; the name of the maker and the date of shipment should be stamped upon the case.

That the storage battery should be properly sealed so that the acid will not slop out and spoil the part of the automobile that it contacts with.

That the battery should be protected from the cold of Winter and the silt of the road.

That it is useless to try to make an automobile give good satisfaction if the wiring from the battery is kicking around under the feet of every person who comes around.

That it is necessary to make good electrical connections; the high resistance of a single bad joint is enough to put the ignition system out of whack.

That it might cost $100 to find out what is the matter with an automobile only to learn that there is a bad joint in the wiring system.

That the garage repairman is entitled to pay for looking for trouble just as much as he is for fixing it after it is found.

That an automobilist who looks three days for trouble should not expect a repairman to locate it in a minute.

That the automobilist who is unreasonable with the repairman is bound to be disappointed; the man will do his best to satisfy the owner on this score.

That the actual trouble is deeper seated; examine the automobile before making the purchase and note if it is likely to disappoint; select the kind that is friendly.

That the best guide to the purchase of an automobile is common sense; take along a good supply; use it.

That price is not the measuring instrument to use in making a selection; appropriateness must be recognized; imagine a sailor going to sea in a skiff.

That what your neighbor has may be wrong for you; it might even be wrong for him; will he tell you of his trouble?

That your wife would like to have a thundering big tonneau to set off her 24-inch-in-diameter head-gear; the tonneau, like the hat, costs much and depreciates rapidly.

That a big tonneau belongs on a full-sized chassis; be sure and purchase the foundation for the house.

That there is a place for everything, even the big tonneau; if you have the place fill it.

That the awkwardness of the situation generally appears after the check is drawn and cashed; it is then too late.

That the salesman's guarantee is never better than the written guarantee of the maker; look in the back of the maker's catalogue.

That it would be unreasonable to expect any maker to allow his salesman to append promiscuous guarantees; there is no telling how far some of them would tote the joke.

That a good automobile is made in a plant rather than in a guarantee.

That it is foolish to go around trying to purchase a law-suit if all that is wanted is a good automobile.

That there are now so many good automobiles to be had that it would be as one chance in a hundred were one to get a bad car.

That nearly every failure or disappointment from the purchaser's point of view is due to bad judgment in making the selection—few makers have time to misrepresent.

That the man who is so unskilled as not to know what he wants would be better off taking same maker's word for it than he would taking free advice from a piker.

That the longer it takes to accumulate the purchase price, the more cautious the purchaser should be.

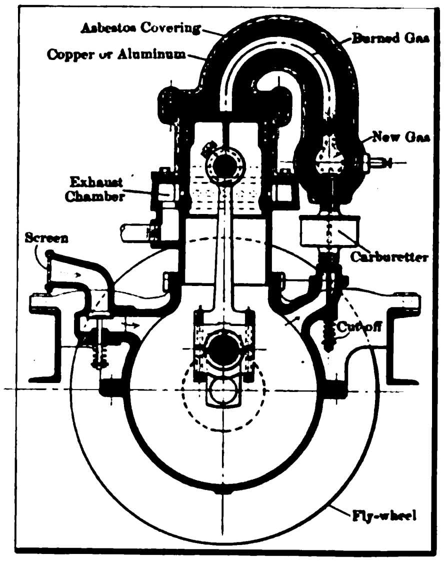
Possibly Valuable Idea

Motor Designed to Increase Thermal Efficiency

REFERRING to the accompanying illustration of a new motor, it will be observed that the combustion chamber, instead of being in the top of the cylinder, is in the form of a neck in an extension, and that provision is made to prevent the transfer of heat from the chamber to the surroundings. It is well appreciated by designers that the average motor leaks heat to the water or air jacket, as the case may be, and that this heat detracts from the thermal efficiency of the motor so much that the actual thermal efficiency of a good motor is around 20 per cent. Any plan that will prevent the heat from passing out through the cylinder walls will have a good effect, provided, of course, that the motor will function properly.

True, if the heat is not gotten rid of as fast as it is formed by the burning of fuel it will pile up, and the motor will be prevented from delivering power, partly on account of the swelling of the incoming mixture, but in the long run due to preignition. In designing water-cooled motors it is the practice to restrict the flame-swept surface as much as possible, and it is the aim to turn as much as possible of the heat into mechanical work. The great main idea is to transform the energy into mechanical work as quickly as possible; it is the heat that remains after the power stroke that does all the damage.

At all events the motor as here depicted is along unconventional lines; it offers food for reflection, and the designer, Jos. E. Bissell, Pittsburgh, Pa., claims that the motor operates with a high thermal efficiency.



Motor designed to prevent the transfer of heat from the combustion chamber to the surroundings

Power, Speed and Efficiency

ECONOMY OF PERFORMANCE OF A MOTOR DEPENDS UPON SPEED AND LOADING; IF THE MOTOR IS OVERLOADED THE ECONOMY WILL BE LOWERED; LIKEWISE, IF THE LOAD IS TOO LIGHT THE ECONOMY WILL FALL OFF

PERHAPS, in time, carbureters will be so refined that the mixture will be exactly right at all speeds. But until this time comes it is useless to expect that a motor will run at any speed and load and deliver its power at a constant thermal or mechanical efficiency.

What is thermal efficiency? Let it be understood that the horsepower of a motor, so called, is but a measure of the heat value (calorific) of the fuel used, let it be coal, gasoline or automobile gasoline, as the case may be, and it will then be easy to understand that by measuring the heat that is turned into mechanical work and comparing it with the total heat in the fuel it will then be possible to determine the thermal efficiency of the motor. When this efficiency is found in some way it will also be observed that much of the heat of the fuel is lost; that is to say, there are no devices used in power work that seem to be capable of utilizing a large percentage of the heat; they cast off the major portion, as the following tabulation will testify to:

THERMAL EFFICIENCY OF VARIOUS TYPES OF POWER PLANTS

	Automobile motors working 4-cycle, water cooled	Marine engines working under the most advantageous conditions	Single expansion steam engines in isolated plants
From	25 per cent.	17 per cent.	10 per cent
To	15 per cent.	12 per cent.	7 per cent.

From the above comparison it will be observed that the best results are realized in the internal combustion motor.

What is mechanical efficiency? It is the difference between the power that is exerted by the gas against the piston of the motor and the power that is realized at the end of the shaft after it passes through the flywheel of the motor. The mechanical efficiency is more or less dependent upon the character of the bearings, efficacy of lubrication, rigidity of the design and all such matters.

It would not be too much to expect that the mechanical efficiency of an automobile motor would equal 80 per cent. There is small chance of it being greater under average conditions; it could be much lower.

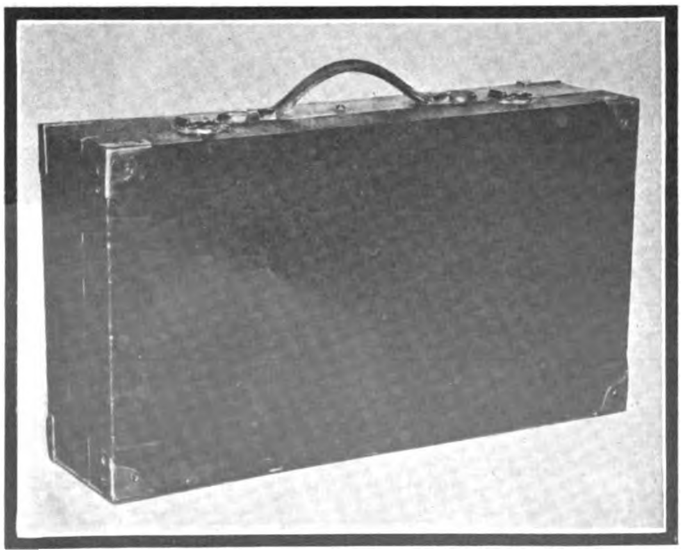


Fig. 1—A neat and compact method of carrying tools—note the corner protectors that make for long service

What are thermic losses and how are they detected? When the manograph is connected to the cylinder of a motor and its use is regulated under proper conditions it will be found that the back pressure, due to the use of a muffler, and, perhaps, on account of restricted passageways, will show; and this back pressure constitutes one of the serious thermic losses.

A second thermic loss may be traced to a depression in the intake, that is to say, the piston sucks a depression in the intake, and this depression is at the expense of power of the motor.

Still another thermic loss is to be traced to heat; if the motor is maintained at a proper temperature the gas, as it is sucked in, will swell up; a given weight of the gas will then occupy a larger space; this is the same as lowering the capacity of the cylinder for gas. The power of a motor is in direct proportion to its capacity for gas, and this capacity, considering a given piston displacement, is regulated by the temperature. If the temperature is high the quantity of gas will be lower than when the temperature is maintained at a lower point.

But there are other considerations that complicate what would seem to be a relatively simple situation. If it is true that more gas will be coaxed in at a low temperature, why not have the temperature low and be done with it? Fine! Let us rivet our gaze upon another phase of the plan. The gas must be in a receptive mood, or else it will not burn. The receptivity of the gas depends upon (a) the ratio of gasoline to air, (b) upon the compression, and (c) upon temperature. If the gasoline is rightly mixed with the air—and this is a difficult problem to solve under conditions of varying speed and changing load—it then remains to adjust the compression to suit the temperature and the inflammability of the gas; this property of mixtures is a variable over broad ranges, with limitations about as follows:

PROPORTIONS OF MIXTURES THAT WILL INFLAME UNDER COMPRESSION

Leanest mixture that will burn	Approximately the best burning mixture	Richest mixture that will burn
1 of gasoline to 26 of air by weight	1 of gasoline to 15 of air by weight	1 of gasoline to 7 of air by weight

It is fairly well appreciated that the mixture, if it is leaner than 1 of gasoline to 17.5 of air by weight, will fail of its purpose, due to popping back in the carbureter. Beyond this point in the scale of lean mixtures the rate of flame travel, or propagation, is so slow that the mixture will still be burning at the end of the stroke, and it will "fire" the incoming charge. The higher the speed of travel of the gas in the intake manifold the leaner the mixture can be without causing back-firing.

In some experiments that were completed for the purpose of observing the conditions that obtain in the intake manifold a spark plug was placed in the manifold and the gas therein was ignited at the time of igniting the mixture in the cylinder. It was found that if the manifold is sufficiently limited in area there will be no back-firing at all, and it was concluded that the ruling factor is the speed of travel of the mixture in the intake manifold; that if the gas travels faster than the speed of travel of the flame in the gas, there could be no back-firing trouble.

Double Sparking Serves a Good Purpose

The widest possible range of working of the mixture, hence the greatest possible thermal efficiency under flexible conditions, will follow if the sparking equipment is so contrived that two sparks will be delivered into the body of the charge simultaneously, but at points remote from each other. The reason why this is so will be found by inspecting the following table:

SPEED OF FLAME IN THE MIXTURE OF DIFFERENT STRENGTHS

Strength of Mixture		Travel of flame
Weight of gasoline	Weight of air	in feet per second
1	8	1.5
1	9	4.3
1	10	6.2
1	11	7.2
1	12	7.5
1	13	7.45
1	14	7.0
1	15	6.4
1	16	5.65
1	17	4.8
1	18	3.8

It has been found that it is more practical to burn slow rich mixtures than it is to burn slow lean mixtures. It is for this reason that a mixture of 1 to 17.5 is looked upon as the leanest one that can be used, although the rate of flame travel is about four feet per second under this condition, whereas it is barely 1.5 feet per second in a mixture holding 1 of gasoline to 8 of air by weight. The trouble with lean mixtures seems to lie in the isolation of the oxygen and the time taken by the hydrogen, carbon and methane in hunting around for oxygen mates. There is also great uncertainty, and the mixture therefore becomes very unreliable. In rich mixtures, on the other hand, the reverse is true; the oxygen is surrounded by fuel elements, and no time is lost in the search; here the difficulty is of another caliber; the flame is quenched by the heat-absorbing ability of the large amount of non-inflammable gas that is present; it must re-kindle hundreds of times perhaps and time is taken in this process.

To recapitulate, lean mixtures are so rich in non-inflammable gases, mostly nitrogen, that the flame is rendered feeble by a process of asphyxiation, whereas rich mixtures are rendered feeble by the heat-absorbing ability of the surfeit of mixture that cannot burn in the absence of oxygen sufficient to accommodate all the oxygen-soaking molecules.

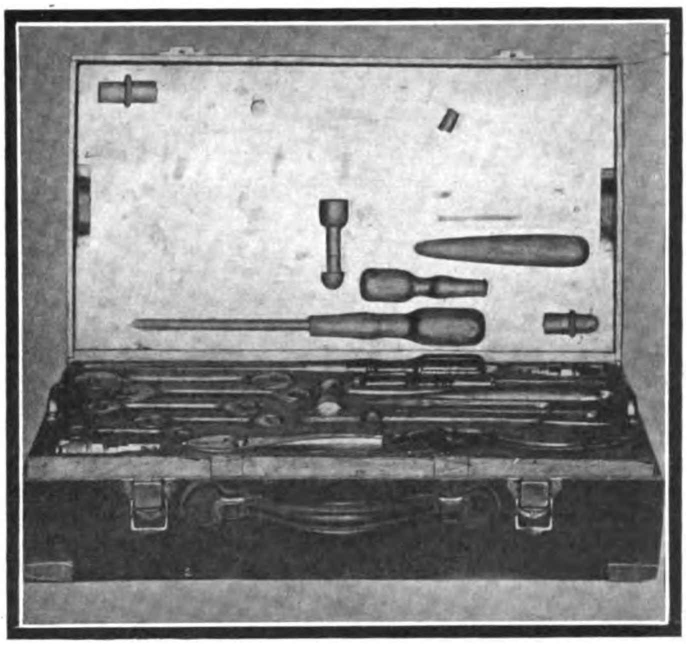


Fig. 2—The lid of the tool case thrown back, showing "a place for everything and everything in its place"

By employing a double spark, in view of the low rate of flame travel in the mixtures that are not of the best proportion, it is possible to hasten the flaming by the simple process of shortening the distance that the flame will have to travel. This idea will also have great efficacy in good mixtures if the speed of the motor is high. It will be readily determined that the whole of the working stroke of a motor running at 3,000 revolutions per minute is barely 0.01 of a second. This is but little time; but two sparks properly placed, firing simultaneously, would have the effect of doubling this time.

Select Good Tools

ILLUSTRATING AND DISCUSSING THE REPAIRMAN'S KIT AND THE METHOD OF ITS PRESERVATION, WITH POINTS FOR THE REPAIRMAN IN PARTICULAR AND OWNERS IN GENERAL

IN the busy world of to-day first impressions count for much, since often there is no time for a second. To have a traveling mechanic come into an owner's garage to repair a car and to see him unroll the tools of his craft from a greasy suit of overalls is likely to create a most unfavorable impression that heavily discounts any work which the mechanic may do. The effect of orderliness on the human mind is worked to advantage in almost every shop which has a really high-class output, so that there can be no doubt of the very real advantage of having a place for everything and everything in its place.

The photographic reproduction shown in Fig. 1 illustrates a neat-looking tool case that is leather covered, and fitted with the proper corner protectors to stand the wear incident to the service Fig. 2 shows the tool arrangement with the top thrown back. A set of solid end wrenches of the best make obtainable will be noted, together with a drop-forged S wrench, two cold chisels two screwdrivers, pliers and a hammer that cannot "lose its head" under the most trying circumstances, because the head and handle are drop-forged of one piece of steel.

Fig. 3 shows the top tool tray removed. The special automobile monkey wrench has a jaw opening of 2 1-4 inches. The socket wrench fits the spark plugs and the large solid end wrench fits front and rear hub caps.

Immediately beneath the hub cap wrench is an oil gun that can be used instead of an oil can, and has the advantage that it may be used in an emergency to draw oil from any oil reservoir on the car. The valve puller takes but little space. Near-by are two recesses cut for cotter pins.

Those interested in something of this character will immediately think of modifications that can be made to advantage. The outside dimensions of the box are 5 3-8 x 11 3-8 x 20 1-2.

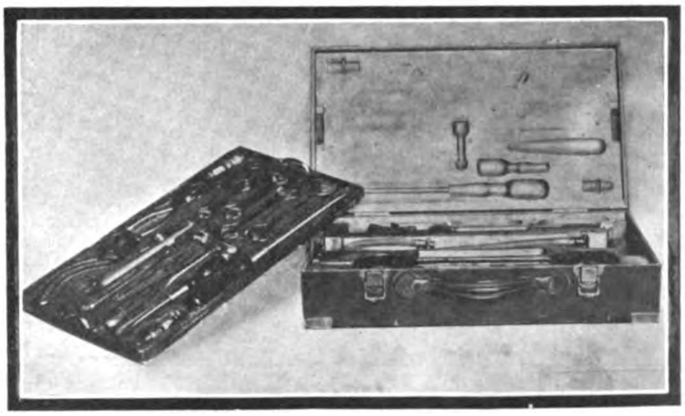


Fig. 3—Showing the top tool tray removed, giving easy access to the lower part of the case

Questions That Arise

SOME OF THOSE THAT COME UP IN EVERY-DAY AUTOMOBILING ARE ANSWERED BY THE MATTER WHICH IS BEING PREPARED BY FORREST R. JONES IN THE NEW EDITION OF THE "AUTOMOBILE CATECHISM" THAT WILL SOON GO TO PRESS

[327]—When the gasoline tank is below the carbureter how is gasoline made to flow to the carbureter?

By pressure of air or gas inside the tank and above the gasoline (compression fuel supply).

[328]—How is the pressure produced and maintained in a compression gasoline tank?

In some systems a small hand air-pump is used to pump air into the gasoline tank until sufficient pressure is secured to start the motor. The exhaust of one cylinder of the motor is then used to maintain the pressure by means of a small tube leading from the pipe at a point near the engine cylinder to the top of the gasoline tank. A check-valve in the tube allows the flow of a portion of the exhaust gas into the tank at the instant the particular cylinder to whose exhaust pipe it is connected is exhausting, but prevents return of the exhaust gas from the tank.

The following modification of the above compression system eliminates the necessity of the hand air-pump. A small tank through which the gasoline passes on its way to the carbureter from the compression tank is placed above the level of the carbureter, and a little of the gasoline always remains in the small tank. When starting the motor it will supply the carbureter long enough for the pressure in the larger tank to be brought sufficiently high by the exhaust to force the gasoline to the carbureter.

When the main gasoline tank becomes empty, it is indicated in the small tank by the lowering of the gasoline level. The small tank is usually placed where visible, as on the dashboard; it often has a capacity sufficient to run the car a few miles.

[329]—Should the compression tube between the exhaust pipe and gasoline tank have a small inner diameter for any reason other than for lightness of weight and cost?

Yes. If a tube with a large opening is used there is possible danger of its becoming filled with a combustible mixture if the cylinder to whose exhaust pipe it is connected misses explosions several times in succession. The combustible mixture in the tube may then become ignited by the hot exhaust gases. In a large tube the flame might pass through to the tank and if considerable air has just been pumped into the latter an explosion might result. When the tube is small the cooling effect of its walls will prevent the flame from passing through it to the tank.

[330]—What means to prevent complete emptying of a gravity fuel tank is sometimes used?

A small compartment in the tank will not allow the fuel to flow from it till a valve is opened by hand. When the fuel from the main body of the tank is all drawn out the motor, of course, stops. Then, by opening the valve to the small reserve compartment, the fuel retained in it becomes available.

[331]—What heats the combustion chamber and cylinder walls when the engine is working properly?

The heat of combustion, of compression, and that produced by the friction of the piston and its rings against the cylinder walls. The heating is chiefly due to combustion. Friction causes but little heat under correct conditions (proper fitting of parts and lubrication).

[332]—How is the engine kept cool enough for working?

Generally by a jacket of circulating water, or by air cooling. Oil is used for cooling sometimes.

[333]—What is a water jacket?

A comparatively thin layer of water surrounding the combustion chamber, ports and part of the cylinder. It is retained by an outer casing of metal, either cast integral with the cylinder or attached as in the case of a copper outer casing.

[334]—How much of the cylinder is surrounded by the water jacket?

From one-third to two-thirds of the part of the bore (measured lengthwise of the cylinder) which is next the combustion chamber.

[335]—In an air-cooled cylinder what provision is made for sufficient cooling?

Metal projections in the form of thin rings, lugs, rods, wires or teeth of a comb are provided to present a maximum amount of radiating surface to the air which (in the motor-in-front type) enters the engine space under the bonnet through a grating in front that occupies the place of the radiator used in water-cooled cars. The flow of air is usually assisted by fans driven by the engine. The projections are sometimes surrounded by a sheet-metal casing and air is forced or drawn through the enclosed space by a fan.

[336]—How is the circulating water kept sufficiently cool?

By causing it to flow through a cooling pipe, coil or radiator connected by tubing or piping with the water-jacket.

[337]—Describe a radiator.

In the simplest type a pipe is bent to form a fairly compact group of convolutions. Thin copper or brass pipe is used. Numerous fins or collars of the same material are placed at a small distance apart along the pipe in order to increase the heat-radiating surface. The hot water coming from the jacket passes through the entire length of the coil, which is cooled by air blowing against it.

Numerous types of radiators are used. Many have flattened pipes (cellular radiators) which contain only a thin layer of water and present a large radiating surface to the air. Copper, or its alloy, brass, is used on account of its great capacity for conducting heat; it also has mechanical advantages such as ease of forming and soldering.

Four-cylinder aviation motors have been developed by the Austrian Daimler company. One is of 30 to 40, the other of 65 to 70 horsepower. Among the details of construction the following are given: The cylinders are cast singly. All valves are worked from above and from one camshaft. The inlet valves are placed at the right and are inserted in special valve housings. The exhaust valves communicate directly with the outlets at the left. The crankshaft is offset, to the left, with relation to the cylinders and works in five bearings, and the bolts securing the cylinders to the crankcasing go through from top to bottom to increase the rigidity between shaft and cylinders, or shaft bearings and pistons, this being apparently a new feature of special value in a very light motor in which the dimensions of materials are much reduced. The pistons are of steel and very light. The centrifugal water pump and the high-tension Bosch magneto are both driven from a cross-shaft passing between the two middle cylinders, the object of this arrangement being to fit the motor for driving either right or left and either one or two propellers, according to the design of the aeroplane. A force-feed oiler, Friedmann patent, is placed on the crankcasing between the cylinders and the flywheel and is driven from the camshaft, whose location is on the right side in the casing. The lower half of the casing is removable without interference with the bearings. The waterjackets are formed by precipitation of copper. The weight of the smaller motor is 70 kilograms (154 pounds) and that of the larger one 95 kilograms (200 pounds).—*Automobil-Welt.*

Quick and Good Painting

M. C. HILLICK SETS FORTH THE METHODS TO PURSUE IN THE REFINISHING OF A CAR ON A BASIS OF EXCELLENCE OF RESULT AT SMALL COST

THE AUTOMOBILE has in previous issues intimated that the tendency in automobile work is to cheapen the cost of production. To accomplish this end the painter must fall in line with the artisans of the other departments and seek to get to rock bottom conditions in the matter of cost of painting the horseless vehicle.

This cannot be done by "skimping" the work or cheapening the finish, because these things stand out in sight of all men. Defects in the surface, or in other parts of the construction work, are passed on to the painter for him, through his art and ingenuity, to conceal under the various plastic pigments with which he deals.

How the desired result may be accomplished follows in brief detail: First the body surface, presumably of aluminum or some other metal. Coming from the body maker let it be gone over if necessary with a patch of emery cloth, or emery paper, or a fine wire brush, and in the absence of these mediums, with some coarse sandpaper. Thus rid the surface of foreign substances and condition it to receive and hold the pigment applied to it.

As to the best available primer. Use, if opportunity affords, a purchased ready to use metal primer, to be applied with a soft point round or oval bristle brush, the coat being brushed out smooth and uniform. If shop prepared, use 2 parts raw linseed oil and 3 parts pure turpentine, to a pint of which mixture add a teaspoonful of pale drying japan. For coloring matter and to give body to the primer add enough oil ground lead colored in the direction of the to be finally chosen color. Another primer that some painters have found to work out very strong and well upon the metal surface consists simply of elastic finishing varnish brushed out thinly over the surface.

As soon as the primer is dry, good and secure, beat up some keg lead in 1 part raw linseed oil and 6 parts turpentine, give it the proper coloring, and apply with a soft chisel point brush.

After allowing for secure drying proceed either with a ready prepared knifing material, of which there are numerous makes, or with a shop-mixed one prepared of 3 parts dry white lead and 1 part best bolted whiting, worked into a plastic glazing condition in equal parts of rubbing varnish and coach japan. letting the mass down a bit with a little pure turpentine. Apply with a broad 2 1-2 inch French scraping knife, half elastic, working the pigment out so uniformly smooth and fine as to necessitate little if any sandpapering.

Permit this coat of knifed-in surface to dry for 48 hours, at which time, using first No. 1 sandpaper and last No. 0 to polish with, fetch the work up to a smooth, glossy condition.

Over this foundation lay a coat of color ground work, or, in other words, a coat of color to serve as the ground or foundation color. Prepare this color by using 1 part raw linseed oil to 5 parts turpentine, which, in case of a japan ground color, will furnish requisite elasticity, durability, and a ground color devoid of glass yet not drying out to a dead appearance—the latter to be avoided at this point in the finish.

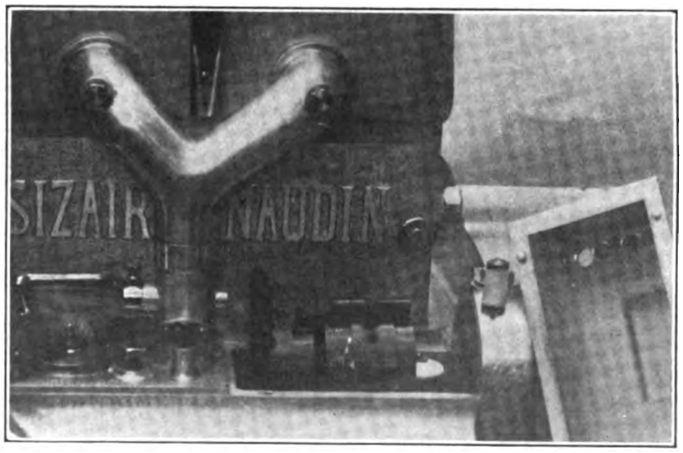
In the event of using lake pigments for the final color the next coat over this preparatory ground color should be a coat of the lake whipped in turpentine to dry flat. Then over this use the lake floated in elastic rubbing varnish. When the color is of the ordinary opaque pigment, or, at most, semi-opaque, such as for example, ultramarine blue, wine color, or carmine, make a varnish color, for the opaque pigments consisting of 1-4 pound of color to 2 pounds of varnish, and for the semi-opaque or transparent pigments, following a solid ground, use 3-4 ounce of color to 1-8 gallon of varnish.

After 36 hours this varnish color, or the transparent glaze will have dried so that it may be lightly rubbed with water and pumice stone flour to the extent of flicking away any dirt nibs, an elastic body finishing varnish of the very best grade obtainable.

For the next coat reduce by one-half the amount of color used in the varnish and apply freely to the surface. Let this coat stand two days, at the expiration of which time again rub with water and pumice stone flour, wash up, stripe and apply such other ornamentation as may be desired. Then apply a coat of clean rubbing varnish. After three days rub this coat moderately with water and pumice stone flour, wash up and finish with an elastic body finishing varnish of the very best grade obtainable.

Bring the chassis meantime along practically the same lines, using one coat of primer, then a coat of surfacing pigment containing enough raw linseed oil to insure adequate elasticity, upon which foundation use the knifing putty to level up the inequalities of the surface and to "face up" any other existing defects. Sandpaper this body of pigment down sleek and smooth, after which apply one coat of flat color, then one coat of transparent glaze or one coat of varnish color as the requirements of the work may indicate. upon which, in due time, after breaking down the gloss with a light rub over with a soft sponge, moist and saturated with pumice stone flour, stripe, and apply one coat of clean rubbing varnish. Give this coat plenty of time to dry, three days or more if possible, then surface thoroughly with water and pumice stone flour, wash up sleek and clean and finish with an elastic chassis finishing varnish.

Enclosed Magneto and Carbureter—The latest model Sizaire & Naudin car exhibited at the Paris Salon shows two innovations in engine practice. On the intake side of the engine the magneto and carbureter are both encased. The magneto is buried in the crankcase casting and is yet on a level with the side frame. It is covered by a light aluminum cover held down by a spring clip, only the four terminals being visible. The carbureter is treated in the same way, the float chamber being entirely under cover, yet instantly revealed by the removal of a spring clip. A Y-shaped tube leads up from the carbureter to the intake ports, the whole being dismountable by withdrawing two bolts. The magneto wires are neatly led up through a brass tube between the forked branches of the intake pipe and the body of the motor.



Showing Sizaire & Naudin magneto and carbureter uncovered. The aluminum cover is shown at the right

Practical Repairing

THE OXY-ACETYLENE WELDING PROCESS APPLIED TO STEEL; ALSO SHOWING HOW BROKEN TEETH CAN BE MADE AS GOOD AS NEW

THE uses of the acetylene flame as applied to welding are so varied that there does not seem to be a part of the car that is broken that cannot be repaired. As has already been stated and shown, aluminum, that had defied the repairman for such a long time, can now be handled with comparative ease and assurance that the repair will last. Welding by electricity is not nearly so recent as the acetylene process, and while the former method has its advantages, the ease with which the latter can be handled recommends it strongly. It goes farther than any other method, and one only has to look at the broken cast-iron gear box illustrated in Fig. 1 to understand what a money-saver it is to the autoist if he will only avail himself of the invention in order to reduce expense in case of accident. The gear box here depicted has been broken owing to a gear wheel coming loose; several of the parts were lost and the repairman has to piece together those parts that remain and build up to them. A year ago this wheel would have been relegated to the scrap heap and there are a good many to-day who would do the same thing. There is no necessity for this, and provided the bearing parts are left and the alignment can be reinstated the job offers very little difficulty. Even if the alignment cannot readily be found, any inexactitude can be made up by the addition of metal and reboring the part.

The parts G1, G2, G3 are parts of the grooves that encircle the ball bearing B1, and the part P1 forms the mainstay of the breakage; it is with this that the repair is started. The two edges are beveled, allowing a small gap between the parts, and metal is run into them. As this is cast iron, a scaling powder is employed to cleanse the parts from dirt, as well as serving in a way as a flux.

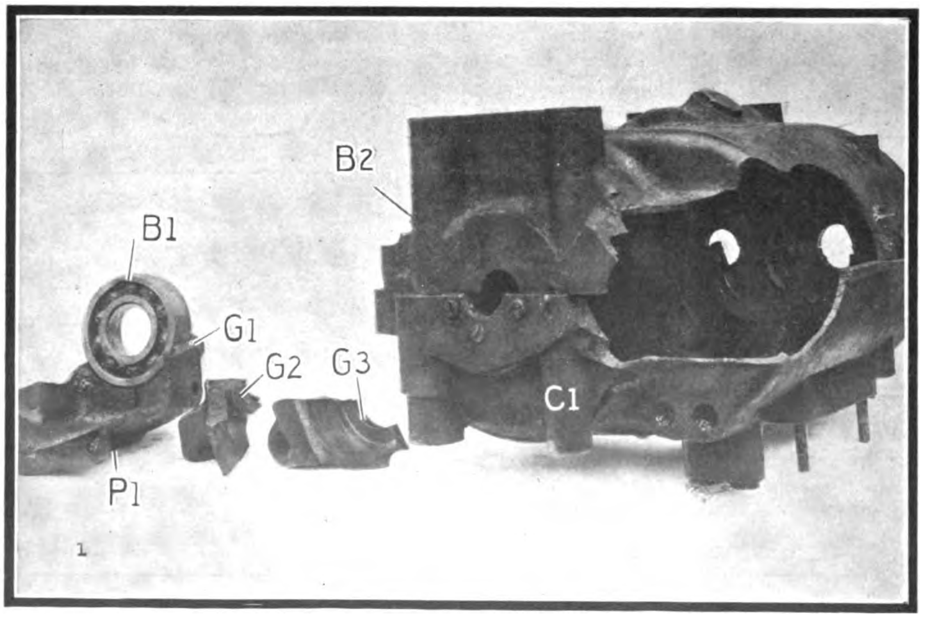


Fig. 1—Broken transmission case in cast iron that can be repaired although several pieces are missing

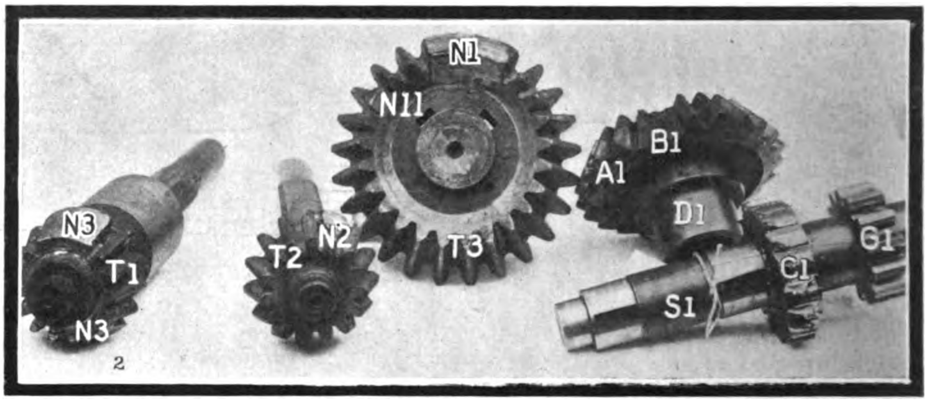


Fig. 2—Showing gear wheels in the broken state and after the welding repair has been effected

The method of welding steel parts that have been broken is similar to that employed in other metals, only steel does not require the scaling powder. The illustration of the method of repairing broken gear wheel teeth can be seen by reference to Fig. 2. Reading from left to right are depicted two driving pinions that have come to grief and have several teeth chipped out of them. The method of treating such parts is as follows: The entire piece is placed in a fire and annealed or softened, so that the case-hardening is removed and the metal restored to its natural hardness, permitting the operator to file away sufficient metal to make a clean and slightly V-shaped joint. A deposit of metal is then welded on by heating the portion of the wheel where the teeth have been broken, and in the same way that sealing wax is applied to a letter so is steel deposited on the part, slightly more in size than the new teeth will occupy. The new metal N3 and N2 will be seen to be circumferentially the same size as the teeth T1 and T2, as the shaft has been placed in the lathe and turned down to size. The next process is to cut the new teeth in just the same manner as if the whole was a solid blank, and the repairers claim that the new metal so deposited is stronger than the original teeth. Be this as it may, it is a fault on the right side. The wheel is then case-hardened in the ordinary way, that is to say, by one of the processes that can be employed to give a satisfactory hard surface. The owner of part D1 had the misfortune to break two teeth A1 and had it repaired. He ran the car for some time, highly delighted with the repair, and thinking to himself how he had saved by not buying a new wheel. One day, however, to his chagrin something went amiss in the gear box, and thinking that the repair had given way, he hied himself to the repair man to tell him about it, and so on. The repair man was sure his work would hold even if the whole car were to give way, and said so. The only way to solve the matter was to take the gear box apart. True enough, the old repair had held, and it was a new break that had caused the trouble. The teeth B1 were then treated as A1 had been,

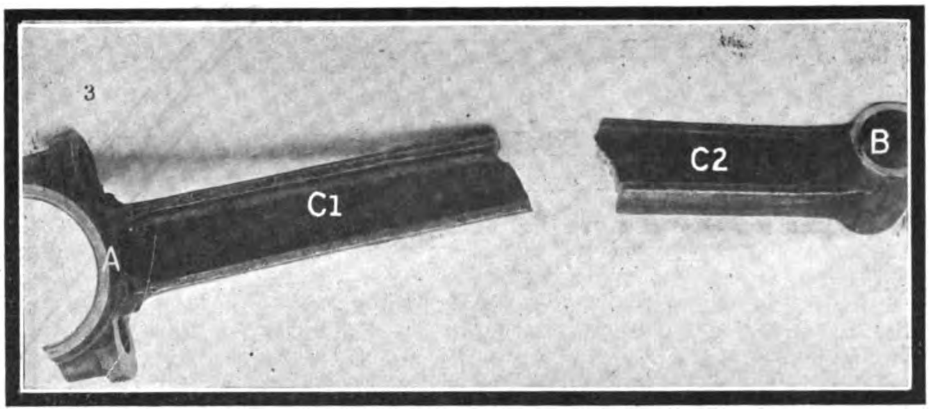


Fig. 3—A broken connecting rod before being repaired; it will be seen that the break is clean and sharp

and the car is now running as well as ever. It is false economy sometimes to have repairs carried out if the body is not in good shape.

N1 and N11 are other illustrations of this work on a slightly larger scale.

In the case of a connecting rod that had snapped, as shown in Fig. 3, there is more skill required than with ordinary cracks and breaks; the distance between the parts A and B must under no circumstances be increased or reduced, otherwise the balance of the motor would be upset, as the compression would be altered should the smallest fraction of an inch elongation or contraction creep in. The parts are joined together, if possible, on a flat metal table (as can be done in this case, as the break is clean), and carefully measured off. If this cannot be done it is necessary to remove another rod and measure the length from that. Should either of the parts be bent slightly they must be heated and straightened, and the place where the joint is to be made V1 double slotted top and bottom, in the manner shown in Fig. 4. Enough metal must be removed to allow for hammering and elongation afterwards, and 1-8 inch is sufficient for this. The parts C1 and C2, in Fig. 4, are then placed in the manner shown, patching up till they are level, and with the above-mentioned gap allowed for. The welding is then carried out in the ordinary way. The part is then filed up in the manner shown in Fig. 5, and the time it took to effect this repair from the arrival of the part in the shop was one hour.

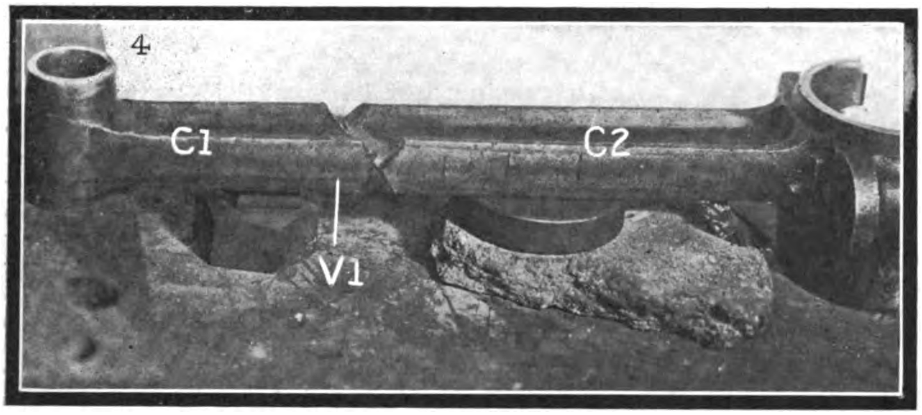


Fig. 4—The two halves placed on a surface plate and slotted prior to being joined

It may be found when measuring after the joining is completed that the part is slightly short; this is easily lengthened on the anvil. It might be as well to mill out some of the metal, but it is inadvisable to take off too much and perhaps weaken the repair.

Ceylon and the Rubber Trade—Something new and unique is going on in Ceylon, namely, the selling of rubber by auction. The first of these public vendues was held in Colombo on the 4th day of November, 1910. Many of the older colonists can remember the auction sales of tea that took place about 1885, the year that they were inaugurated. These persons, who grew to realize the colossal development of the tea industry, are of the mind that the auctions of rubber will ultimately become quite as important. Twenty-two tons of rubber were put up for sale the first day. Ceylon has been led to take the step, owing to her relative position to the big consuming countries. The buyers from the neighboring lands find it very convenient to go to Colombo for their supplies. But a note of interest is sounded in the fact that the largest bidder during the initial vendue made the purchase on behalf of the United States. The plan is to hold the auctions weekly. Already the enterprise has received the mark of success. Ceylon to-day has 185,000 acres planted in Para rubber, 12,000 acres of which are bearing. A Ceylon authority, writing upon the subject of rubber in that country, gives it as his belief that 220,000 acres will be the maximum area planted with rubber in the island. He estimates 140 trees to the acre, which, at one and one-half pounds per tree per annum would yield a sufficient amount by 1920 to guarantee an export of 20,000 pounds per acre. In 1909 there were 681 tons of rubber exported from Ceylon. Plantation rubber there, as in the Malays, British Guiana and other sections, appears to be the only solution of the problem of supplying the demand, which is recent years has increased rapidly owing to the rapid growth of the automobile trade.

Radiator Refutes Chicken and Egg Story—A darky was engaged to drive the automobile of a well-known citizen. Next Sunday he entertained the parson with a pair of chickens for dinner.

Parson (with a sad twinkle in his eye)—"Jackson, wha did de fus chicken come frum?"

Jackson—"You all ma think it kum from an aig, pa'son, but dis chicken was hidin' in de radiata when I captur'd it, and fo' fear you might strain youa curiosity, parson, ah kin voluntea de informashun dat de second fowl was in de flywheel—dar ain't no aig story in konnecshun wid dis hea dinnah."

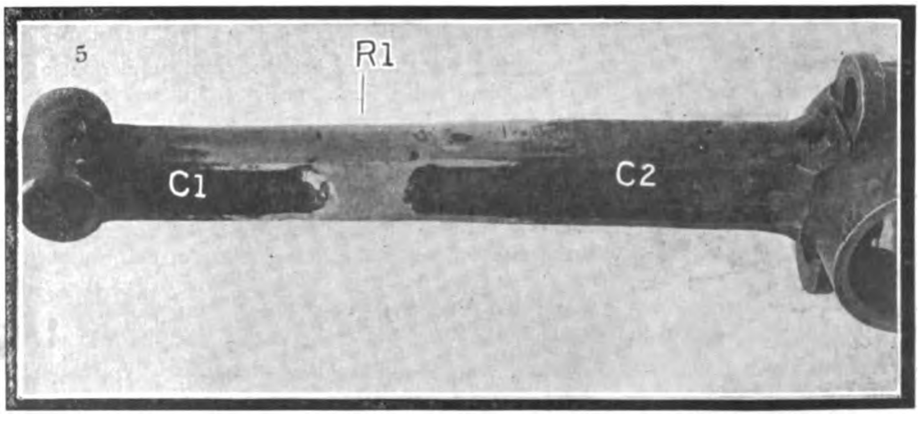


Fig. 5—Same connecting rod joined. It is possible to see the new metal that has been run in after filling

Keen and Apropos Observations

SOME OF THE READERS OF "THE AUTOMOBILE" OFFER SUGGESTIONS OF A PRACTICAL CHARACTER WHICH SHOULD BE OF EXCELLENT VALUE TO THOSE WHO ARE LACKING IN EXPERIENCE

YOUR system of lubrication expounded on pages 992-993 of your December 15 issue, and the diagram and schedule which accompanied same, have given me just the practical guidance I need in correctly solving the lubrication problem.

I should like to tell you the scheme I have devised that I may automatically have my memory jogged at just the right time when certain oiling operations are to be performed. I took a large calendar for 1911, pasted the diagram of the car you printed and the index giving key to the letters showing oiling locations above the pad, then I began with January 7—the first date in the year which appears on your schedule—and on each date throughout January I marked—in the square occupied by the figures representing that date—the letters denoting the exact spot where oil was required on that particular day.

To distinguish between oil and grease I made the letters representing the former in red and the latter in blue. The same plan was then followed leaf after leaf throughout the year, and my "Oiling Calendar" was hung in the most prominent location on my garage walls.

Look at my calendar page for January now: Beginning with the 7th day we find in blue, A-M-R-LA, and in red, B-C-F-G-J-L-P-Q-S-U-W-Z-AA-CA-GA-HA, a row of bewildering hieroglyphics, but to me, with the diagram and key before me, an ever-present reminder of what must be done on this day to keep my car in perfect condition.

Since I have prepared my calendar it has occurred to me that I could have made the characters much plainer if I had used one where each week is represented on a separate page and comfortable writing space left opposite the date.

Medina, O. THOMAS P. HALLOCK.

Why Do Springs Break in the Center?

Let us reason. Heretofore your minds have been riveted on your motive power, transmissions, clutches and various perplexing things that go with the building of an automobile. I feel that you have paid too little attention to the matter of breakage of springs in the center. If the center attachments are planned strong enough and are perfect fits, so you could use a broken spring, you would never have one break. Make them break outside and then it is the fault of the spring maker. Below are a few recommendations that I would like to make:

Have your spring seat, or lower bearing, of proper length and made the exact radius of the spring normal.

If you use two clips make them of liberal size.

Plan a top plate to go underneath these clips with a slightly sharper curve than the radius of the spring normal, and have it strong enough in thickness so it will be impossible for a spring to move underneath it at the center. I would recommend using between the spring and its lower bearing, duck No. 6 or No. 8, saturated with lead and oil. This will preserve the fibre and when drawn down tight there will be no material to displace; you do not want to use material under a spring that will displace while in use. Use as heavy a spring washer under the nuts as the stem of the clip will compress without injury.

I would recommend for a light runabout where you use 1 3-4-inch steel, a clip with 1-2-inch shank. For a 5-passenger car where 2-inch steel is used, 9-16-inch shank.

For a 7-passenger car where 2 1-4 or 2 1-2-inch steel is used, 5-8-inch shanks. And in each case use spring washers as thick as you possibly can crush without injury to the clip shank.

Many are using a single clip. When these are used care should be taken that the inside of the clip is of the same radius as the spring is normal, so it will absolutely bind the spring tight in the center.

If you will observe these recommendations I think you will eliminate the breakage of the springs in the center, which is no fault of the spring maker.

Some are using springs that are called "beaded center." In my mind there is nothing gained by this. If a spring is held down firmly in the center and not allowed to move it cannot crystallize and will not break. Just bear in mind, if you plan your attachments so you can use a broken spring, you will have none break. R. D. WOODFORD.

Discussing the Phases of Self-Starters

For a number of years there has been considerable discussion regarding the advisability of using self-starting devices for explosive motors. We find as far back as 1882 an applicant for a patent stating "An objection to the use of ordinary gas engines is the necessity of starting them by hand, or by some power stored up for the purpose," and while this referred to stationary engineers, it is even more applicable to automobile motors.

There can be no argument as to the advantage of having a motor start at will, without the necessity of cranking, and we have this in its ideal form, as far as simplicity goes, when the motor starts on the spark, even taking into account the remote possibility of injury due to its firing with crank on dead center.

It is to be very much regretted that no motor will always start on the spark, and to make conditions such that this will even frequently happen often requires such an adjustment of the carbureter as to make it give poor results for running. As this method of starting cannot be relied upon, we must resort to cranking or else use a self-starter. Custom has decreed that a number of devices should be so-called, though, technically, few accomplish this result. Self-starters should, therefore, be divided into two classes: Those which work by the expenditure of manual force, and those which are the real self-starters and depend upon some outside stored-up energy. Neither of these takes into account the numerous aids to starting, such as safety cranking arrangements, spark shifting levers and compression relief cams.

The first of these classes generally consists of a lever or combination of levers connected by ratchet or other device to crankshaft, and arranged so that they can be operated either by hand or foot from the driver's seat, and, by so operating, accomplish the same result as cranking. It can be seen that the advantage of this type is very doubtful, the only gain being that the work is done in a more convenient position, while the complication and possibility of getting out of order is very much increased.

Of the second class of starters one of the most common forms is the spiral spring arrangement which is wound up by the motor when running and which in turn starts it as it unwinds.

An electric motor, operated by storage battery, has also been tried, the battery in turn being charged by the motor run as a dynamo.

Acetylene and other explosive gases under pressure have been used, as have cartridges filled with powder or other explosives, in the latter case the explosion taking place in a separate chamber connected with the cylinder. This system is being used to some extent for large stationary engines.

A system which has met with success consists in utilizing compressed air which is secured from the cylinders of motor and stored in tank. It would seem that some mild form of explosive in combustible cartridges, like celluloid, for instance, with automatic feed, worked and fired by the regular ignition system, would eventually solve this problem. W. G. Wall.

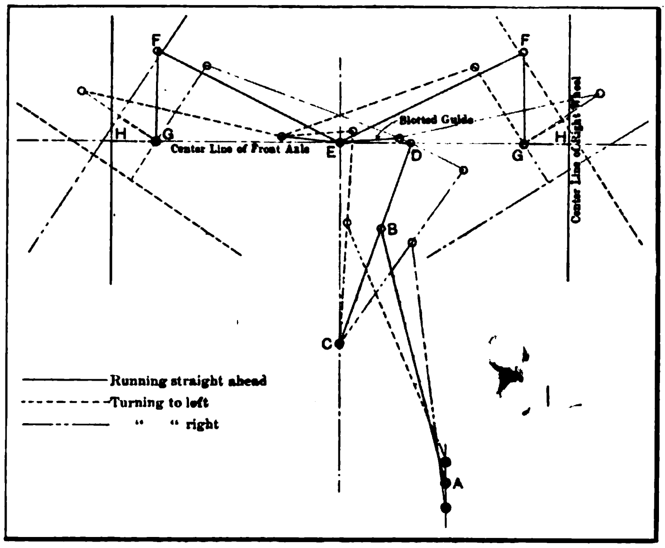
Scheme for a True Automobile Steering Gear

Some time ago I designed a steering gear for automobiles which may have sufficient points of interest for auto manufacturers to warrant its publication in your journal.

When the steering gear of an automobile is constructed so as to turn the two front wheels through the same angle. The plan for well-known reasons, is injudicious, since it causes the wheels to exert a side thrust to the detriment of both the car and the roadbed. Especially on turns and curves of the roads the effect of this side thrust is noticeable.

To overcome this difficulty the steering gear here shown was designed. The length of the turning radius was measured from the center of the car midway between the front and rear axles. The maximum throw shown on the accompanying sketch is for a 5-foot radius.

To explain more in detail, it may be stated that the essential parts of this gear are: A properly determined slotted guide in which a pin E moves, actuated by a set of levers from the usual steering wheel; onto this pin E two reachrods E F are connected which in turn manipulate the elbow levers FGH, on which the wheels are fastened in the usual manner. The sketch shows the position of the gear for running straight ahead and for turns to the right and to the left.



Design of a steering gear, submitted by a reader of "The Automobile," which possesses many points of merit

The knuckle joint A connects rod A B to the worm screw, which is moved by the hand wheel. C is a fixed pivot conveniently located on the longitudinal axis of car, or near it. B and D are pin joints giving some play to the several rods and their angular positions. The slotted guide is cut in a steel plate, both ends of which are fixed to the front axle, and a sufficient distance above same to allow the arm E D to pass between. For easier motion a grooved wheel and a pin would be better than just a pin at E. Above the guide plate we have the two reachrods E F, which swing about pin E and pin F. The elbow lever FGH turns the wheels on the pivot at G through the desired angle.

Necessarily for different wheel gauges different rods and guide plates are required. The curvature of the slotted guide is such as to compel the wheels to assume at all times positions which are tangent to their radius about the instantaneous center of rotation of the car. O. von Voigtlander.

Coming Events

CALENDAR OF FUTURE HAPPENINGS IN THE AUTOMOBILE WORLD THAT WILL HELP THE READER KEEP HIS DATES STRAIGHT—SHOWS, ANNUAL MEETINGS AND OTHER FIXTURES

Dec. 31-Jan. 7, '11	New York City, Grand Central Palace, Eleventh Annual International Automobile Show.
Jan. 2-7	New York City, Hotel Astor, Annual Importers' Salon.
Jan. 7-14	New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Manufacturers.
Jan. 11-12	New York, Annual Meeting, Society of Automobile Engineers.
Jan. 14-28	Philadelphia, Annual Show, Philadelphia Licensed Automobile Dealers' Association, First and Third Regiment Armories.
Jan. 16-21	New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A.L.A.M.
Jan. 16-21	Detroit, Mich., Tenth Annual Show, Detroit Automobile Dealers' Association, Wayne Pavilion.
Jan. 14-20	Milwaukee, Wis., Annual Show, Milwaukee Automobile Dealers' Association, Auditorium.
Jan. 25-28	St. Paul, Minn., Annual Show, Automobile Dealers' Association of St. Paul, Auditorium.
Jan. 28-Feb. 4	Chicago Coliseum, Tenth Annual National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Pleasure Cars and Accessories, Exclusively.
Feb. 6-11	Chicago Coliseum, Tenth National Automobile Show Under the Auspices of the National Association of Automobile Manufacturers, Inc., Commercial Vehicles, Pleasure Cars, Motorcycles and Accessories.
Feb. 6-12	Buffalo, N. Y., Ninth Annual Show, Automobile Trade Association of Buffalo, Broadway Arsenal.
Feb. 13-18	Washington, D. C., Annual Show, Convention Hall.
Feb. 13-18	St. Louis, Mo., Fifth Annual Show, Coliseum.
Feb. 13-18	Winnipeg, Man., First Annual Show, Winnipeg Motor Trades Association.
Feb. 13-19	Kansas City, Mo., Annual Show, Motor Car Trade Association.
Feb. 14-19	Dayton, O., Second Annual Show, Memorial Building.
Feb. 15-18	Grand Rapids, Mich., Annual Show.
Feb. 18-25	Minneapolis, Minn., Annual Show, Minneapolis Automobile Show Association, National Guard Armory.
Feb. 18-25	Brooklyn, N. Y., Annual Show, Brooklyn Motor Vehicle Dealers' Association, 23d Regt. Armory.
Feb. 18-25	Binghamton, N. Y., Second Annual Show, Binghamton Automobile Club and Chamber of Commerce, State Armory.
Feb. 18-25	Newark, N. J., Fourth Annual Show, New Jersey Automobile Exhibition Co.
Feb. 20-25	Cincinnati, O., Annual Show, Cincinnati Automobile Dealers' Association.
Feb. 20-25	Portland, Me., Sixth Annual Show, Auditorium.
Feb. 20-26	Omaha, Neb., Annual Show, Omaha Automobile Association.
Feb. 21-25	Baltimore, Md., Annual Show, Automobile Club of Maryland, Fifth Regiment Armory.
Feb. 22	Cleveland, O., Annual Show, Cleveland Automobile Show Company.
Feb. 24-27	New Orleans, La., Annual Show, New Orleans Automobile Club.
Feb. 25-Mar. 4	Toronto, Ont., Automobile Show, Ontario Motor League.
Feb. 27-Mar. 4	Kansas City, Mo., Fifth Annual Show, Kansas City Automobile Dealers' Association, Convention Hall.
Mar. 4-11	Boston, Mechanics' Building, Ninth Annual Show, Licensed Automobile Dealers' Association.
Mar. 7-11	Des Moines, Ia., Third Annual Show, Des Moines Automobile Dealers' Association, Coliseum.
Mar. 14-18	Syracuse, N. Y., Third Annual Show, Syracuse Automobile Dealers' Association, State Armory.
Mar. 14-18	Denver, Col., Annual Automobile Show, Management Motor Field, Colorado Auditorium.
Mar. 15-18	Louisville, Ky., Annual Show, Louisville Automobile Dealers' Association, First Regiment Armory.
Mar. 18-25	Pittsburg, Annual Show, Pittsburg Auto Show Association (Inc.), Exposition Hall.
Mar. 25-Apr. 1	Buffalo, N. Y., Fourth Power Boat and Sportsmen's Show, Sixty-fifth Regiment Arsenal, Buffalo Launch Club.
Mar. 25-Apr. 8	Pittsburg, Fifth Annual Show, Duquesne Garden, First Week, Pleasure Cars; Second Week, Commercial Trucks. Automobile Dealers' Association of Pittsburg, Inc.
Apr. 1-8	Montreal, Can., Automobile and Motor Boat Show, Automobile and Aero Club of Canada.

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MR. SALESMAN, you will succeed admirably only upon one condition, and that is that you tell the truth.

* * *

MR. SALESMAN, when you pick out "selling points" and enlarge upon them it is as much as to say that the other points rank as defects.

* * *

MR. SALESMAN, you cannot make a good impression upon a prospective if you intimate that some parts of your automobile are not good.

* * *

MR. SALESMAN, you have no right to set yourself up as the judge of the automobile that you are selling. What is the matter with the chief engineer of your company?

* * *

MR. SALESMAN, you cannot possibly tell the truth about the automobile that you are selling unless you know it.

* * *

MR. SALESMAN, you should be able to swap all your fine-phrased selling points for true statements of fact, which are, of course, known to the designers of your car.

MR. SALESMAN, you cannot make a good impression upon a purchaser by trying to sell him what he does not want.

* * *

MR. SALESMAN, you waste your time trying to sell a truck to a man when he wants a touring car, or a touring car when he wants a runabout, or your car if it is not what he wants.

* * *

MR. SALESMAN, you do not have to know your man, but you should know your car.

* * *

MR. SALESMAN, you do yourself a great injustice when you try to imitate the alleged salesman who claims that he can sell anything, and who makes no pretense at considering the purchaser's welfare.

* * *

MR. SALESMAN, your automobile must be a good one, otherwise your engineering department would build another kind.

* * *

MR. SALESMAN, it is your business to know what it is good for, and then find the class of customers who will have need for your kind of a car.

* * *

MR. SALESMAN, you have no right to tell your story with variations which will be a departure from the truth simply for the purpose of pleasing your prospective.

* * *

MR. SALESMAN, you will become the most pronouncedly successful salesman on "automobile row" within a twelvemonth after you learn all about your product and then tell it to the customer.

* * *

MR. SALESMAN, you imitate a book agent when you trot out a bundle of stock arguments which do not fit your automobile any better than they would a wheelbarrow.

* * *

MR. SALESMAN, your customer would not have money enough to buy an automobile were he to be so shallow as not to know that you are merely talking against time.

* * *

MR. SALESMAN, it is an ancient fallacy that is wrapped up in the idea that the truth sounds too plain, and that you must be a "diplomat" to sell a car.

* * *

MR. SALESMAN, you compel attention when you know what you are talking about and you say it straight from the shoulder.

* * *

MR. SALESMAN, are you afraid of the truth? If you are so anxious to please your customer, why don't you give him a dose of it? The truth is exactly what he is after.

MR. BUYER, when you go in quest of an automobile don't say that you know all about it unless you do.

* * *

MR. BUYER, you should not put on a mysterious air and try to conceal from the salesman the object of your mission.

* * *

MR. BUYER, if you know what kind of a car you have a need for, ask the salesman if he has that kind for sale.

* * *

MR. BUYER, if you don't know what you want, you have no right to take up the salesman's time.

* * *

MR. BUYER, if you are merely looking around on a speculative basis, all you have to do is to say so; the salesman will then know that you are in need of information and he will give it to you.

* * *

MR. BUYER, if you want a $500 automobile, what possible excuse can you offer for going to a place where they have only the $5,000 kind?

* * *

MR. BUYER, if you examine a given make of automobile, knowing perfectly well that you have preconceived notions of designs that are not embodied in that make of car, what excuse do you offer yourself for expending your time in the examination of that which you know you do not want?

* * *

MR. BUYER, it stands to reason that you cannot make changes after an automobile is finished without killing the harmony that should reside therein.

* * *

MR. BUYER, if you insist upon having material alterations made in the car that you finally select, you should ask the maker to cancel his guarantee.

* * *

MR. BUYER; it is scarcely to be expected that a maker of a car should guarantee the good performance of your "improvements"; the maker pays for the services of an engineer upon whom he relies for what he wants.

* * *

MR. BUYER, if you discover an automobile that will go like the dickens on a level, hard road, why should you expect it to be a racing car on a 20 per cent. grade?

* * *

MR. BUYER, the rules that should govern the purchase of an automobile are not unlike the methods to pursue when you go in quest of a pound of tea. If you ask for what you want, in precise terms, the chances are that you will get it.

MR. BUYER, there is a tradition among salesmen which has to do with the making of a "favorable impression" at any cost; you will have to pay the cost.

* * *

MR. BUYER, you may not fully realize just what you are after when you race around like a March wind, but the salesman—he knows.

* * *

MR. BUYER, when you finally come upon a car that attracts your discriminating notice, and you go for a demonstration, why should you wish to give the dust to racing automobiles?

* * *

MR. BUYER, you know that "you cannot eat your cake and have it, too," nor can you expect an automobile to be economical of maintenance, an indefatigable hill climber and capable of outstripping racing cars on the level roadway besides.

* * *

MR. BUYER, it is impossible to accentuate each of three virtues; to whatever extent you add to one you must subtract from the other, and you might better invest in something that has moderation for its foundation.

* * *

MR. BUYER, you probably belong to the class of purchasers who would insist upon a larger driving sprocket. When you go looking for trouble in this direction, it is yours for the asking.

* * *

MR. BUYER, nearly all dissatisfaction may be directly traced to lack of preparedness on the part of the purchaser.

* * *

MR. BUYER, the salesman cannot be expected to understand your needs, save only to the extent that you inform him.

* * *

MR. BUYER, you should not take your money out of the bank where it is staying at 4 per cent. and trade it off for an automobile of the kind that will not give you an equal return.

* * *

MR. BUYER, you will be able to more than double your income if you buy and use an automobile, but it must be the kind that you can use.

* * *

MR. BUYER, if you are a doctor, and your radius of travel is now one mile, making the area four square miles, you can easily extend this radius another mile, which will give you an active area of 16 square miles, but you do not have to incur the cost of a touring car.

* * *

MR. BUYER, if you are a bank clerk on a small income, you can get enough fresh air through the intelligent use of a $500 runabout to fit you out for the presidency of a bank.

News Section

HAPPENINGS OF THE WEEK IN VARIOUS SECTIONS OF THE COUNTRY AS GATHERED BY THE 84 SPECIAL WRITERS AND CORRESPONDENTS OF "THE AUTOMOBILE"

Palace Show Will Be Thrown Open to the Public on New Year's Eve—The Salon Follows on Monday Night—The Big Garden Display in the Throes of Active Preparation—News of the Other Shows—Chicago's Space Assignments Announced—Private Exhibitions Will Be a Feature of the Metropolitan Show Season—Jersey's Inter-Club Row Takes on a New Phase—News of Maker and Dealer in Many Fields, Etc.

Palace Show First to Greet New York Motordom

COMING first on the list of metropolitan automobile shows, the Eleventh Annual International Exhibition, which will open at the Grand Central Palace New Year's eve, is awaited with considerable interest. The show, according to announcement, has been promoted by the American Motor Car Manufacturers' Exhibit Association, although the organization has not been completed. The managers, Messrs. Longendyke and Conant, encountered many difficulties in the preliminary work, but succeeded in assembling about seventy automobile manufacturers and district agents on their rolls.

Fore-doors are most in evidence. Among the makers who have adopted this type of body are the Alpena, Warren, Washington, Michigan, Abbott-Detroit, Parry, Unit, Velie, Lion, Paterson and others. Torpedo bodies, shaped like big projectiles with oval openings for passengers, are shown by numerous companies. There is more of tendency to the hooded dash than formerly. Several concerns will show convertible bodies, thus making one chassis serve for pleasure car or light truck with small effort. The commercial cars will be represented by a large line of trucks of various sizes, powers and purposes.

The accessory exhibit will not be large, but will be representative of a number of interesting features of the industry.

The feature of the show will be the exhibition of aeroplanes, several record-making and breaking machines having been secured by the management.

The management has announced that a contract calling for $1.600 has been made with a 35-piece orchestra.

The full list of car manufacturers who are down for space includes the following names:

Abbott Motor Co.	Detroit, Mich.
American Motor Truck Co of Michigan	Detroit, Mich.
Atterbury Motor Car Co.	Buffalo, N. Y.
American Motor Truck Co.	Lockport, N. Y.
H. H. Babcock Co.	Watertown, N. Y.
Louis J. Bergdoll Motor Co.	Philadelphia, Pa.
C. S. Baeder (Lexington Motor Car Co.)	210 W. 76th St., New York
Chase Motor Truck Co.	Syracuse, N. Y.
Chicago Pneumatic Tool Co.	Chicago, Ill.
Cortland Motor Wagon Co.	Cortland, N. Y.
Clarke-Carter Auto Co.	Jackson, Mich.
Columbus Buggy Co.	Columbus, O.
J. M. Cunningham & Sons Co.	Rochester, N. Y.
Findlay Motor Co.	Findlay, O.
Gramm Motor Car Co.	Bowling Green, O.
Harry S. Houpt Mfg. Co.	2010 Broadway, New York
Imperial Auto Co.	Jackson, Mich.
Johnson Service Co. (Commercial)	Milwaukee, Wis.
Johnson Service Co. (Pleasure)	Milwaukee, Wis.
Krit Motor Car Co.	Detroit, Mich.
Lion Motor Car Co.	Adrian, Mich.
Metz Company	Waltham, Mass.
Martin Carriage Works	York, Pa.
Michigan Buggy Co.	Kalamazoo, Mich.
New Haven Truck and Auto Works	New Haven, Conn.
Oliver Motor Car Co.	Detroit, Mich.
Albert T. Otto (Saurer Truck)	1876 Broadway, New York
Owosso Motor Co.	Owosso, Mich.
Parry Auto Co.	Indianapolis, Ind.
W. A. Paterson Co.	Flint, Mich.
Pennsylvania Motor Car Co.	Pittsburg, Pa.
Penn-Unit Car Co.,	Allentown, Pa.
J. M. Quinby & Co. (Isotta Car)	Newark, N. J.
Roader Car Co.	Brocton, Mass.
Scioto Auto Car Co.	Chillicothe, O.
Spencer, Llano, Briner Co. (Petrel Car)	1777 Broadway, New York
Staver Carriage Co.	Chicago, Ill.
Warren Motor Car Co.	Detroit, Mich.
West Side Garage and Motor Co. (Seitz Commercial Car)	160 W. 101st St., N. Y.
Whiting Motor Car Co.	Flint, Mich.
C. W. Kelsey Mfg. Co.	Hartford, Conn.
Crawford Automobile Co.	Hagerstown, Md.
Coleman Motor Car Co.	Ilion, N. Y.
Cass Motor Truck Co.	Port Huron, Mich.
Victor Motor Truck Co.	Buffalo, N. Y.
Otto Motor Car Co. of N. Y. (Otto Car)	1964 Broadway, New York
The Only Car Co.	1919 Broadway, New York
Alpena Motor Car Co.	Alpena, Mich.
Henry Motor Car Sales Co., (Henry Motor Car Co., Muskegon, Mich.)	Chicago, Ill.
Correja Motor Car Co.	1851 Broadway, New York
Gaylord Motor Car Co.	Gaylord, Mich.
Geneva Wagon Co.	Geneva, N. Y.
Richard B. Darre (Cyklonette)	2 W. 90th St., New York
The De Tamble Motors Co.	Anderson, Ind.
L. M. Hartman Sales Agency (Hart-Kraft Commercial Car)	York, Pa.
Maytag-Mason Motor Co.	Waterloo, Ia.
Ideal Motor Co. (Sage & Creighton Trucks)	701 Grand River Ave., Detroit, Mich.
Velie Motor Vehicle Co.	Moline, Ill.
Colt-Stratton Co. (Cole "30")	New York, N. Y.
Flanagan Motor Car Co. (Monitor Trucks)	679 73d St., Bklyn., N. Y.
Otto Motor Car Co. of New York (Crown Truck of Milwaukee)	1964 Broadway, New York
Carter Motor Car Corporation	Washington, D. C.
Beyster-Detroit Motor Car Co.	Detroit, Mich.
McFarlan Motor Car Co.	Connersville, Ind.
Paige-Detroit Auto Co.	Detroit, Mich.
International Harvester Co. of America	Philadelphia, Pa.
Clarke-Norwalk Co.	1236 Pacific St., Brooklyn

The F. A. L. car will not be shown and the Carhartt Automobile Corporation and the Kelley Motor Truck Company have withdrawn. Whether the Parry Automobile Company will show or not was not announced by the management. The Black Crow car will also be among the absentees, but aside from these there will be a large number on show.

The aeroplane exhibits are to be shown in the names of the following and include seven types:

D. & F. Radiator
U. S. McAdamite Metal Co.
E. J. Willis
Dean Mfg. Co.
Elbridge Engine Co.
Vanco Mfg. Co.
Aerial Equipment Co.
American Aero. Supply Co.
Grady Mfg. Co.
Am. Met. Fusing & Cutting Co.
Na. Finkelstein

The list of accessory makers and handlers who will show are as follows:

Economy Tread Co.
A. H. Kasner
Standard Metal Works Co.
William R. Winn
A. J. Meyers, Inc.
Auto Club of America
Calmon Asbestos & Rub. Wks.
New York Coil Co.
Rector Eng. Co.
B. E. Mfg. Co.
Automobile Supply & Mfg. Co.
Troy Sunshade Carriage Co.
John F. Galvin
A. H. Green & Co.
Fabrikoid Works
Sterling Machine & Stamp. Co
Bushey Demountable Rim Co.
Auto Wind Deflector Co.
American Pedal Co.
Behringer Radiator Co.
F. Z. H. Part Co.
John W. Rapp Co.
Safety Tire Co.
Ross Heaton Mfg. Co.
Bristol Co.
C. A. Buffington
Wm. C. Myron

Poultry Show to Give Way to Automobiles

WITH only a little over a week more before the opening of the show of the Association of Licensed Automobile Manufacturers at Madison Square Garden, preparations for the event are humming along with intensity.

Piled in and near the building, which is occupied at present by a poultry show, are vast heaps of structural steel and temporary lattice work which will be used to form the interior alterations of the big building.

Only part of the building is being used for the poultry exhibit and everywhere else within the structure gangs of men are busy making ready for the automobile show. Already the basement is practically complete and ready for the installation of the numerous exhibits that will be displayed there.

The Rathskellar will be particularly complete this year, as in fact will be every other detail of the show.

Each beam and girder to be used in bringing about the metamorphosis of the Garden has been carefully numbered and a place for it is all ready and as soon as the men can get to work the steel will be placed in quick time.

None of the exhibits are ready at this time, but the installation of the cars and accessories is the least difficult portion of the undertaking. When all is ready to put them in their places it will be only a matter of a few hours to accomplish what seems like an enormous job.

During the first week of the show it has been estimated that there will be at least 700 factory salesmen assigned to the exhibition. In past years some fault has been found with the men who were supposed to be expert salesmen. It was frequently noted that the men in many of the spaces did not seem to have an intimate knowledge of the goods on display. In recent shows this has been corrected, and this year the men who will be stationed at the various booths to explain the lines to possible customers will be drawn from the very flower of the selling forces of the factories. In addition to this big force of salesmen, there will be experts by the hundreds and officers by the scores to tell the public all about their exhibits.

The total number of persons who will be engaged throughout the week in the building is estimated at about 2,000.

Invitations, handsomely engraved, are being made ready for mailing, and special efforts are being exerted to make the opening night by far the greatest in point of attendance in the history of the automobile show.

The co-operative feature of the A. L. A. M. function has been brought emphatically to public notice this year. General Manager Reeves, in speaking of this feature, said: "The profits that may arise from the show go back to the exhibitors after the bills are paid. The dividends in the past have been material, and I have no doubt that they will be comfortable this time."

Salon Cars Represent Olympia and Paris Types

MOST of the concerns that will exhibit in the Importers' Automobile Salon at the Hotel Astor ballroom from January 2 to 7, have cars or chassis that won favorable comment at the recent Olympia show in London, or the Salon in Paris.

The Renault exhibit will include two polished chassis shown at both London and Paris, a 25-35 horsepower American Special and a 35-45 horsepower, both four-cylinder models. The Demarest exhibit will include a 40-horsepower Itala show chassis that was displayed at both London and Paris, and an English Daimler chassis that was displayed at Olympia. The De Dion exhibit will include two chassis of models built especially for American roads, the De Dion-Bouton firm making a practice of preparing chassis for each country in which it sells cars.

The Benz exhibit will include the racer with which David Bruce-Brown won the Automobile Club of America's Grand Prize gold cup and a show chassis of a 50 horsepower shaft drive model.

The Panhard exhibit will include a number of the new valveless engine models and it is expected that a 30-horsepower valveless car, with a Labourdette limousine body, shown at London and Paris, will get here in time for the Salon. The C. G. V. exhibit will include a six-cylinder 18-24-horsepower C. G. V. limousine shown at Paris and a four-cylinder 12-horsepower Zedel inside drive landaulet. The limousine body was built by Kellner and is finished inside in mahogany.

The Napier exhibit will include two show cars that were displayed at the Olympia show in London, both models being fitted with removable wire wheels. The Darracq exhibit will include a six-cylinder 60-horsepower touring model, with a seven-seated Rothschild body that was shown at both London and Paris and a four-cylinder 20-24-horsepower model brought here especially for the Salon. The Quinby exhibit will include two Isotta-Fraschini models that were shown at the Paris Salon.

The Peugeot exhibit will include models from the Paris Salon. The S. P. A. exhibit will include cars sent from Italy especially for the Salon in this city. The S. P. O. exhibit will include a runabout and Vinot town car, the coachwork having been mounted here especially for the Salon.

Managing Director Wright Is in Town

The latest promise in the shape of foreign-made automobiles comes with the appearance of Warwick Wright, managing director of the English firm which handles the entire output of the factory where the Metallurgique car is made. When Director Wright paid a visit to THE AUTOMOBILE he disclosed enough of his immediate future plans to indicate that he will enter the Metallurgique car in the Salon, and a limousine fitted with Louis XIV furnishings will be here on time for the opening of the Salon. This limousine is one of the latest and most elegant creations of the firm, and it differs in many respects from the general run of cars of this character, notable among which mention is made of a wood finish for the interior, clusters of electric lights for illuminating purposes, and comfort is assured to the occupants of the limousine, due to the fact that the cushions are from 18 to 22 inches deep. It will be understood that this particular Metallurgique model will be something worth going to see when it is stated that the price is about $18,000. The body is the work of craftsmen in the establishment of Vandan Plas. It would seem that there is quite a market abroad for these rather high-priced automobiles, the output of the Metallurgique Company being something like 3,000 cars per annum. It is the idea to establish an American branch for this well-known make of automobile, although it is unlikely that there will be a very large sale for such costly automobiles.

News Notes of the Coming Automobile Shows

CHICAGO, Dec. 26—Following is the complete official list of firms, corporations and individuals to exhibit at the forthcoming national automobile show:

Pleasure Vehicle Section

January 28th to February 4th, 1911

AUTOMOBILES, COLISEUM (Main Floor)

A1. Winton Motor Carriage Co.
A2. Buick Motor Co..
A3. Lozier Motor Co.
A4. Chalmers Motor Co.
A5. National Motor Vehicle Co.
A6. Pierce-Arrow Motor Car Co.
B1. Moline Auto Co.
B2. Hudson Motor Co.
B3. Stevens-Duryea Co.
B4. Reo Motor Car Co.
B5. H. H. Franklin Mfg. Co.
B6. Olds Motor Works.
C1. Packard Motor Car Co.
C2. Thomas B. Jeffery Co.
C3. F. B. Stearns Co.
C4. E-M-F Co.
C5. Cadillac Motor Car Co.
C6. Peerless Motor Car Co.
D1. Maxwell-Briscoe Motor Co.
D2. Willys-Overland Co.
D3. Pope Mfg. Co.
D4. E. R. Thomas Motor Co.
D5. Locomobile Co. of America
D6 Dayton Motor Car Co.
E1. Woods Motor Vehicle Co.
E2. Columbia Motor Car Co.
E3. Atlas Motor Car Co.
E4. Premier Motor Mfg. Co.
F1. Knox Automobile Co.
F2. White Mfg. Co.
F3. Matheson Automobile Co.
F4. American Locomotive Co.
G1. Baker Motor Vehicle Co.
G2. Corbin Motor Vehicle Corp.
H1. Elmore Mfg. Co.
H2. Haynes Automobile Co.
J1. Metzger Motor Car Co.
K1. Mitchell-Lewis Motor Co.
L1. F-A-L Motor Co.

AUTOMOBILES, COLISEUM ANNEX (First Floor)

M1. Brush Runabout Co.
N1. Studebaker Bros. Mfg. Co.
O1. Nordyke & Marmon Co.
O2. Streator Motor Car Co.
P1. Inter-State Auto Co.
Q1. Jackson Automobile Co.
Q2. Bartholomew Company
Q3. Babcock Elec. Carriage Co.

AUTOMOBILES, FIRST REGIMENT ARMORY (Main Floor)

A1. Hupp Motor Car Co.
A2. Waverley Company
A3. Dorris Motor Car Co.
A4. Kissel Motor Car Co.
B1. Selden Motor Vehicle Co.
B2. W. H. McIntyre Co.
B3. Pierce Motor Co.
B4. American Motor Car Co.
C1. Cartercar Company
C2. Austin Automobile Co.
C3. Garford Co.
C4. Royal Tourist Car Co.
D1. Anderson Carriage Co.
D2. Moon Motor Car Co.
D3. Pullman Motor Car Co.
D4. Buckeye Mfg. Co.
E1. Speedwell Motor Car Co.
E2. Fiat Auto Co.
E3. Diamond T Motor Car Co.
E4. Auburn Automobile Co.
E5. Benz Auto Import Co.
E6. Simplex Motor Car Co.
F1. Black Mfg. Co.
F2. Rauch & Lang Carriage Co.
G1. Ohio Motor Car Co.
G2. Courier Car Co.
G3. Midland Motor Co.
G4. Chadwick Engineering Wks.
G5. Staver Carriage Co.
G6. Schacht Motor Car Co.
H1. Great Western Auto Co.

AUTOMOBILES, COLISEUM BASEMENT

1. Hupp-Yeats Electric Car Co.
3. Colby Motor Co.
4. Kenmore Mfg. Co.
5. Ohio Electric Car Co.
6. Enger Motor Car Co.
8. Cole Motor Car Co.
9. Westcott Motor Car Co.
10. Broc Electric Vehicle Co.
11. Haberer & Co.
12. Middleby Auto Co.
13. Lexington Motor Car Co.
14. The Carriage Woodstock Co.
15. B. C. K. Motor Car Co.
16. Otto Gas Engine Works
17. McFarlan Motor Car Co.
18. Zimmerman Mfg. Co.

ACCESSORIES, COLISEUM GALLERY

1. Michelin Tire Co.
2. Lovell-McConnell Mfg. Co.
3. Vesta Accumulator Co.
4. Standard Roller Bearing Co.
5a. Hayes Mfg. Co.
5. Herz & Co.
5b. Imperial Brass Mfg. Co.
6. C. T. Ham Mfg. Co.
7. The Jones Speedometer Co.
8. N. Y. & N. J. Lubricant Co.
C. A. Mezger.
9. Weed Chain Tire Grip Co.
10. Continental Caoutchouc Co.
11. Valentine & Co.
12. Wheeler & Schebler
13. Conn. Telephone & Elec. Co.
14. Swinehart Tire & Rubber Co.
15. A. O. Smith Co.
16. Consolidated Rubber Tire Co.
17. Heinze Electric Co.
18. Pennsylvania Rubber Co.
19. Warner Instrument Co.
20. Republic Rubber Co.
21. Republic Rubber Co.
22. McCord Mfg. Co.
23. Whitney Mfg. Co.
24. Briscoe Mfg. Co.
25. Joseph Dixon Crucible Co.
26. Morgan & Wright.
27. Morgan & Wright
28. Standard Welding Co.
29. American Ball Bearing Co.
30. Hartford Rubber Works Co.
31. Hartford Rubber Works Co.
32. Timken-Detroit Axle Co.
33. Timken Roller Bearing Co.
34. R. E. Dietz Co.
35. Diamond Chain & Mfg. Co.
36. Gray-Hawley Mfg. Co.
37. Wm. Cramp & Sons Ship & Eng. Bldg. Co.
38. Fisk Rubber Co.
39. Fisk Rubber Co.
40. National Tube Co.
41. Badger Brass Mfg. Co.
42. Veeder Mfg. Co.
43. Gray & Davis
44. G & J Tire Co.
45. G & J Tire Co.
46. National Carbon Co.
47. B. F. Goodrich Co.
48. B. F. Goodrich Co.
49. C. F. Splitdorf
50. Gabriel Horn Mfg. Co.
51. Goodyear Tire & Rubber Co.
52. Goodyear Tire & Rubber Co.
53. Long Mfg. Co.
54. J. H. Williams & Co.
55. Diamond Rubber Co.
56. Diamond Rubber Co.
57. Warner Gear Co.
58. A. W. Harris Oil Co.
59. Hartford Suspension Co.
60. Hartford Suspension Co.
61. Baldwin Chain & Mfg. Co.
62. Spicer Mfg. Co.
63. Brown-Lipe Gear Co.
64. Pittsfield Spark Coil Co.
65. Continental Motor Mfg. Co.
66. Remy Electric Co.
67. Firestone Tire & Rubber Co.
68. Firestone Tire & Rubber Co.
69. The Elec. Storage Bat. Co.
70. Oliver Mfg. Co.
71. S. F. Bowser & Co
72. S. F. Bowser & Co.
73. Edmunds & Jones Mfg. Co.
74. Kokomo Electric Co.
75. Byrne-Kingston & Co.
76a. U. S. Light & Heating Co.
76. C. F. Ernst's Sons

ACCESSORIES, COLISEUM ANNEX (Second Floor)

77. Motz Clincher Tire & Rubber Co.
78. Warner Mfg. Co.
79. Sprague Umbrella Co.
80. Sprague Umbrella Co.
81. Auto Parts Mfg. Co.
82. Royal Equipment Co.
83. Royal Equipment Co.
84. Muncie Gear Works.
85. Gemmer Mfg. Co.
86. Excelsior Motor & Mfg. Co.
87. Stromberg Mot. Devices Co.
88. Stromberg Mot. Devices Co.
89. Havoline Oil Co.
90. Sherwin-Williams Co.
91. Thermoid Rubber Co.
92. Thermoid Rubber Co.
93. Cook's Standard Tool Co.
94. Booth Demountable Rim Co.
95. Auto Improvement Co.
96. American Ever Ready Co.
97. The Homo Co. of America.
98. Ross Gear & Tool Co.
99. Whitney Steel Co.
100. Turner Brass Works.
101. Edison Storage Battery Co.
102. Driggs-Seabury Ordnance Corp.
103. National Coil Co.
104. Link-Belt Co.
105. Stewart & Clark Mfg. Co.
106. Cleveland Speed Indicator Co.
107. Empire Tire Co.
108. Empire Tire Co.
109. Western Motor Co.
110. Eisemann Magneto Co.
111. Eisemann Magneto Co.
112. Sparks Withington Co.
113. Stein Double Cushion Tire Co.
114. Randall-Faichney Co.
115. Continental Rubber Works Co.
116. Briggs Mfg. Co.
117. Star Rubber Co.
118. Bosch Magneto Co.
119. Bosch Magneto Co.
120. E. B. Wagner Mfg. Co.
121. Motsinger Device Mfg. Co.
122. R. E. Hardy Co.
124. Pantasote Co.
125. Ajax-Grieb Rubber Co.
126. Ajax-Grieb Rubber Co.
127. Gilbert Mfg. Co.
128. J. H. Sager Co.
129. Globe Mach. & Stamping Co.
130. Adam Cook's Sons.
131. Never-Miss Mfg. Co.
132. Leather Tire Goods Co.
133. Briggs & Stratton Co.
134. Atwater-Kent Mfg. Works.
136. C. A. Shaler Co.
137. Batavia Rubber Co.
138. George A. Haws.
139. Dover Stamping & Mfg. Co.
140. McCue Company.
141. Pfanstiehl Electrical Laboratories.
142. Apple Electric Co.
143. Reichenbach Laboratories Co.
144. Willard Storage Battery Co.
145. Auburn Auto Pump Co.
146. Standard Thermometer Co.
147. Russel Motor Axle Co.

ACCESSORIES, FIRST REGIMENT ARMORY (Balcony)

1. Horseless Age.
2. Elite Mfg. Co.
3. Ajax Trunk & Sample Case Co.
4. Wm. E. Pratt Mfg. Co.
5. Norton Company.
6. Perfection Spring Co.
7. Rutherford Rubber Co.
8. Rutherford Rubber Co.
9. Universal Tire Protector Co.
10. Fellwock Auto & Mfg. Co.
11. Lutz-Lockwood Mfg. Co.
12. Motor Parts Co.
13. Charles O. Tingley & Co.
14. Barco Brass & Joint Co.
15. Motor Vehicle Publishing Co.
16. Findeisen & Kropf Mfg. Co.
17. Atlantic Refining Co.
18. F. A. Brownell Motor Co.
19. Skinner & Skinner Co.
20. Marshalltown Buggy Co.
21. Simms Magneto Co.
22..S½ K & W Mfg. Co.
22. N½ Armiger Chemical Co.
23. Garage Equipment Mfg. Co.
24. S. Breakstone.
25. K-W Ignition Co.
26. Gates-Osborne Mfg. Co.
27. Frank E. Sparks.
28. Standard Varnish Works.
29. Shawmut Tire Co.
30. Keystone Lubricating Co.
31. John W. Blackledge Mfg. Co.
32. Polson Mfg. Co.
33. Union Auto Repair Co.
34. Cycle & Auto Trade Journal.
35. Motor Age.
36. Morrison-Ricker Mfg. Co.
37. Troy Carriage Sunshade Co.
38. Model Gas Engine Works.
39. Longdin-Brugger Co.
40. The Automobile.

Commercial Vehicle Section

Feb. 6th to 11th, 1911

MOTOR VEHICLES, COLISEUM (Main Floor)

A1. Mack Bros. Motor Car Co.
A2. Mais Motor Truck Co.
A3. U. S. Motor Truck Co.
A4. Hart-Kraft Motor Co.
A5. White Company.
A6. Studebaker Bros. Mfg. Co.
B1. Alden Sampson Mfg. Co.
B2. Courier Car Co.
B3. W. H. McIntyre Co.
B4. Waverley Company.
B5. Reo Motor Car Co.
B6. Willys-Overland Co.
B7. Cartercar Co.
B8. Grabowsky Power Wagon Co.
B9. Garford Company.
C1. Packard Motor Car Co.
C2. Pope Mfg. Co.
C3. Avery Company.
C4. Reliance Motor Truck Co.
C5. Rapid Motor Vehicle Co.
D1. Peerless Motor Car Co.
D2. American Locomotive Co.
D3. Pierce-Arrow Motor Car Co.
D4. Metzger Motor Car Co.
D5. H. H. Franklin Mfg. Co.
D6. Knox Automobile Co.
D7. Kissel Motor Car Co.
E2. Kelly Motor Truck Co.
E3. Independent Harvester Co.
E4. Adams Bros. Co.
F2. Thomas B. Jeffery Co.
F2. General Vehicle Co.
F3. Chase Motor Truck Co.
F4. Saurer Motor Trucks.
G1. Atlas Motor Car Co.
G2. Mercury Mfg. Co.
G3. Dayton Auto Truck Co.
J1. Chicago Comercial Car Co.
K1. Lansden Co.
L1. Federal Motor Truck Co.
M1. Automobile Maintenance Co.
M2. F. B. Stearns Co.
M3. Economy Motor Car Co.
M4. Anderson Carriage Co.
N1. Marquette Motor Vehicle Co.
N2. Monitor Automobile Works.
N3. Clark Delivery Car Co..
N4. Schmidt Bros. Co.
R1. Brodesser Motor Truck Co.
R2. Sternberg Mfg. Co.
S1. Harder's Fire Proof Storage & Van Co.

ACCESSORIES, COLISEUM GALLERY

1. Michelin Tire Co.
2. Lovell-McConnell Mfg. Co.
3. Vesta Accumlator Co.
4. Standard Roller Bearing Co.
5a. Hayes Mfg. Co.
5. Cook's Standard Tool Co.
5b. Imperial Brass Mfg. Co.
6. C. T. Ham Mfg. Co.
7. Jones Speedometer Co.
8. N. Y. & N. J. Lubricant Co.
C. A. Mezger.
9. Weed Chain Tire Grip Co.
10. Continental Caoutchouc Co.
11. Valentine & Co.
12. Wheeler & Schebler.
13. Conn. Telephone & Electric Co.
14. Swinehart Tire & Rubber Co.

15. A. O. Smith Co.
16. Consolidated Rubber Tire Co.
17. Heinze Electric Co.
18. Pennsylvania Rubber Co.
19. Warner Instrument Co.
20. Republic Rubber Co.
21. Republic Rubber Co.
22. McCord Mfg. Co.
23. Whitney Mfg. Co.
24. Briscoe Mfg. Co.
25. Joseph Dixon Crucible Co.
26. Morgan & Wright.
27. Morgan & Wright.
28. Standard Welding Co.
29. American Ball Bearing Co.
30. Hartford Rubber Works Co.
31. Hartford Rubber Works Co.
32. Timken-Detroit Axle Co.
33. Timken Roller Bearing Co.
34. R. E. Dietz Co.
35. Diamond Chain & Mfg. Co.
36. Gray-Hawley Mfg. Co.
37. Wm. Cramp & Sons Ship & Engine Building Co.
38. Fisk Rubber Co.
39. Fisk Rubber Co.
40. National Tube Co.
41. Badger Brass Mfg. Co.
42. Veeder Mfg. Co.
43. Gray & Davis.
44. G & J Tire Co.
45. G & J Tire Co.
46. National Carbon Co.
47. B. F. Goodrich Co.
48. B. F. Goodrich Co.
49. C. F. Splitdorf.
50. Gabriel Horn Mfg. Co.
51. Goodyear Tire & Rubber Co.
52. Goodyear Tire & Rubber Co.
53. Long Mfg. Co.
54. J. H. Williams & Co.
55. Diamond Rubber Co.
56. Diamond Rubber Co.
57. Warner Gear Co.
58. A. W. Harris Oil Co.
59. Hartford Suspension Co.
60. Hartford Suspension Co.
61. Baldwin Chain & Mfg. Co.
62. Spicer Mfg. Co.
63. Brown-Lipe Gear Co.
64. Pittsfield Spark Coil Co.
65. Continental Motor Mfg. Co.
66. Remy Electric Co.
67. Firestone Tire & Rubber Co.
68. Firestone Tire & Rubber Co.
69. Electric Storage Battery Co.
70. Oliver Mfg. Co.
71. S. F. Bowser & Co.
72. S. F. Bowser & Co.
73. Edmunds & Jones Mfg. Co.
74. Kokomo Electric Co.
75. Byrne, Kingston & Co.
76a. U. S. Light & Heating Co.

ACCESSORIES, COLISEUM ANNEX (Second Floor)

77. Motz Clincher Tire & Rubber Co.
78. Warner Mfg. Co.
79. The Buda Company.
80. Garage Equipment Mfg. Co.
81. Auto Parts Mfg. Co.
82. Royal Equipment Co.
83. Royal Equipment Co.
84. Muncie Gear Works.
85. Gemmer Mfg. Co.
86. Excelsior Motor & Mfg. Co.
87. Stromberg Motor Devices Co.
88. Stromberg Motor Devices Co.
89. Havoline Oil Co.
90. Cook's Standard Tool Co.
91. Thermoid Rubber Co.
92. Thermoid Rubber Co.
93. Power Wagon.
94. Horseless Age.
95. Auto Improvement Co.
96. American Ever Ready Co.
97. Homo Co. of America.
98. Ross Gear & Tool Co.
99. Whiteley Steel Co.
100. Turner Brass Works.
101. Edison Storage Battery Co.
102. Driggs-Seabury Ordnance Corp.
103. National Coil Co.
104. Link-Belt Co.
105. Stewart & Clark Mfg. Co.
106. Cleveland Speed Indicator Co.
107. Empire Tire Co.
108. Empire Tire Co.
109. Western Motor Co.
110. Eisemann Magneto Co.
111. Eisemann Magneto Co.
112. Sparks Withington Co.
113. Stein Double Cushion Tire Co.
114. Stevens Mfg. Co.
115. Continental Rubber Works Co.
116. Briggs Mfg. Co.
117. Cycle & Auto Trade Journal.
118. Bosch Magneto Co.
119. Bosch Magneto Co.
120. E. B. Van Wagner Mfg. Co.
121. Morrison-Ricker Mfg. Co.
122. Universal Tire Protector Co.
123. Findeisen & Kropf Mfg. Co.
124. Perfection Spring Co.
125. International Metal Polish Co.
126. International Metal Polish Co.
127. Simms Magneto Co.
128. Frank E. Sparks.
129. H. H. Franklin Mfg. Co.
130. Automatic Motor & Engineering Co.
131. Model Gas Engine Works.
132. Model Gas Engine Works.
133. Briggs & Stratton Co.
134. C. Cowles & Co.
135. Motor Vehicle Publishing Co.
136. Nathan Novelty Mfg. Co.
137. Booth Demountable Rim Co.
138. Eagle Company.
139. Universal Rim Co.
140. Carter Carburetor Co.
141. London Auto Supply Co.
142. Atlas Chain Co.
143. Adams & Westlake Co.
144. Willard Storage Battery Co.
145. Lutz-Lockwood Mfg. Co.
146. Sheldon Axle Co.
147. Sheldon Axle Co.

Motorcycle Section

COLISEUM ANNEX

O1. Harley-Davidson Motor Co.
O2. Excelsior Motor & Mfg. Co.
O3. Aurora Automatic Machinery Co.
O4. Pope Mfg. Co.
O5. Hendee Mfg. Co.
O6. Emblem Mfg. Co.
O7. Motorcycling.
O8. Pontiac Motorcycle Co.
O9. Detroit Motorcycle Mfg. Co.
O10. Motorcylce Publishing Co.
O11. N. S. U. Motor Co.
O12. Eclipse Machine Co.
P1. Reading Standard Co.
P2. American Motor Co.
P3. Wagner Motor Cycle Co.
P4. Bicycling World & Motorcycle Review.
P5. Merkel-Light Motor Co.
R2. Reliance Motorcycle Co.
R3. Edwards-Crist Mfg. Co.
R4. Miami Cycle & Mfg. Co.
R5. New Era Auto-Cycle Co.
R6. Minneapolis Motorcycle Co.
R7. Pierce Cycle Co.

All Space Taken at Cincinnati

CINCINNATI, O., Dec. 28—The directors of the Cincinnati Automobile Dealers' Association announced to-day that the exhibition space arranged for in Music Hall by the association for the annual automobile show to be held from February 20 to 25 has been more than subscribed.

The figures compiled by the executive committee to-day indicate that there is 30 per cent. more floor area desired than is available.

This is an extraordinary condition, as the space reserved for the show this season is greater than that of any previous exposition of this kind in Cincinnati. In order to accommodate all the applicants, an adjustment of the spaces reserved will have to be made. For that purpose a meeting of the executive committee and the exhibitors will be held Saturday afternoon at 2 o'clock at the headquarters of the association. The hearty cooperation of the automobile club and all local automobile interests is responsible for the happy results.

Dates for Baltimore Exhibition

BALTIMORE, MD., Dec. 26—The Baltimore Automobile Show from February 21 to 25, inclusive, at the Fifth Regiment Armory, will be conducted jointly by the dealers and the Automobile Club of Maryland. This decision was reached at a meeting of the committees representing the dealers and the club and at which the sub-committees to handle the show were named.

The sub-committees selected are composed of two members each, one from the dealers' organization and one from the club.

The sub-committees are as follows: Lighting—Joseph M. Zamoiski and H. J. Sturdevant. Decorations—Joel Nassauer and W. L. Duck. Tickets and advertisements—Thomas Young and C. L. Callahan. Rental and floor space—H. M. Luzius and A. Stanley Zell. The club committee at the meeting was composed of Joel G. Nassauer, Thomas G. Young, Joseph M. Zamoiski and H. M. Luzius. The dealers' committee consisted of A. Stanley Zell, C. L. Callahan, Leo A. Shaab and William Duck.

A big feature of this year's show will be the commercial display, while the accessories and airships will be well represented. On the Friday or Saturday night before the show a big banquet will be held for the dealers and club members.

British Columbia to See Show

VANCOUVER, B. C., Dec. 26—Vancouver, B. C., is to come to the front with an automobile show, to be held in the big horse show building for eight days, from Friday, January 27, to Saturday, February 4. This will be the first automobile show ever held in British Columbia, and is to be a comprehensive display of pleasure cars, commercial cars, accessories and motor boats.

The Vancouver Motor Trade Association, Ltd., which has charge of the show, realizes the value of the show from the standpoint of the general public as well as the dealers.

During 1910 the sale of automobiles in Vancouver and British Columbia increased 120 per cent. over the previous year. The dullness noticeable in commerce in some portions of the United States has had no effect on trade across the line, and conservative business men there are preparing for a big year to come.

Space Is Going at Pittsburgh

PITTSBURGH, PA., Dec. 26—Floor plans for the annual show were first given out on December 9 and thus far 38 makes of pleasure cars and 14 makes of trucks and delivery wagons have signed and selected space. Inquiry from manufacturers not now represented in this district indicate that there will not be enough space to go around.

Pittsburgh's three automobile factories—The Pittsburgh Motor Car Co.; the Penn Motor Car Co., and the Packers' Truck Co.—will show their products for the first time at this show.

Inquiries for accessory space have been received from all automobile centers.

Will Meet at Milwaukee Show

MILWAUKEE, Dec. 26—A number of important meetings will be held in Milwaukee, Wis., during the third annual motor show in the Auditorium, January 14 to 20. The Wisconsin State Automobile Association will hold its semi-annual or winter meeting and the Wisconsin Retail Automobile Dealers' Association will hold its first annual meeting.

Private Exhibitions Show Season Feature

SEVERAL of the makers of automobiles represented in New York whose cars will not be shown at either of the big displays in the Garden, Palace or the Hotel Astor, will conduct exhibitions in their salesrooms during the show period.

Among these are the Rambler, Ford, Carhartt, Black Crow, S. G. V. and Fiat. The Rambler line, consisting of a landaulet, towncar, coupé, touring car and chassis, will be shown at the rooms of the Rambler Automobile Company, of New York, 38 West Sixty-second street. The exhibition will open January 7 and continue to January 21.

The Ford Motor Company, 1723 Broadway, will show runabouts, touring cars, coupé and a stripped chassis, the exhibition covering the two weeks of the Garden affair.

The Carhartt Auto Sales Company has engaged an extra room at the Plaza Hotel for exhibition purposes during the metropolitan show season. In addition to the five-passenger, fore-door model now on display, there will be shown a chassis and a limousine.

Otto F. Rost, the Eastern representative of the Crow Motor Car Company, has issued elaborate invitations to the trade to attend the exhibition of Black Crow cars at his salesrooms, 1595 Broadway, throughout the Garden show. He will display a racy roadster and a Dreadnought.

The "S. G. V." cars, although licensed under the Selden patent, will not be shown at the Garden.

Instead they will have a private exhibit in the reception room of the Waldorf, at the Thirty-third street entrance, for ten days, from January 5 to January 14, inclusive, thus exhibiting for three days of the Importers' Salon and the entire week of the Garden show.

The Fiat Automobile Company will conduct a show from January 2 to 21 at its salesrooms, near Columbus Circle. A full line of 35-horsepower cars built at the Poughkeepsie works of the company will be displayed, in addition to several of the Turin models. The line will include a chassis, seven passenger touring car, runabout that can be converted into a four passenger car, several types of fore door cars and others.

Students to Visit Brooklyn Show

For the first time in this country, at least, a class of students in motoring will be seen in session at an automobile show during the exhibit of the Brooklyn Dealers' Association, at the Twenty-third Regiment Armory, in February.

The Bedford Branch, Y. M. C. A., was the first to take space outside of the dealers, with the idea of showing sectional parts of engines, etc., books and charts. Supervisor C. F. Shulz decided to take one section of each class to the armory, four nights a week, shifting the division regularly. It is possible, too, that the afternoon classes may be similarly transferred.

Auto Associations to Meet at Show

During the coming A. L. A. M. show there are seven important meetings of organizations scheduled to take place. These run all the way from the conventions of important committees to annual meetings of big societies and a series of great banquets.

On January 10 the executive committee and the national board of A. A. A. will assemble for a series of open meetings that will continue until the close of the show.

January 11 will find the Executive Committee of the A. L. A. M. in session at headquarters, 7 East Forty-second street. The same day the Executive Committee of the National Association of Automobile Manufacturers will convene and the organization of the National Show will be reviewed.

In the morning of January 11 the Society of Automobile Engineers will meet at the Automobile Club of America and will hold sessions during the day; banquet in the evening, and continue the work of the convention on the following day.

January 12 the Board of Managers of the A. L. A. M. will meet. During the evening the annual banquet of the association will be given at the Hotel Astor.

On January 13 the Motor and Accessory Manufacturers will enjoy a sumptuous banquet at the Waldorf-Astoria, after business meetings at headquarters, 17 West Forty-second street.

Altogether the week will have a distinct social tinge.

Fine Roads for British Columbia

VANCOUVER, B. C., Dec. 26—The present government of British Columbia, headed by Hon. Richard McBride, is making a record in road building which, taking into consideration the population of the province, is excellent.

With an estimated population of a little over 300,000, the British Columbia government will expend something like $4,500,000 this year in the building of roads. All this money is drawn from the treasury and is not specially levied for any one period.

The argument is that even with the other vast natural resources of the province, agriculture must in the final event be the mainstay of its prosperity, and agriculture first of all must have good roads.

Among the many roads now under construction under the supervision of Thomas Taylor, Minister of Public Works, is the road from Alberni district through to Ucluelet and Clayoquet on the west coast. This road will be a marvel of wonderful scenery and at the same time will open up large tracts that will become excellent agricultural country. This road will cross rivers and extend along the lakes of the central and western portion of Vancouver Island and from a point of picturesque attractiveness will afford a never-ending variety of scenery to the lover of outdoors.

New Traffic Law at Spokane

SPOKANE, Dec. 26—Spokane at last has a traffic law, and motorists who have been talking "rules of the road" and comparing Spokane unfavorably with other cities for the past few months are awaiting the practical application in this city of the rules which regulate the conduct of horses and horseless vehicles on the public highways.

Fifteen miles per hour has been fixed as the rate of speed within the fire limits, and 20 miles without.

Portland Club Defies A. A. A.

PORTLAND, ORE., Dec. 26—The Portland Automobile Club will hold a race next summer during the annual Rose Festival, and it will be without the sanction of the A. A. A.

After a year of rest the Portland club has taken some definite steps on the announcement of a policy for the coming year and from all indications it will be a busy one.

Streator Co. Puts in Sprinklers

STREATOR, Ill., Dec. 26—The Streator Motor Car Company has just completed the installation of a sprinkling system in its plant. This system will sprinkle and make fire-proof five and one-half acres of buildings.

The buildings are all fire-proof in construction, but this additional protection has been taken on account of the stock.

Jersey Inter Club Row Has After-Clap

NEWARK, N. J., Dec. 27—Summoned to a special meeting Wednesday night, the members of the New Jersey Automobile and Motor Club will act upon a resolution to be offered on behalf of the sympathizers with the Associated Automobile Clubs of New Jersey to overthrow the recent action of the club in splitting away from the state body and the A. A. A. A big attendance has been indicated and all around the meeting holds out much promise of lively doings.

The big Newark club cut away from the A. A. A. through the action of its trustees who objected to what was described as taxation without representation and from the state organization because, while it is claimed that 60 per cent. of the membership in the state body was furnished by the Newark club, the plan of the club for prospective legislation was not received kindly by the state body.

The crux of the whole matter seems to be the failure of a law to pass the Jersey legislature at the last session, which was rejected by the associated clubs, it is said, because a rider was attached to the bill, providing for the free admission of outsiders to Jersey for thirty-two days each year, conditioned upon the registration of such visitors and the granting by them of a power of attorney to the Secretary of State, giving him the power to accept service of legal processes in the event of violation of the laws.

The administration of the Newark club points out that this law should not have been declined, because it was a step in the right direction and a concession to motordom even in New Jersey.

It is claimed that in the event of the passage of the law, New Jersey motorists would not now be obliged to take out New York and Pennsylvania state licenses and thus would have been saved much annoyance and expense.

On the other hand, the representatives of the Associated Clubs declare that there is a deep, dark political plot underlying the whole situation.

They state that no self-respecting citizen of Jersey would countenance such a law as was presented, where the visitors would be obliged to surrender some of their legal rights and privileges in order to tour in the state.

The administration of the club goes into the meeting to-morrow night with much confidence that the action of the trustees will be sustained and that the severance from the state body and A. A. A. will be approved. The opposition is hopeful of rejecting the resolutions and a stiff battle is impending.

No matter which way it turns out there is likely to be a new club in Newark. If the administration of President Clarence H. Bissell is sustained there certainly will be made a determined effort to organize a new club, and if it is defeated there is already talk of reorganization.

Gould to Finance Richmond Road

WASHINGTON, D. C., Dec. 24—Washington motorists are greatly interested in the news that Frank J. Gould, the New York millionaire, has donated $100,000 for the construction of a highway between this city and Richmond, Va. The only proviso he makes is that the route is to be so arranged as to include Fredericksburg, Va. According to the announcement, Mr. Gould leaves the matter of selecting the route of the proposed highway to the motorists of Washington and Richmond.

President W. S. Duvall, of the Automobile Club of Washington, stated that as soon as the club receives official notification of the Gould gift, it will immediately appoint a survey committee to select the route and after the work is completed will lay it before the financier. In addition, the club, acting with the Automobile Club of Richmond, will form a finance committee to raise a portion of the total sum needed to build the highway.

"The idea of building a public highway between Washington and Richmond," said President Duvall, "will meet with the approval of all Washingtonians interested in good roads, as well as the great mass of motorists in the eastern part of the country. The club is prepared to join hands with the business men of the city in an effort to raise funds needed to complete the work that Mr. Gould's donation will inaugurate. A road of this kind has been one of the ancient needs of both Washington and Richmond."

Framing New Nebraska Law

LINCOLN, NEB., Dec. 26—Addison Wait, the new secretary of state of Nebraska, has drawn up a number of important amendments to the present automobile law of this State. He will have this introduced into the legislature which meets in January.

His proposed law will change the annual license fee of $1 to one of $5 for automobiles and $2 for motorcycles, but these fees are to be in lieu of all other state taxes as levied by the state board of equalization and assessment. One-half is to be paid by the secretary of state to the state treasurer for the benefit of the state general fund, and the other half to be distributed on the first of each year to each county on an equal per capita basis, according to the national census for the year 1910, the latter fund to be used for the improvement of the public highways in said counties under, and by the supervision of, the authorities provided by statute.

Auto-Sleigh at Kalamazoo

KALAMAZOO, MICH., Dec. 26—Sleigh riding in automobiles is the latest fad in Kalamazoo. Thomas H. Midgely originated the idea in this city. Mr. Midgley had his Cartercar equipped with runners on the front wheels. The runners are slid along the snow by the power of the rear wheels.

The rear wheels serving as drive wheels carry anti-skid chains and the machine runs well. The car attracted much attention and stirred up considerable comment when first seen on the streets.

For Good North Carolina Roads

WADESBORO, N. C., Dec. 26—With U. B. Blalock as president, the Anson County Good Roads Association has been permanently organized, with the idea of promoting a number of good roads throughout the county.

A bond issue of $250,000 is proposed and, judging by the enthusiasm of the citizens, bids fair to be easily carried.

Hoxsey's New Altitude Record.

LOS ANGELES, Dec. 26—Arch Hoxsey, in a Wright aeroplane, made a new world's altitude record to-day, when he flew over two miles in the air. His barograph showed 11,474 feet, something over 1,000 feet higher than the mark set last week by Legagneux at Pau, France.

License Money for Roads

LANSING, MICH., Dec. 26—The various automobile clubs of the State are to join forces with good roads officials in an effort to have the Legislature pass a bill similar to the law which formerly was in effect, turning over to the State highway commissioner at least a portion of the money secured from automobile licenses. This money is to be used in promoting the Michigan Good Roads movement.

News of Maker and Dealer in Many Fields

DETROIT, MICH., Dec. 26—Announcement is made that C. A. Magee, of St. Louis, has been appointed auditor of the General Motors Co. and will assume his new duties the first of the year. He has been identified with the Laclede Gas Light Co., of St. Louis, for some years as comptroller. Mr. Magee will have his headquarters in Detroit, where the general offices of the company are to be located.

Directors of the Lozier Motor Co., at the recent annual meeting, elected the following officers: President, Henry A. Lozier; vice-presidents, Gilbert W. Lee and Fred C. Chandler; treasurer, Charles H. Hodges; assistant treasurers, Samuel Regar and Henry H. Sanger; secretary, Cyrus E. Lothrop. Members of the executive committee were all re-elected, as follows: George G. Booth, Charles H. Hodges, Lewis H. Jones, Gilbert W. Lee, Cyrus E. Lothrop, Charles B. Warren and Henry A. Lozier, ex-officio.

Harry Knott, who formerly was connected with the Frank Seaman advertising agency in New York, is the new advertising manager for the E-M-F Co., filling the vacancy caused by the resignation of E. LeRoy Pelletier last summer.

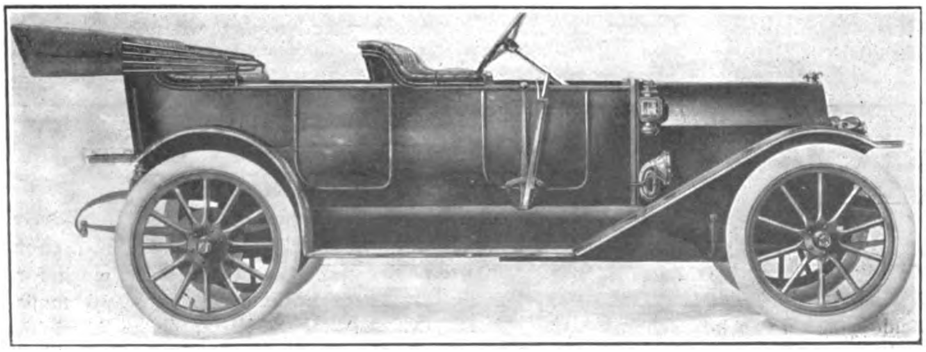
Vernon C. Fry, whose purchase of the assets of the bankrupt Detroit-Dearborn Motor Car Co. was noted, announces that he will continue the business with the present facilities, turning out the same kind of cars that were manufactured by the old company. A new corporation will be organized at once, which will be headed by Mr. Fry as president. A company is in process of formation for the manufacture of a puncture-proof inner tube, invented by E. A. Marsh. The tube, on the tread side, is constructed of coils, which permit much greater elasticity than is the case with the ordinary tube.

Work is being pushed on the extensive plant of the Universal Motor Truck Co., which is being erected at the Grand Trunk railroad and Theodore street. It is hoped to have it ready for occupancy by January 15. The site comprises three acres. The main building will be 84 by 258 feet, four stories high and of reinforced concrete construction. It is being built on the flat-slab system, without beams or girders. The company is capitalized at $350,000.

Sampson "35" Looks Smart

The Alden Sampson Manufacturing Company will exhibit the Sampson "35" at the Garden Show. This is the first touring car the Sampson Company has built. It is also the newest member of the United States Motor Company family of passenger cars. The price is $1,250.

A man of average size can rest his elbow on the back of the tonneau seat, which is the highest part of the new car. Foredoors are another feature. It is built on long straight lines. The body line and hood line are one.



Sampson "35"—latest of the United States Motor Company's family

Auto Parts Company Expands

DETROIT, MICH., Dec. 26—The Auto Parts Company has purchased entire plant of Widman & Company, furniture manufacturers, occupying an entire block on Grand Trunk railway, for $65,000 and has started moving in.

The purchase greatly increases the company's facilities, making a total floor space of 60,000 square feet instead of 20,000 square feet. The officers are: President, Alfred O. Dunk; secretary, Lewis A. Austin; treasurer, V. C. Anderson.

Southwestern Dealers to Organize

KANSAS CITY, Dec. 26—The Kansas City Automobile Dealers' Association is engaged in forming the Southwestern Automobile Dealers' Association.

About 6,000 letters have been sent out and a meeting has been arranged to take place in Kansas City during the fifth annual automobile show, the week of February 27. The exact date of the meeting has not as yet been decided upon, but will probably be about March 1.

Lawton Maxwell Agency Moves

LAWTON, Okla., Dec. 26—Thompson's Garage, Lawton, Okla., is removing to 618-620 D avenue this month, having bought out the McDuffie Motor Car Company, formerly located there. Thompson's has been in Lawton since 1902, and is the Maxwell agency for Southwest Oklahoma.

The new location is in a cement building, 50 by 140, with 50 by 40 basement, and is up-to-date in every line of garage service.

Father of Nickel-Chrome Steel Dead

Otto Thallner, inventor of nickel-chrome steel, and known all over the world as an authority on steel, died at his home in Reinscheid-Hasben, Germany, December 11, after a protracted illness.

Mr. Thallner was an ardent advocate of the electrical process of making steel, and for a number of years held the position of chief metallurgist of the Heil Works, Rich Lindenberg.

Briggs New Brush General Manager

DETROIT, Dec. 26—President Frank Briscoe, of the Brush Runabout Company, has appointed Claude S. Briggs to the position of General Manager of the Brush forces.

Mr. Briggs is, perhaps, best known to the automobile trade as the principal organizer and first president of the Krit Motor Car Company, a Detroit concern incorporated in 1909. In July, this year, Mr. Briggs joined the business staff of the Brush Runabout Company.

Brown-Lipe Divides Line

SYRACUSE, N. Y., Dec. 26—On January 1 the differential gear department of the Brown-Lipe Gear Company will be operated in the new factory of the Brown-Lipe-Chapin Company, but a short distance from the old factory.

The Brown-Lipe Gear Company owns a controlling interest in the Brown-Lipe-Chapin Company.

Revelations Regarding the Rubber Industry

WHILE no serious root disease has attacked the rubber trees in the Malaysia plantations, there are great armies of white ants to be contended with. These industrious little creatures manage to burrow in the soil of the estates with all the energy of their black kin of other countries. They have their officers who cut out their work for them and the "privates" delve away while their superiors look on, the slaves meanwhile scurrying about as though they were controlled by the inflexible rules of a labor union. The fondness that the white ants of the Malaysia territory show for the roots of rubber trees as a steady diet has the effect of devastating whole plantations at a time, and efforts are on foot to devise plans for the extinction of the white pests.

Inasmuch as the Philippines lie within the zone of the rubber belt, if we consider the location of the Malay States, the soil is especially adapted to the cultivation of plantation rubber. The five thousand Para rubber seeds recently ordered to be sent from Singapore are intended to start the industry on the right track. Wild rubber is being gathered in the Philippines at the present day. The method is to cut down the trees, instead of tapping them for the latex, as is being done in the Bartica section of British Guiana and in the Malay States. The proposed extension of the railway system throughout the islands by the United States government will, it is expected, have the effect of stimulating the plantation rubber industry to a paying commercial basis.

Experts claim that in time the oil produced from rubber seeds within the zone of the Malay States will become a marketable commodity and as such will develop into an important commercial factor. The Botanical Gardens in Singapore, which are regarded as being the birthplace of the plantation rubber industry of Malaysia, and which have furnished great quantities of rubber seeds to the plantations in other sections, seem to be incapable at the present time to supply the demand for Hevea seeds, and it will no doubt be spring before it is possible to fill the orders that are now on file.

While it is true that the natural resources of the Province of Mozambique, Portuguese East Africa, are but slightly developed, it is a fact that wild forest rubber has been exploited here commercially for upward of half a century. Within the last few months the possibilities of developing the trade in rubber so that it shall become a greater source of revenue have merged into bright probabilities. Various species of the root called landlophia have been found growing in profusion in Lourence Marquez, which is in the extreme south of the Province; also as far north as Ibo, the very extreme northern end of Portuguese East Africa. The plan is being exploited extensively from Inhambane, Biera, Quelinane, Moma, Angoche and Ibo, respectively, the plants in the case of the last three named places being handled through the town and island of Mozambique. The landlophia grows south of Zambezi. As a vine it frequently attains to great length, and many specimens are found as thick as a man's arm. There is also the vine distinguished as landlophia kirkii, which is capable of producing rubber after it has grown to be one inch in diameter. The method of tapping is by a series of long blazes.

What is said to be the largest rubber plantation in the world, containing twenty-nine square miles, is located in the Department of Soconusco, Mexico. It is situated at an elevation of from fifty to three hundred and fifty feet. It consists of seven million trees. The first plantings were made in the shade, as the planters of that day deemed it necessary to protect the young plants from the excessive heat. But it has since been decided that shade is not a necessary factor in the rubber plantation industry. Several trees that were planted by the original owners now form "a beautiful forest, with an absolutely clear 'floor,' and there are numberless seedlings" within the space. The plantation is divided into areas, or blocks, of about 1,148 feet on each side, the individual areas containing approximately thirty and one-half acres. Each acre is intended to hold 300 trees. Avenues twenty-four feet wide run between the respective areas. Small hills are thrown up six feet apart as soon as possible after the work of clearing and burning off the waste and undergrowth is finished. Lines are run every twelve feet, thereby producing plats of ground each six feet by twelve. The tappers go out at 2 o'clock in the morning and by sunrise they complete their task, the early hour being chosen because the cool morning temperature aids the flow of the latex. An expert tapper will get on an average of five gallons of sap, representing five pounds of rubber.

Down in British Guiana, where the Colonial government is interested in the cultivation of plantation Para rubber, 250 acres of the hills out of the 15,000 acres have been planted with sisal and 200 more acres will soon be planted. Along the division lines 3,200 Para rubber trees have been planted and clearings are being made as fast as possible to plant the remaining part of the territory with rubber trees.

The first tapping of plantation rubber trees in British North Borneo, the whilom camping-ground of the vicious "head-hunters," took place on June 11, 1910. The operation was absolutely successful, and the latez flowed freely. The occasion marked a new epoch in the development of the interior of this Rajah-ruled country. Appropriate celebrations were observed. One factory has been built and plantation rubber is already being exported as a commercial commodity.

In certain parts of the Isthmus of Tehuantepec, Mexico, the ground is prepared for planting after a system of staking off the plats in the areas, instead of throwing up the soil into small hills.

Many coffee plantations in Dutch East India have changed hands and have been laid out into rubber plantations since the industry was introduced there. The capital involved is mainly foreign. The sum of $33,000,000 has been invested. People criticise the enterprise pro and con. By some it is considered gratifying that the new industry is proceeding on a large scale. They claim that its effect upon the general prosperity of the Dutch Colonies will result favorably. Other people do not look upon the enterprise in such a charitable light.

It is estimated that by 1915 the facilities of the Malay States will be sufficient to warrant the production of 90,000,000 pounds of plantation Para rubber yearly.

Dr. Carlos Spegazzini, government botanist, is authority for the statement that guayule rubber of the sort found in Mexico does not exist in Argentina. He says that the rubber found in the latter country is a growth of guayule arbustivo, known as yarillas. The product being poor in rubber and rich in resin, it is only fit for use in the manufacture of varnishes.

Fine Para rubber is the standard in the manufacture of automobile tires. No other rubber will withstand the strain and the wear and tear.

Plan Country-Wide Race Circuit

SPOKANE, WASH., Dec. 26—Promoters and supporters of the international automobile race meeting, for purses aggregating $40,000, in Spokane next summer, are enthusiastic boosters for the grand circuit of speedways and they will urge the projectors to include Spokane in the circuit, pledging financial and other support to the plan.

Waldo G. Paine and R. W. French, who is one of the promoters of the international meet in Spokane, both declare that the people of this city and the rich district tribuary to it will give every possible assistance to the plan.

News in Brief from the East, West and South

BROOKLYN, Dec. 26—Open house will be kept by the Long Island Automobile Club on New Year's eve.

NEW YORK, Dec. 26—Fred Manning, formerly with the Warner Instrument Company, has joined the sales department of the National Motor Vehicle Company.

SAN FRANCISCO, Dec. 26—The Frank O. Renstrom Company is now located at Van Ness & Golden Gate avenues. The company acts as agent for the Kline-Kar.

NEWARK, N. J., Dec. 26—The Rt. Rev. John J. O'Connor, bishop of New Jersey diocese, was presented with a Lozier limousine by the members of his diocese. The car was a Christmas gift.

CHICAGO, Dec. 26—The Badger Motor Car Company, of Columbus, Wis., has secured quarters at 1223 Michigan avenue for a general sales agency and F. W. Stewart, sales manager, will be in charge.

NEW YORK, Dec. 26—Harry S. Houpt has announced that he will assume charge of the Alco sales department in the metropolitan district. Mr. Houpt will be assisted by A. D. Frost and Fred S. Titus.

BOSTON, Dec. 26—Smalley Daniels, handling several accessories at 23 Motor Mart, has returned from an extended trip to the Pacific Coast. He reports excellent business and good prospects for next year.

DETROIT, Dec. 26—Thomas J. Wetzel, of the Thos. J. Wetzel Company, 17 West 42d street, New York City, will sell the output of the C. M. Hall Lamp Co. for 1911. Mr. Wetzel is vice-president of the company.

MIDDLETOWN, CONN., Dec. 26—The Fisk Garage, 140 Washington street, has been opened. Charles R. Fisk is manager. The Locomobile and Marion cars will be handled. Robert L. Beach is in charge of the sales department.

MILWAUKEE, Dec. 26—The biennial report of the secretary of state of Wisconsin, issued early this week by Secretary James A. Frear, shows that up to December 1, 13,753 motor car licenses had been issued during the past year.

ST. LOUIS, Dec. 26—Milton B. Strauss, formerly sales manager of the Parry Automobile Company, Indianapolis, Ind., has accepted a similar position with the Moon Motor Car Company, of St. Louis, Mo., and has already entered upon his duties.

BALTIMORE, MD., Dec. 26—The application of Charles J. F. Steiner to build an automobile factory at Monument and Eleventh streets has been granted. The plans call for a brick and concrete structure with a slag roof. It will front 80 feet on Monument street and have a depth of 160 feet.

TACOMA, Dec. 26—The Thurston County Good Roads Association held its annual meeting the past week at the State Capital, Olympia, and re-elected C. B. Mann as president for another year. The association will entertain the Pacific Highway Association in that city on Jan. 18, 1911.

OMAHA, Dec. 26—The Ford Motor Company's new branch building at Twentieth and Harney streets has just been completed and the Omaha representatives have moved in their stock. The building cost the Ford company $40,000. It is of brick, concrete and tile construction throughout, two stories and basement, and 60 by 132 feet.

LOGANSPORT, IND., Dec. 26—The Western Motor Co., manufacturers of the Rutenber Motors, will have its general offices and sales department transferred from Logansport, Ind., to Marion, Ind., where a new, modern, fire-proof factory and office building has been erected, fully equipped to handle the building of all of the Rutenber models. The 1911 output will be, approximately, 10,000 motors. New models of 4 and 6-cylinder motors for heavy duty work are being built and will be brought out in the early part of next year.

NEW YORK, Dec. 26—J. B. Hulett, known to the automobile trade through his connection with the Owen Company, of Detroit, and formerly with the Pope-Toledo works, has joined the Lozier forces, and is making a western trip in the interests of Lozier cars. C. L. Simmons, formerly western traveler, is now covering the southern states.

BALTIMORE, MD., Dec. 26—The purchase of the Baltimore and Frederick turnpike by the state roads commission has been consummated and all the tollgates on this pike from Baltimore to Boonsboro have, therefore, been closed. The tollgates from Boonsboro to Hagerstown have been closed for a month past, pending repairs to the road.

DALLAS, TEX., Dec. 26—An automobile highway across Texas from Texarkana to El Paso along the lines of the national highway from New York to Atlanta is proposed by the automobile clubs of Dallas and Fort Worth. Such a highway was proposed after this year's Glidden Tour, but interest was allowed to lag until recently the project was taken up by Dallas and Fort Worth newspapers.

RACINE, WIS., Dec. 26—The addition to the boiler shops of the J. I. Case Threshing Machine Co. is just being completed. This is a building 60 feet by 215 feet, which will be used exclusively for a stock room for the Case boiler shops. A boiler storage has been completed 230 feet by 60 feet. This is equipped with a traveling train for movement of boilers from one part of the building to another.

PORTLAND, Dec. 26—A resolution has been adopted by the Good Roads Association of Oregon to tax automobiles 25 cents per horsepower on all automobiles in the State of Oregon up to 50 horsepower and 50 cents per horsepower for all machines over 50 horsepower, the proceeds to be collected by each county and to revert to the county in which collected and to be used in the maintenance and oiling of permanent roads.

SEATTLE, Dec. 26—To provide room for their large stock of Chalmers, Overland and Thomas cars, the Pacific Car Company, of Tacoma, has entirely remodeled the third floor of its garage. The office space has been greatly enlarged and a separate office has been given to the taxicab department. Frank Veazie has assumed charge of the taxicab department, while George A. Stewart has been made sales manager.

KOKOMO, IND., Dec. 26—Byrne Kingston & Company and the Kokomo Electric Company, Kokomo, Ind., have opened a branch at 475 Woodward avenue, Detroit, with Forrest J. Alvin manager. They are represented in New York by W. E. Kemp, with headquarters at 1650 Broadway, and in Boston by Smalley Daniels in the Motor Mart. Arrangements are also being made to open a branch in San Francisco and which will be announced at an early date.

MILWAUKEE, Dec. 26—The inventory of the estate of Thomas B. Jeffery, of Kenosha, Wis., late president and founder of the big Rambler works, shows an estate valued at $3,731,306.77, the largest ever probated in Kenosha county. The largest single item in the inventory is the interest of Mr. Jeffery in the Rambler works, amounting to $2,007,346. The remainder consists of personal property and real estate in Kenosha and other counties and interests in a number of the largest industries of America.

OMAHA, NEB., Dec. 26—Articles of incorporation have been filed with the secretary of state in the sum of $50,000 for the establishment of a new automobile firm known as the National Supply Company. The firm has leased for a term of years spacious office quarters and salesroom at 1115 Farnum street. It will put in a line of National cars and one or two cheaper lines. The company has elected H. E. Wilcox as president, W. H. Baugh, of Hastings, Neb., as secretary and treasurer, while A. M. Baugh, of Fremont, Neb., will manage the sales department.

New Sleeve Type of Motor

ROBERT MILLER, OF NEW YORK CITY, HAS HAD ISSUED TO HIM LETTERS PATENT OF THE UNITED STATES RELATING TO 4-CYCLE INTERNAL COMBUSTION MOTORS OF THE SLEEVE TYPE (SERIAL NUMBER, 546,714)

JUST now, when there is so much interest taken in the sleeve type of internal combustion motor for automobile work, it is more than likely that new patents, bearing upon this subject, will be of unusual interest, and for this reason it is the purpose here to present the Miller invention, which was issued December 20, in full.

Robert Miller has invented a 4-cycle internal combustion motor, of which the following is a specification.

Similar letters refer to similar parts throughout the drawings.

Figure 1 is a sectional elevation of the motor taken in a plane at right angles to the axis of the crank shaft; Fig. 2 is a sectional elevation of the engine taken in the plane of the axis of the crank shaft; Fig. 3 is a horizontal section of the device taken on the plane X X (Fig. 1), with the ports Q on the same level as the ports O; Fig. 4 is a horizontal section of the device taken on the plane Y Y (Fig. 2), with the ports R on the same level taken on the plane N (Fig. 1), with the ports N‴ on the same as the ports P; Fig. 5 is a horizontal section of the device level as the port N′; Fig. 6 is a diagrammatic section in elevation of the device at the top of the compression stroke, at about the moment of firing; Fig. 7 is a diagrammatic section in elevation of the device at the bottom of the explosion stroke; Fig. 8 is a diagrammatic section in elevation of the device at the top of the exhaust stroke; Fig. 9 is a diagrammatic section in elevation of the device just before the bottom of the intake stroke.

For the sake of clearness and simplicity in Figs. 6, 7, 8 and 9, the ports are the only parts of said figures which are lettered.

A is the cylinder head; B is the cylinder; C is the water jacket space in the cylinder; D is a sliding sleeve traveling vertically inside of cylinder B; E is a flywheel; F is the main crank; G is the main connecting rod; H is the piston; J is the spark plug; K is the crank case; N′ is an auxiliary exhaust port in cylinder B, so located that its bottom is level with the top of piston H at lower dead center; N″ is the auxiliary exhaust connection; N‴ are auxiliary exhaust ports in sleeve D; O are the main exhaust ports in cylinder B; P are the intake ports in cylinder B; these ports have their bottom about level with the top of the auxiliary exhaust ports N′; P′ in the intake connection; Q are the main exhaust ports in sleeve D; R are the intake ports in sleeve D; S is the main crank shaft; *a* is a gear wheel; *b* is a pinion half the diameter of the wheel *a* and meshed into wheel *a*; pinion *b* is fixed with reference to main shaft S; *f* is a crank connecting wheel *a* to connecting rod *d*; *d* is a gear connecting rod joining crank *f* to sleeve D.

The operation of the device is as follows: Fig. 6 shows the engine at the top of the stroke, at full compression, and at the moment of firing. At this point, the ports are all closed. As soon as the charge explodes in cylinder B, piston H is thereby driven downward, and crank F is thereby rotated in the direction shown by the arrow in Fig. 6. Thereupon by reason of the relation between pinion *a* and gear wheel *b* and connecting rod *d*, sleeve D begins to descend, with the result that at the bottom of the explosion stroke sleeve D has descended so far that auxiliary exhaust ports N‴ and N′ register with each other, and the auxiliary exhaust takes place, as shown in Fig. 7. It will also be noted by reference to Fig. 7, that while the auxiliary exhaust ports N‴ and N′ are fully open, the main exhaust ports Q and O are just beginning to open. As the rotary motion of crank F continues, the piston H begins to rise until it reaches the top of the exhaust stroke, as shown in Fig. 8, at which time exhaust ports Q and O are fully open. It will be noted, by reference to Fig. 8, that sleeve D is now traveling upward, so that ports Q and O are closing. As the revolution of crank F continues on the downward intake stroke, the piston H descends and the sleeve D ascends, until they reach the relative positions shown in Fig. 9, at which time exhaust ports O and Q are closed, auxiliary exhaust ports N′ and N‴ are closed, and intake ports R and P are open. As piston H has been descending with exhaust ports O and Q closed, a partial vacuum has been created inside of cylinder B, and as soon as intake ports R and P open, the charges rush into cylinder B. As the rotary motion of crank F continues, the intake ports P R close, the main exhaust ports O and Q remain closed, and the charge is compressed up to the

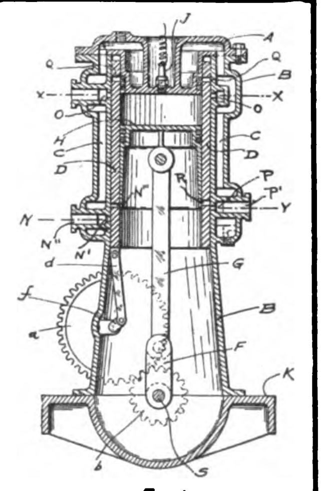


Fig. 1.

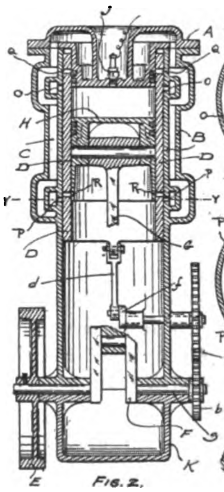


Fig. 2.

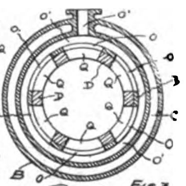


Fig. 3.

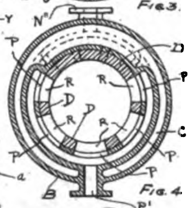


Fig. 4.

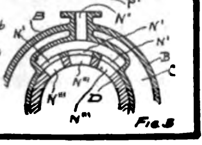


Fig. 5

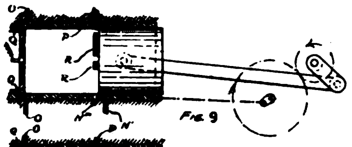


Fig. 9

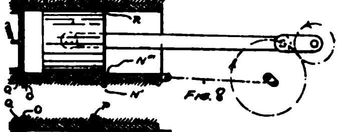


Fig. 8

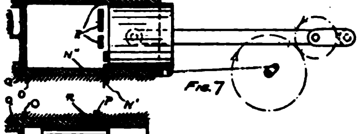


Fig. 7

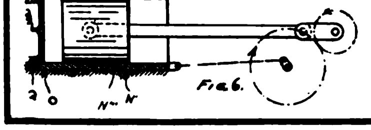


Fig. 6.

moment of firing, as shown in Fig. 6, thus completing the cycle of the engine's operation.

The construction allowing in a four-cycle engine a charge admission very much delayed from what is usually done is essentially new, and alters not only the structure but the results achieved as well. For example, the residual gases remaining in the clearance have a longer time to cool before the admission of the new charge. This cooling results in their shrinkage and allows a larger live charge to be drawn in. Also the residual gases being thus cooled are less apt to ignite the entering charge if said charge be lean. Also, by delaying the admission of the charge until a considerable vacuum is built up in the cylinder, the charge enters with a rush so that inertia effects can be utilized to ram a full charge into the cylinder. In this respect, the construction allowing an inlet port encompassing the cylinder, said inertia effect has little to oppose it, so that a full charge is assured.

Claims of the Patent

1. In four-cycle internal combustion engines, in combination, a piston; a main crank shaft; a connecting rod connecting said piston and said crank shaft; a cylinder having main exhaust ports in its upper portion, having auxiliary exhaust ports in its lower portion and having intake ports slightly above said auxiliary exhaust ports; a sleeve fitting closely within said cylinder and outside of said piston, and free to move to a limited extent up and down with relation to said cylinder, said sleeve having main exhaust ports in its upper portion (said ports registering in plan with said main exhaust ports in said cylinder), and having auxiliary exhaust ports in its lower portion (said ports registering in plan with said auxiliary exhaust ports in said cylinder), and having intake ports slightly above said auxiliary exhaust ports (said intake ports registering in plan with said intake ports in said cylinder); a gear wheel; a gear connecting rod connecting said gear wheel to said sleeve; a pinion of one-half the diameter of said gear wheel and meshed into said gear wheel, said pinion being fixed to and concentric with said main crank shaft; said crank shaft, pinion, gear wheel, gear connecting rod, sleeve, piston and connecting rod all co-operating whereby all of said ports are closed during the compression stroke and until almost the bottom of the explosion stroke, and whereby said auxiliary exhaust ports open at the bottom of the explosion stroke, and whereby said main exhaust ports remain open during the entire exhaust stroke, and whereby said main exhaust ports and said auxiliary ports remain closed during the intake stroke, and whereby said intake ports open near the bottom of said intake stroke.

2. In four-cycle internal combustion engines, in combination, a piston; a main crank shaft; a connecting rod connecting said piston and said crank shaft; a cylinder having main exhaust ports in its upper portion, having auxiliary exhaust ports in its lower portion, and having intake ports slightly above said auxiliary exhaust ports; a sleeve fitting closely within said cylinder and outside of said piston, and free to move to a limited extent up and down with relation to said cylinder, said sleeve having main exhaust ports in its upper portion (said ports registering in plan with said main exhaust ports in said cylinder), and having auxiliary exhaust ports in its lower portion (said ports registering in plan with said auxiliary exhaust ports in said cylinder), and having intake ports slightly above said auxiliary exhaust ports (said intake ports registering in plan with said intake ports in said cylinder); means for moving said sleeve to a limited degree up and down in said cylinder; said crank shaft, sleeve, moving means, piston and connecting rod all co-operating whereby all of said ports are closed during the compression stroke and until almost the bottom of the explosion stroke, and whereby said auxiliary exhaust ports open at the bottom of the explosion stroke, and whereby said main exhaust ports remain open during the entire exhaust stroke, and whereby said main exhaust ports and said auxiliary exhaust ports remain closed during the intake stroke, and whereby said intake ports open near the bottom of said intake stroke.

3. In four-cycle internal combustion engines, in combination, a piston; a main crank shaft; a connecting rod connecting said piston and said crank shaft; a cylinder having exhaust ports in its upper portion, and having intake ports in its lower portion; a sleeve fitting closely within said cylinder and outside of said piston, and free to move to a limited extent up and down with relation to said cylinder, said sleeve having exhaust ports in its upper portion (said ports registering in plan with said exhaust ports in said cylinder), and having intake ports in its lower portion (said intake ports registering in plan with said intake ports in said cylinder); a gear wheel; a gear connecting rod connecting said gear wheel to said sleeve; a pinion of one-half the diameter of said gear wheel, and meshed into said gear wheel, said pinion being fixed to and concentric with said main crank shaft; said crank shaft, pinion, gear wheel, gear connecting rod, sleeve, piston and connecting rod all co-operating whereby all of said ports are closed during the compression stroke and until almost the bottom of the explosion stroke, and whereby said exhaust ports remain closed during the intake stroke, and whereby said intake ports open near the bottom of said intake stroke.

4. In four-cycle internal combustion engines, in combination, a piston; a main crank shaft; a connecting rod connecting said piston and said crank shaft; a cylinder having exhaust ports in its upper portion, and having intake ports in its lower portion; a sleeve fitting closely within said cylinder and outside of said piston, and free to move to a limited extent up and down with relation to said cylinder, said sleeve having exhaust ports in its upper portion (said ports registering in plan with said exhaust ports in said cylinder), and having intake ports in its lower portion (said intake ports registering in plan with said intake ports in said cylinder); means for moving said sleeve to a limited degree up and down in said cylinder; said crank shaft, sleeve, moving means, piston and connecting rod all co-operating whereby all of said ports are closed during the compression stroke and until almost the bottom of the explosion stroke, and whereby said exhaust ports remain open during the entire exhaust stroke, and whereby said exhaust ports remain closed during the intake stroke, and whereby said intake ports open near the bottom of said intake stroke.

Superior Truck Makes Debut

Detroit, Dec. 26—The latest delivery car to appear on Detroit streets is the "Superior," built by the Superior Motor Car Co., which, nearly a year ago, secured the original Ford factory on Mack Ave.

The company, of which F. N. Cooper is president, C. W. Dreyer, secretary, Stephen A. Pratt, vice-president, is composed of business men of Detroit. The board of directors consists of the above named, together with George Moore, Albert Strelow, C. J. Netting, John D. Templeton and John L. Austin.

J. L. Austin is the managing director, while the engineering department is in charge of B. F. Wright.

For 1911 the company is building three models, consisting of a high-grade merchants' delivery car of large capacity, the normal rate being 1,200 lbs., a stakebody express-truck and an open combination delivery car, which is adapted for country use.

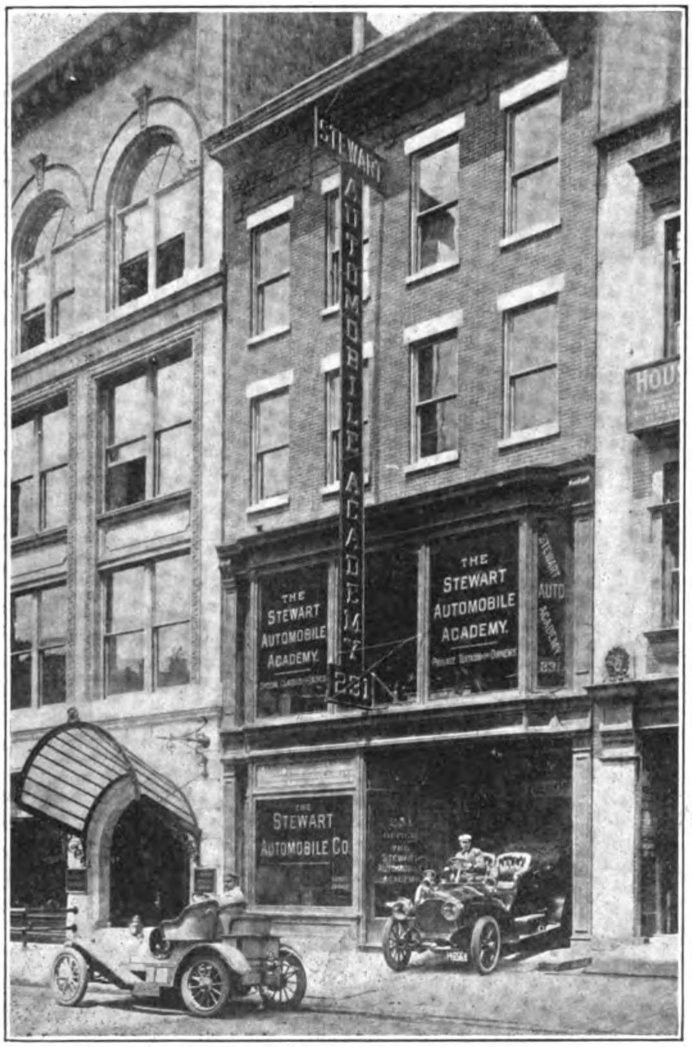
Open Branch Welding Plants

Springfield, Mass., Dec. 26—The Autogenous Welding Equipment Company recently opened plants for the repair of broken parts of all descriptions, making a specialty of automobile work, such as frozen cylinders, broken aluminum cases, at 62½ Church street, Hartford, Conn., and at Southampton street, junction with Massachusetts avenue, Boston, Mass.

Batzell Goes With Mossberg Co.

Attleboro, Mass., Dec. 26—A. Edwin Batzell, formerly with the United Manufacturers of New York City, is now sales representative with the Frank Mossberg Co., of Attleboro, Mass.

Prominent New York City Garages—Stewart

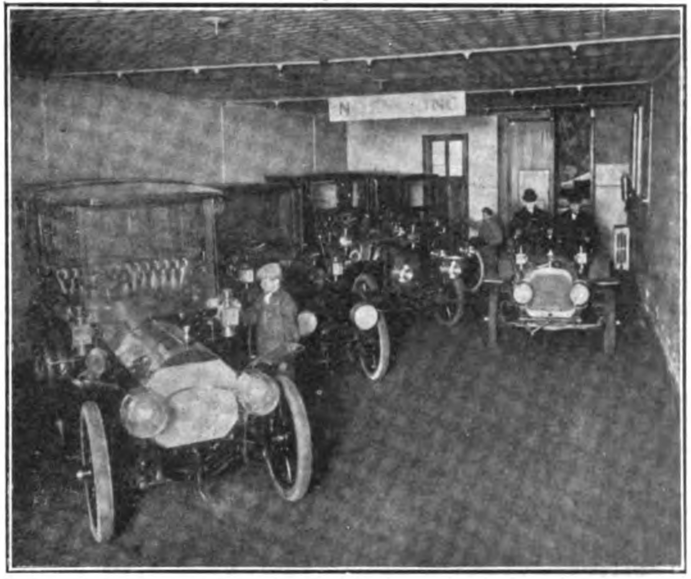


Exterior of Stewart Garage, New York City

IN connection with an automobile school, the garage of the Stewart Automobile Company, 231 West Fifty-fourth street, New York City, presents two sides, the useful one, in that the students of the school may have reference to the cars there housed,. and the more practical one, conducting a garage for a profit. The garage and school are housed in a rather narrow building, just West of Broadway, in the same block with the Automobile Club of America, the school having the second floor only, while the garage occupies the balance of the four-story building, including the basement.

On the ground floor, as one enters from the street, there is the car entrance at the right, this being a 12-foot door, and at the left is the entrance to the office, the latter being in such close proximity to the former, that by the aid of a glass partition the checker may stay in the office at all times, and still keep track of the incoming and outgoing cars.

The position of the elevator will at once be noted. this being set squarely



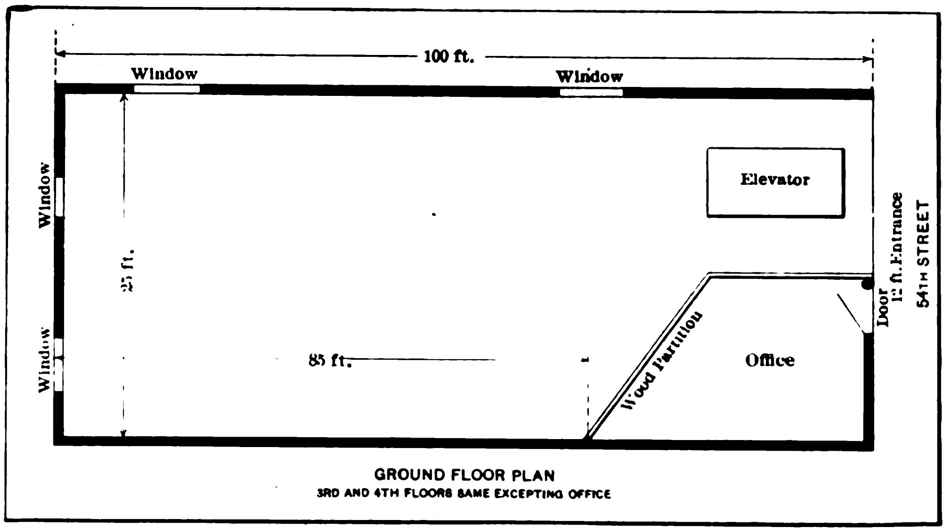
One upper floor of Stewart garage. cars in place

in the middle of the entrance for the cars. While some garage owners and keepers might object to this, in the main it is a position which is favored. If not actually followed in practice, it is at least advocated. In garage location and arrangement, the placing of the elevator arouses the most discussion.

The first floor is reserved for the cars upon which work is to be done, while the third floor carries the balance of the live storage, and the floor above it, the top one, other live and all of the dead storage. Another view shows the cars on the third floor, revealing the cleanliness and order, which is maintained there. The view is from the rear, facing the elevator at the front, where a car has just come up.

The building is of brick, opening on one side, the easterly, onto a blind court, while the rear end goes back nearly to the center of the block. This may not yield much light, but it has an advantageous side, in that the fire risk is lessened, which is well worth while to both garage keeper and owners of cars housed there.

Gasoline and oil are stored in the basement, the former being located underground, but so as to be available for drawing off on the ground floor, where the natural demand for it comes.



Floor plan showing arrangement with elevator at entrance

Among the Accessories

THE BROWN STEERING GEAR; AUBURN LABOR-SAVING TIRE PUMP; CAR BODY POLISH; PROTECTOR FOR THE TIRE

THE NEW BROWN STEERING GEAR

It is worthy of note that in the steering gear as here presented, in Figs. 1 and 2, ample provision is made for irreversibility, and the surfaces which are designed to take pressure are so liberally provided that the unit pressure is maintained at a low point under the most severe conditions of service. The type of gear is an unusual one, and it is being marketed by the Baldwin Chain & Manufacturing Company, of Worcester, Mass. Referring to the illustrations, it will be observed that the crank movement is obtained by the eccentric movement of a spider in combination with a crank arm on a spindle. When the steering wheel is rotated the spider is rotated also by means of a bevel gear and pinion, and the cheek of the crank spindle, being provided with a bearing face which engages in slots formed by two sectors, which fit in the eccentric cavity of the spider, imparts motion to the crank, which is duly transmitted to the steering arm. The wearing parts are profusely lubricated, and means for replenishing the lubricant are at hand.

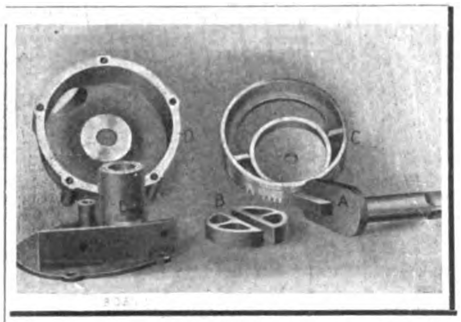


Fig. 1—Brown steering gear, showing the different component parts

LABOR-SAVING TIRE PUMP

This pump, shown in Fig. 3, is of the friction-drive type operated from the flywheel of the engine. One of its features is the method employed to insure positive contact under any pressure and with no more strain to the friction face than is actually required to carry the load. The pump body is hinged to a supporting arm and carries the friction wheel. It has two cylinders, the main or compressing cylinder, and the auxiliary cylinder, or contact cylinder. The auxiliary cylinder is used to hold the friction wheel in contact with the flywheel and has direct communication with the tire when hose is attached. Both cylinders are fitted with suitable pistons.

When connection is made with the tire the back pressure enters the contact cylinder, forcing its piston against the supporting arm. This pressure causes the pump body with the friction wheel to swing outward into contact with the flywheel. Detaching hose from the tire allows the pressure to escape from the contact cylinder and the friction wheel swings freely out of contact.

The contact cylinder is accurately proportioned so that only a small amount of pressure is required to put the pump into operation, and as the pressure increases the force of contact increases in the right proportion to preserve a contact under a varying pressure.

The piston employed is made in two parts, telescoping each other with an asbestos filler between them. The increasing air pressure on the piston forces the two parts together, expanding the asbestos filler against the walls of the cylinder, thereby sealing the joint against leaks, and yet by the flexibility of the asbestos filler the piston draws apart when the air pressure is removed, permitting the piston to move freely in the cylinder. The piston used in the compression cylinder is similar to engine pistons. It is fitted with two expansion metal rings having lapped joints, and, like the cylinders and pistons, they are ground to size. Lubrication is by grease forced through grease cups. The whole pump is made reversible and the friction wheel may be used on either side.

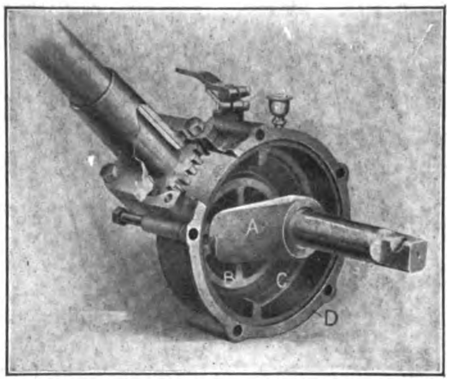


Fig. 2—View of Brown steering gear with one cover removed

With the pump sufficient rubber hose is furnished to reach all tires, also a reliable pressure gauge and necessary brass connections, including a coupling to be inserted in the hose just outside the body, permitting the uncoupling of the longer piece when not in use. All necessary fittings are furnished with the pump.

The pump is manufactured by the Auburn Auto Pump Company, 87 Church Street, Boston, Mass.

POLISH FOR CAR BODIES

In order to obviate the necessity of polishing a car daily a tarnish preventive, known as Stay Shiny, has been placed on the market by Fred A. Schmoeger, of Sterling, Ill. It is claimed by the makers' that a coating of this material will stay on the bright parts of the car for quite a long time without requiring renewal and that the coating is invisible and is non-injurious to metals of any description, also that heat and weather conditions have no eeffct on it. The liquid is applied with a brush supplied with the tin.

. PROTECTS THE SPARE TIRE

The Hopewell Tire Case is a continuous casing, which wraps about the spare tire, and is held in position by two endless spiral springs. The use of these spiral wound japanned piano wire springs eliminates all fastening devices. The inherent adjustability of these springs allows the case to fit all treads as well as new and worn tires. This construction prevents wrinkling, and gives an absolutely water-tight and perfect-fitting case. When not in use, case can be folded in a very small package. The tire case is sent enclosed in an enamel duck bag suitable for an inner tube bag. The case is made by Hopewell Brothers, Newton Mass., and it is being extensively adopted by the class of automobilists who are trying to economize cost without reducing the utility of their automobiles.

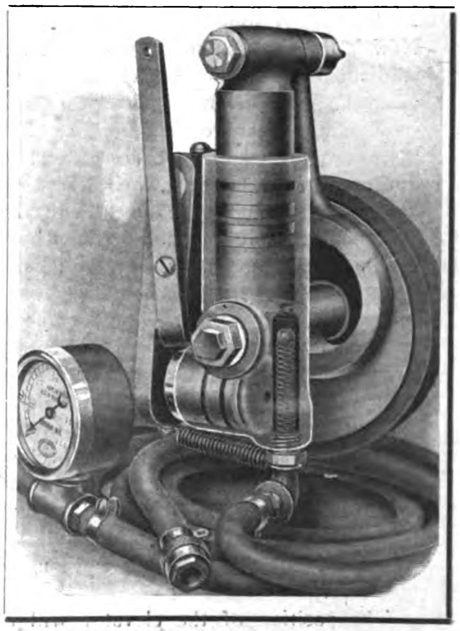


Fig. 3—The Ten Eyck tire pump. Its operation is by friction off the flywheel